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**OPPORTUNITIES** 



CSIC

# CSIC MOMENTUM PROGRAMME: DEVELOP YOUR DIGITAL TALENT



The "CSIC Momentum Programme: Develop Your Digital Talent" is part of Investment 4 of Component 19 of the <u>Recovery</u>, <u>Transformation</u>, and <u>Resilience Plan</u> (PRTR), which is organized through the <u>National Digital</u> <u>Skills Plan</u>. Momentum was created with the aim of promoting a new generation of professionals with **advanced digital skills** who can be retained in the Spanish science and innovation ecosystem through the **hiring and training** (240 ECTS) of research and technical personnel for 48 months.



Aware of the challenges and opportunities posed by the digital age, this programme is conceived as an engine of transformation whose main objective is to **attract, train and retain highly qualified talent** in strategic areas of Science and Technology, strengthening the capacity of CSIC and Spain for research, innovation, entrepreneurship and public-private collaboration, contributing to the social and economic progress of society.

The programme, **financed by** the <u>Secretariat of State for Digitization and</u> <u>Artificial Intelligence</u> – <u>Ministry for Digital Transformation and Public</u> <u>Service</u>, through <u>Red.es</u>, and with funds from PRTR, benefits greatly from the **strengths of CSIC**, including its multidisciplinary and interdisciplinary nature, collaboration with diverse stakeholders in the Science, Technology, and Innovation Sector (SECTI), international partnerships, expertise and training capabilities, and widespread <u>geographical presence</u>.















# TRAINING PLAN FOR MOMENTUM

The **Momentum Training Plan (MTP)**, the backbone of this programme, aims to train highly qualified personnel with **advanced digital skills** in the field of scientific and technical research.

This innovative approach to training, which takes advantage of the CSIC's experience and training capacity, ensures that participants, through the design of an **Individualized Training Plan (ITP)**, acquire theoretical and technical knowledge in digitalization, and develop essential skills to success in today's world of work.

Each beneficiary will have a personalized **Training Curriculum**, which must include their entire educational itinerary. This curriculum will include **Training Sheets** with specific information on activities, their ECTS and their impact.

The **Training Plan** will consist of a total of 240 ECTS spread over 48 months to ensure the candidate's academic and professional growth. Within these credits, 15 to 40 ECTS will be designated for the **Annual Report** (60-160 ECTS over four years) to document yearly progress and accomplishments. Between 20 and 60 ECTS will be set aside for **training placements** over the four-year period to provide practical experience. At least 20 ECTS, equivalent to 3 months of stays, must be completed over the contract period. Lastly, 60 to 180 ECTS will be dedicated to **digital skills training activities**, such as specialized courses, master's degrees, and summer schools, spanning the entire contract duration to ensure tailored comprehensive training. Optionally, up to 40 ECTS over the four years can be used for **additional complementary training**, including workshop and seminar attendance, among other activities.



The initiative is organized through **research projects** in the fields of **artificial intelligence, digitalization, and related technologies**. These projects will involve hiring **research and technical** staff with degrees in various areas of knowledge, under the modalities of **predoctoral, university graduate** and **postdoctoral** contracts.















# CANDIDATE SELECTION AND RECRUITMENT

C<u>SIC's Labour Exchange</u> will be the selection mechanism to access the jobs offered.

As a state agency, the CSIC selection and recruitment procedures respect the constitutional principles of **equality, merit and capacity** governing access to public employment, allowing the selection and recruitment of the most suitable candidates according to their training and experience.



Phases of the candidate selection and recruitment process

Predoctoral researchers contracts for this programme will be executed via:

• <u>CSIC's Labour Exchange</u> for technical staff, professional groups M3, M2, M1, and E2 of the single agreement, pre-doctoral and training contracts for professional practice. Applicants must create their "Request for integration into the predoctoral contracts Labour Exchange (2021)"

The **Technical personnel** (university Graduate FC1) and **Postdoctoral** (Doctor FC1 and Doctor FC2) contracts will be executed via:

 <u>CSIC's Labour Exchange</u> – Contracts Outside Agreement. Applicants must create their "Request for integration into the DOCTORS Out-of-Agreement Labour Exchange" or their "Request for integration into the Out-of-Agreement Labour Exchange for UNIVERSITY GRADUATES", depending on the type of contract.











## **EMPLOYMENT OPPORTUNITIES**

The CSIC is one of the institutions recognized by the European Commission with the "**HR Excellence in Research**" seal, implementing policies to ensure a work environment that allows all staff to fully develop their capabilities. CSIC promotes gender equality, diversity, and inclusion, fosters a positive work atmosphere, cares for the mental health of its employees, offers social benefits, facilitates work-life balance, flexible working conditions, and supports continuous training as well as openness and mobility programmes.

Below are the various **positions offered** within the **Momentum programme**. Those interested in the available opportunities can contact the Principal Investigators (PI) directly for additional information.



For any inquiries, please contact **momentum@csic.es**.















# **PREDOCTORAL POSITIONS**



# **52 Contracts**

# 11 CCAA

7 PTI / HUBS

# **45 CENTRES**

# **21 CITIES**

Andalucía Aragón Asturias Cantabria Castilla y León Cataluña Islas Baleares La Rioja Madrid Murcia Comunidad Valenciana













Plan de Recuperación, Transformación y Resiliencia



**Technological and scientific fields:** Artificial intelligence - Image analysis and computer vision - Edge Computing

Location: Granada, Andalucía, IAA-CSIC, https://www.iaa.csic.es/

Research Group/PI: VHEGA, Rubén López Coto, https://vhega.iaa.es/

#### PROJECT SUMMARY

The project aims to apply advanced deep learning (DL) techniques to data from Imaging Atmospheric Cherenkov Telescopes (IACTs), particularly focusing on the Large-Sized Telescopes (LSTs) in La Palma. Using Convolutional Neural Networks (CNNs), Graph Neural Networks (GNNs), and Transformers, the project seeks to enhance data analysis, optimizing event separation and achieving precise energy and direction reconstruction. A key innovation is combining DL with edge computing, processing data at the source to reduce latency, conserve bandwidth, and improve real-time analysis. This approach is especially beneficial for applications like autonomous vehicles and smart cities, as well as for the efficient operation of LSTs. The project targets very high-energy (VHE) gamma-ray astronomy, exploring high-energy radiation from cosmic events like black holes and stellar explosions. The LSTs detect Cherenkov light from these energetic particles, and improved data analysis via DL will significantly enhance their performance. Initially focusing on LST-1, a prototype for the Cherenkov Telescope Array Observatory (CTAO), the project aims to scale DL analysis for multiple telescopes, establishing it as a standard method. A comprehensive CNN-based pipeline will be optimized with real data, aiding in the detection and analysis of phenomena like pulsars, which could answer key questions about particle acceleration and cosmic rays. The project also emphasizes enhancing digital skills by training researchers and students in advanced machine learning and data analysis techniques, boosting their employability. In summary, the project promises technological advancements in astrophysical data analysis and improvement in digital skills, positioning CSIC as a leader in DL and edge computing applications in VHE gamma-ray astronomy.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualification(s) required: Graduate in Physics, Mathematics or similar.
- Proficiency in Spanish and English
- Knowledge of very high-energy gamma-ray analysis, especially in the study of pulsars using Cherenkov telescopes.

#### Merits to be considered:

- Knowledge of Python
- Experience with libraries such as PyTorch and TensorFlow

#### WHAT IS OFFERED

Study of pulsars using the latest image analysis techniques through the analysis of very high energy gamma rays. Short training stays at leading centers for very high energy gamma rays. Attendance at machine learning courses, software schools, and in-person meetings.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *Bioinformatics applied to the study of the sunflower-broomrape interaction* 

#### Technological and scientific fields: Computational Biology (Bioinformatics)

**Location:** Córdoba, Andalucía, Instituto de Agricultura Sostenible (IAS-CSIC) (<u>https://www.ias.csic.es/</u>)

Research Group/PI: Mejora genética de cultivos oleaginosos anuales / Begoña Pérez Vich

#### PROJECT SUMMARY

The project aims to address the resolution of biological and agronomic problems through the use of bioinformatics and high-performance computing. It is designed to give a new bioinformatic approach to the ongoing studies of the research group on the genetic characterization of avirulence genes in sunflower broomrape, a parasitic plant that constitutes the main biotic threat to sunflower cultivation. The primary objective is to study populations of broomrape from different races present in Spain using bioinformatic approaches with massive genomic and transcriptomic data to understand the mechanisms the parasite uses to overcome the resistance present in sunflowers and, consequently, to establish novel control strategies based on molecular targets. The project will be carried out within a pioneering research group at the global level in genetic studies of sunflower broomrape and in the development of molecular and genomic tools for the species, such as the sequencing and annotation of its genome.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Required academic qualifications: (i) Bachelor's degree or equivalent, preferably in Biology, Biotechnology, Genetics, or Biochemistry, and (ii) University Master's degree in Bioinformatics, Agri-food, Biotechnology, or equivalent.

- Proficiency in Spanish and English.

#### Merits to be considered:

**Knowledge in:** (i) Linux operating system, (ii) programming languages, such as Python and/or Perl, and (iii) bioinformatics software.

#### WHAT IS OFFERED

Integration into a world-leading research group in the area of research where the project is being conducted, as well as solid training in bioinformatic and molecular analysis and its application in biotechnology research. This training is supported by a comprehensive Training Plan consisting of (i) 100 ECTs corresponding to research work, (ii) 40 ECTs from training stays (two stays at LIPME, CNRS/INRAE, Toulouse, France), (iii) 90 ECTs of training in digital competencies (Diploma of Specialization in Bioinformatic Analysis, UPO Sevilla, and Master's in Advanced Bioinformatic Analysis, UPO Sevilla, online), and (iv) 24 ECTs of complementary training (seminars, conferences).

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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# Project: Analysis of biological images using AI to understand brain function and dysfunction (brAIn)

#### Technological and scientific fields: Image analysis and computer vision

Location: Seville, Andalucía, Instituto de Biomedicina de Sevilla (IBiS) <u>https://www.ibis-sevilla.es/es/</u>

**Research Group/PI:** Mechanisms of neuronal maintenance / Alberto Pascual Bravo. <u>https://www.ibis-sevilla.es/en/research/neurosciences/mechanisms-of-neuronal-maintenance/</u>

#### PROJECT SUMMARY

The analysis of morphological and topological changes in the mammal brain during disease is still a challenge. Previous approaches to capture the organization of this organ have been mostly limited to the analysis of 2D images and/or small volumes. However, the brain is a very complex 3D structure characterized by high connectivity between brain areas. To understand the brain organization in physiologic conditions and its disorganization during pathology, we need to develop new analysis techniques that will allow us to exploit the huge amount of data that is being recollected by the scientific community. In particular, the use of the Artificial intelligence (AI) will be crucial. Changes in brain organization are intermingled with molecular alterations within the cells, therefore, to properly understand the impact of pathology on brain organization and find potential strategies for interventions, it is essential to integrate the vast information produced by -omics with the intricated morphology of the brain. In this sense, our institute (IBiS) has made a strong effort to implement single-cell technologies, receiving support to acquire single-cell transcriptomics and proteomics technologies and, more recently, spatial transcriptomics. The completion of brAIn will set up a new toolbox of computational strategies to analyze and exploit to its maximal level those new technologies. Of course, all IBiS researchers will benefit from these new pipelines, which could be applied to other organs and pathologies.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

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- Degree in Computer Engineering, Health Engineering, Statistics, or similar.
- Programming skills: R, Python or MATLAB
- Languages: spanish and english (fluid speaking or B2).

#### Merits to be considered:

- Knowledge/academic training in theoretical foundations of life sciences.
- Experience in transcriptomic/genomic data analysis.
- Experience in computational analysis of microscopy images.

#### WHAT IS OFFERED

The PIs have recently contributed in the fields of AD-omics (Alvarez-Vergara et al., 2021, Nat. Commun.; March-Diaz et al., 2021, Nat. Aging; Mora-Romero et al., 2024, Nat. Metabolism) and image analysis of complex 3D structures (Gomez-Galvez et al., 2018, Nat. Commun.) and in the development of software for image analysis and biomedical applications (CartoCell: Andrés-San Román et al., 2023, Cell Reports Methods; NDICIA: Saez et al., 2013, BMC Medicine). Therefore, an international impact of brAIn is expected. The predoctoral researcher will be trained in the acquisition, interpretation and analysis of images of different types, including but not limited to confocal planes, clarified brain volumes and massive data inputs from -omics, in situ, or spatial transcriptomics. Image analysis methods will be developed by "artificial intelligence" (AI) and computer vision to capture the maximum complexity of the data and be able to make comparisons and predictions about function and dysfunction.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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### Project: Strengthening SILICE: advanced indicators and new functionalities

#### Technological and scientific fields: Data analysis and integration

Location: Córdoba, Andalusia, Institute for Advanced Social Studies (IESA), www.iesa.csic.es

**Research Group/PI:** Innovation sociology, José Luis Ortega, <u>www.uco.es/uco-csic-innovacion/en/home-en/</u>

#### PROJECT SUMMARY

This project is framed on the need of developing open applications that support Open Science policies (National Open Science Strategy, Barcelona Declaration). SILICE (silice.csic.es) (Sistema de Información sobre Literatura Científica Española) aims to describe the Spanish research production (publications, authors, organizations) exclusively from open sources (ORCID, Crossref, OpenAlex, ROR). In this way, the main objective of this project is to progress SILICE web application developing scholarly profiles by users, adding new and rigorous quality indicators about research activity, a monitoring dashboard and a sign in service. To do this, the project foresees a massive data download form the selected sources and the processing of these data (MySQL, OpenRefine, R Studio) addressed to design and built research indicators.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Bachelor's degree Knowledge in English language (writing, reading)

#### Merits to be considered:

Academic training in Information Science or Sociology. Any research experience is welcome (articles, book chapters, conferences, projects, etc.). Knowledge on Data Science (Python, R, OpenRefine, etc.). Knowledge on Statistics

#### WHAT IS OFFERED

This position provides a only opportunity to develop a scientific career in one of the leading CSIC research groups working in the study of research production, sociology of science and bibliometrics. As novel researchers, he/she would carried out a PhD dissertation about the principal research lines of the group such as bibliometric indicators, correction of science through research publications, and editorial control of the publishing system. In addition, he/she would collaborate in other studies performed by the group, taking part in articles, projects and attending conferences. A key element is the training, offering:

- Master's degree (60 ETC) in data science.
- Three months research stay in a national or international research centre.
- Attending CSIC internal training courses.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Tools to evaluate potential impacts of drought on aquifers and associated wetlands as support for adaptation in a context of climate change

Technological and scientific fields: Artificial Intelligence, Remote Sensing, Digital Twins, Web Tools and Services, Climate Change

Location: Granada, Andalucía (Spain), IGME-CSIC, https://www.igme.es/

**Research Group/PI:** Research group on water resources, associated ecosystems and climate and global change (REACT), PI: David Pulido Velázquez, https://www.igme.es/

#### **PROJECT SUMMARY**

This project aims to contribute to improving the management and visibility of groundwater, which is a strategic resource to increase the resilience of water systems to droughts. Its purpose is the design of tools and web services to evaluate potential impacts of droughts on groundwater and associated wetlands as support for decision-making on adaptation in the current context of Climate Change. It is proposed to develop and integrate novel artificial intelligence approaches and classic digital twins to advance the prediction/estimation of droughts, incorporating field information and remote sensing (to monitor wetlands). Significant scientific production is expected, with numerous high-impact SCI publications.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The candidate has to fulfil the requirements to be accepted in the doctoral program of earth Science

#### Merits to be considered:

Knowledge and experience in hydrology and the application of Artificial Intelligence techniques will be valued.

#### WHAT IS OFFERED

The project includes financing training in digital skills of 120 ECTS. In the first year, the hire will begin the Master's Degree in Data Science and Computer Engineering at the University of Granada (UGR), which has 60 ECTS credits (20 the first year and 40 the second). The master's degree offers training in a research and professional profile that is currently in high demand in the field of Information and Communications Technologies. Three training stays abroad are proposed, one of 3 months (20 ECTS) and two of 1 month (7 ECTS each), which represents a total of 34 ECTS, so that the hired person receives training in the following technological fields:

1) Artificial intelligence and remote sensing. Stay (3 months) at "The Geological Survey of Denmark and Greenland" (GEUS).

2) Web tools and services. They are important for the proposal and for the training of the person hired, so two 1-month stays are proposed in the third year of the contract in two leading geological services in their use: "British Geological Survey" (BGS) and "Bureau de Recherches Géologiques et Minières" (BRGM), with which we collaborate in the GSEU project (Horizon Europe, 2022-2027).

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *Bioinformatics training for genomics and breeding data analysis, data integration and software development.* 

**Technological and scientific fields:** Digital tools for agriculture, Computational biology, Data analysis and integration, Artificial Intelligence

Location: Málaga, Adalucía. IHSM. https://www.ihsm.uma-csic.es/

**Research Group/PI:** Breeding and developmental biology of subtropical fruit. Noé Fernández Pozo. https://www.ihsm.uma-csic.es/grupos/13

#### **PROJECT SUMMARY**

Recent advancements in omics technologies and the availability for the exploitation of thousands of genotypes hold unique opportunities to accelerate precision crop breeding. However, a major bottleneck lies in integrating those data using the appropriate software tools, artificial intelligence, systems modelling, and bioinformatics. IHSM research lines are focused in subtropical and Mediterranean plant species such as tomato, strawberry, mango, avocado, and cherimoya. Using the unique germplasm collections available at the IHSM, the institute is generating a large amount of omics data. The bioinformatic team of the institute has contributed several genomic portals of different crop species that are becoming reference tools at the international level. The aim of this proposal is to enhance the value of the data available to the center by generating a team of experts in integrative biology, incorporating Artificial intelligence as the foundations for new research lines in our institute. We propose a program to train a team of experts in Plant and Computer science, capable to (1) analyze omics data of the species studied in our institute and integrate them in our platforms; (2) implement and develop new bioinformatics tools in our platforms to manage pangenomics and multi-omics data; (3) apply computational biology algorithms and AI to study the genetic variations of thousands of accessions and their association with traits agricultural interest, and (4) apply AI to study emerging knowledge in multi-omics data.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Grade related to life science. Proficiency in Spanish and English. Basic bioinformatics skills. Knowledge about biology and genomics.

#### Merits to be considered:

Experience with AI, programming languages, and data analysis. Knowledge about plant science.

#### WHAT IS OFFERED

We offer a four years contract with intensive training in bioinformatics and artificial inteligence aiming to obtain a PhD with expertise in bioinformatics and artificial inteligence applied to plant science. It will include international stays and collaborations with researchers worldwide in countries such as USA or Australia. The candidate will learn to develop bioinformatics tools and will work with subtropical and Mediterranean species, for wich we maintain an unique germplam collection of subtropical species in Europe.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Development of AI Techniques for the Design, Optimization, and Autonomous Operation of RF-to-Digital Interfaces in IoT Devices

**Technological and scientific fields:** Artificial Intelligence, Advanced Data Analytics/EdgeComputing, Sensoring

**Location:** Sevilla, Andalucía, Instituto de Microelectrónica de Sevilla, <u>http://www.imse-</u><u>cnm.csic.es</u>

Research Group/PI: Digital and Mixed-Signal Design /Gustavo Liñán Cembrano

#### **PROJECT SUMMARY**

The Project aims to develop and apply new Artificial Intelligence techniques in the Design and Operation of RF-to-Digital Interfaces for Software-Defined Radio (SDR) transceivers intended for the Internet of Things. The goal is to employ AI to analyze the radio spectrum in the environment of the IoT device to identify the optimal frequency band for operation. Additionally, the microelectronic design of the system will also be AI-assisted; starting from high-level specs, a trained AI will provide a valid high-level block design, moreover, from these block-level specs, valid electrical designs will also be obtained by specifically trained and optimized AIs. This project is fully oriented towards the completion of the candidate's doctoral thesis and encompasses a detailed, comprehensive, and ambitious training program in both microelectronics design and AI, including two 3-months residencies at prestigious institutions.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Official Univ. Bachelor's Degree in (and/or): Physics, Mathematics, Dual Degree Physics-Mathematics, Computer Science, Electronic Engineering, Robotics and Mechatronics Engineering, Telecommunications Engineering.

Languages: Fluency in Spanish and/or English. (Level B2 or Higher)

#### Merits to be considered:

Official University Master's Degree in (and/or): Microelectronics, Telecommunications Engineering, Computer Science, Microelectronics: Design and Test of Micro/Nano scale Systems, Artificial Intelligence.

#### WHAT IS OFFERED

To develop a doctoral thesis in a field of absolute prevalence and great current projection. The candidate will receive high-level training in areas with significant professional prospects: artificial intelligence and microelectronics design. The candidate will join a consolidated team with ongoing projects in complementary topics, enabling him/she to successfully tackle the challenges posed. Additionally, two 3-months stays at prestigious institutions will be carried out, offering the opportunity to start building his/her future professional network.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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### Position Offered: PREDOCTORAL RESEARCHER Project: Development of tools and algorithms for the processing and integration of large-scale spatial and single-cell transcriptomics data, utilizing highperformance computing and artificial intelligence

**Technological and scientific fields:** Massive data and information processing technologies, high-performance computing, medical imaging, data analysis and integration, artificial intelligence, computational biology, image analysis and computer vision, edge computing

**Location:** Granada, Andalusia, Institute of Parasitology and Biomedicine "López-Neyra". <u>https://www.ipb.csic.es</u>

**Research Group/PI:** Genetic Basis of Autoimmune Diseases. Javier Martín, <u>https://www.ipb.csic.es/departamentos/javiermartin.html</u>

#### PROJECT SUMMARY

Bioinformatics plays a fundamental role by closely aligning with the most recent technological advances, with analyses and results relying on advanced tools and algorithms. Bioinformatics not only facilitates the management of these data but also drives innovation in personalized medicine and fosters interdisciplinary collaboration, a key piece in the advancement of science. This project aims to develop new methods and algorithms capable of analyzing and integrating a vast volume of biomedical data related to single-cell transcriptomic analysis and the latest spatial transcriptomics. The project encompasses numerous themes, such as: mass data processing technology, FAIR principles (Findable, Accessible, Interoperable, and Reusable), high-performance computing, analysis of medical images using artificial intelligence, and integration of multidimensional data.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The following requirements must be met:

- Degree in Biochemistry or Molecular Biology or Biomedicine or Biotechnology or Computer Engineering.
- Official Master's Degree for the completion of a doctoral thesis
- Fluency in Spanish and English (spoken and written)

#### Merits to be considered:

The following essential requirements must be met:

- Master's degree in Bioinformatics or Biostatistics or Omics Data Analysis
- Proficiency in applications of Artificial Intelligence in Health/Biomedicine
- Knowledge of descriptive statistics-based data analysis techniques
- Experience in programming in R/Python and proficiency in Linux usage

• Certificate C1 of the Common European Framework of Reference for Languages (CEFR)

#### WHAT IS OFFERED

This project will facilitate the analysis of large volumes of data from an innovative platform for biomedical research, allowing for the addressing of complex biological questions and the development of new therapeutic approaches. Additionally, it will promote the training of researchers in advanced bioinformatics and data analysis techniques, ensuring that the CSIC remains at the forefront of research. **It includes a training plan of 240 ECTS credits** (over the 4 years of the contract), encompassing the completion of a master's degree, various courses, and two research stays.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Digital Innovation in Nanomaterial Characterization: Development of Computational Methods for Characterization and Analysis by Transmission Electron Microscopy.

Technological and scientific fields: Artificial Intelligence, Massive Data and Information Processing Technologies, Nanotechnology, New Materials, Image Analysis, and Computer Vision.

Location: Zaragoza, Aragón, Instituto de Nanociencia y Materiales (INMA), https://inma.unizarcsic.es/

Research Group/PI: Nanofabrication and Advanced Microscopies (NANOMIDAS) / Álvaro Mayoral García

#### **PROJECT SUMMARY**

Transmission Electron Microscopy (TEM) is capable of revealing unique information that is not accessible by other means: local information, direct visualization of the material, or chemical mapping at the atomic scale. TEM is a fundamental tool for the development of the new generation of materials in fields such as energy, environment, and health. This project will focus on the implementation of 4D-STEM, the development of new image reconstruction methods using ptychographic techniques, as well as the implementation of an image analysis protocol that facilitates the detection of structural defects. The materials subject to study will be, on one hand, nanoporous solids widely used as heterogeneous catalysts and, on the other hand, titanium oxide used as a photocatalyst, both with strong industrial applications.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Bachelor's degree in Chemical Sciences, Physical Sciences, Materials Science. •
- Engineering in Computer Science, Engineering in Telecommunications. •
- Master's degree.

#### Merits to be considered:

- Knowledge in Transmission Electron Microscopy.
- Knowledge in programming (Python and other programming languages).

#### WHAT IS OFFERED

Predoctoral contract to pursue a PhD at INMA, a center with the Severo Ochoa quality seal, which also has the advantage of being a joint center between CSIC and the University of Zaragoza. Within the project, there will be access to the most advanced characterization techniques in electron microscopy, with access to Spain's unique scientific and technical facilities. The project has a strong international component, so stays and/or participation in conferences are expected. Additionally, stays will be carried out at the University of Alcalá de Henares. The training program includes a total of approximately 250 ECTS, which includes the preparation of an annual report, stays at other centers (University of Alcalá and ShanghaiTech University, China), and training courses in computational techniques.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Saharan dust during the Holocene through advanced observation technologies applied in sedimentary records and prediction of future scenarios using climatology in digital platforms

**Technological and scientific fields:** Advanced Techniques in Earth and Ocean Observation; Global Change and Biodiversity

Location: Zaragoza, Aragón; Instituto Pirenaico de Ecología; https://www.ipe.csic.es

**Research Group/PI:** Paleoambientes Cuaternarios y Cambio Global; Jorge Pey Betrán (IPE-CSIC) y Pedro Salvador Martínez (CIEMAT); <u>https://www.ipe.csic.es/paleoambientes-cuaternarios-y-cambio-global</u>

#### **PROJECT SUMMARY**

The hired person will have the opportunity to use new observational techniques in geology to obtain large datasets of compositional, geochemical, and mineralogical information from sedimentary records. Through the application of advanced statistical techniques, these will culminate in the reconstruction of calima events throughout the Holocene. Additionally, they will develop a digital application to estimate the probability of calima events across different regions of Spain. The paleohistorical reconstruction of Saharan dust waves and the implementation of a digital platform to execute the described methodology will provide the scientific community, various administrations, and society at large with scientific evidence regarding the evolution of the phenomenon over the last millennia. This will also serve as a fundamental tool for air quality managers and public health authorities.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Bachelor's Degree in Environmental Sciences, Geology, Chemistry, or other equivalent specializations; Master's Degree; English and Spanish as working languages, at least B2 level.

#### Merits to be considered:

Knowledge in GIS, geochemistry, and mineralogy; Knowledge in environmental science, particularly in environmental legislation, air quality regulations, and applied experimental and analytical procedures and techniques; Knowledge in meteorology and climatology.

#### WHAT IS OFFERED

-Optimize a novel methodology to determine Saharan dust microlayers stored in complex sedimentary records and quantify their spatial-temporal contribution and variability during the Holocene in the Iberian Peninsula-Balearic Islands-Canary Islands sector.

-Integrate Saharan dust transport scenarios occurring between 1948 and 2020 into climate projections for the coming decades to infer the most likely trend.

-Develop a digital platform to enhance the predictability of calima episodes and thereby strengthen early warning systems.

-Training periods in Spain and abroad throughout the project, in both research centers and industry (60 ECTS); Training program in digital skills and advanced statistics (60 ECTS); Attendance at national and especially international conferences; and training in cross-cutting competencies (20 ECTS).

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: jorge.pey@ipe.csic.es Phone: (+34) 976369393









Project: Automated Discovery of Biocatalysts through Artificial Intelligence for the Production of Compounds of Pharmaceutical Interest

**Technological and scientific fields:** Artificial Intelligence, Biotech, Computational Biology, Data Analysis and Integration, New Drug Design

Location: Zaragoza, Aragón, ISQCH, http://isqch.unizar-csic.es/ISQCHportal

Research Group/PI: The Alegre Group, Juan V. Alegre Requena, <u>https://thealegregroup.com</u>

#### PROJECT SUMMARY

This project will advance basic knowledge in digital biocatalysis, as well as promote the use of artificial intelligence protocols to design new biocatalysts and synthesize high-value chemicals such as pharmaceuticals. The ability to design biocatalysts through computational approaches not only increases the efficiency of their discovery, but also opens the door to performing complex chemical transformations that were previously considered unattainable. This advanced methodology promises to offer greener and more economical solutions for the synthesis of chemical products that are attractive to the chemical and pharmaceutical industries.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Licenciate or Graduate and MSc in Chemistry
- Proficiency in English

#### Merits to be considered:

- Knowledge of chemical machine learning and computational chemistry
- Experience with Python
- Proficiency in Gaussian

#### WHAT IS OFFERED

- 160 ECTS including bibliographic work, carrying out the proposed research, writing articles, and conference presentations
- 60 ECTS in research stays at the University of Girona and international institutions
- 120 ECTS in learning to code, familiarizing with computational chemistry programs, conducting data analysis and interpretation, and developing predictive artificial intelligence models, among other digital competencies
- 40 ECTS in scientific dissemination and supervision of junior group members

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €. Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT Email: jv.alegre@csic.es

Phone: 976761296











# Position Offered: PREDOCTORAL RESEARCHER Project: Consolidation of Climate Services in Spain: Utilizing AI and Big Data to Enhance Preparedness for Extreme Events

Technological and scientific fields: Service Platforms for Climate Services, Artificial Intelligence, Massive Data and Information Processing Technologies, High-Performance Computing, Cloud Computing, Advanced Data Analytics/Edge Computing

Location: Zaragoza, Aragón, Instituto Pirenaico de Ecología, https://www.ipe.csic.es

**Research Group/PI:** Environmental Hydrology and Climate-Human Activity Interactions, Sergio Vicente Serrano

#### **PROJECT SUMMARY**

The research project aims to improve the management of climate variability and extreme weather events in Spain in the context of climate change. It utilizes advanced technologies such as Big Data, artificial intelligence, and cloud computing, combined with knowledge in meteorology and climatology, to develop efficient climate services that meet specific sectoral needs and enhance socioeconomic and environmental management. Advances in these technologies allow the creation of massive databases, improvement in the quality of climate predictions and projections, and the development of effective early warning systems, reducing risks and vulnerabilities. The project focuses on the standardization and customization of climate services, supporting climate change adaptation and mitigation, with the goal of positioning Spain at the forefront in the use of these technologies for sustainable and resilient development.

#### **PROFESSIONAL PROFILE**

Minimum requirements:

Academic degrees required:

- Graduate in Computing engineering
- Graduate in geography and environment •
- Graduate in mathematics
- Graduate in economy

#### Merits to be considered:

Knowledge on programming languages

#### WHAT IS OFFERED

The project offers research and training activities in innovative aspects related to climate services and climate variability and change processes. The research project is structured in several phases over four years. The core of the thesis will be the training of predictive models on specific phenomena such as droughts and heat waves, developing continuous monitoring and early warning systems based on predictive models, with the implementation of algorithms that analyze data in real-time. The pre-doctoral contract will include various training stays and courses to develop skills in climate analysis techniques, programming in R, and agrometeorological indicators, totalling 60 ECTS in stays. During the second year, the researcher will complete a 50 ECTS stay at national or international research centers and other 5 ECTS stays each to complement specific research topics. Additionally, the researcher will undertake a 60 ECTS Master's in Research in Artificial Intelligence at UNED, to integrate spatial databases and artificial intelligence techniques into their doctoral thesis project. Complementarily, the researcher will take courses from the CSIC Training Plan, focusing on artificial intelligence, programming languages, and supercomputing, accumulating an additional 24 ECTS.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: svicen@ipe.csic.es Phone: +34876243764













### Position Offered: PREDOCTORAL RESEARCHER Project: Manufacturing of optofluidic microreactors by 3D printing for water decontamination

Technological and scientific fields: 3D printing and additive manufaturing.

Location: Oviedo, Asturias, Instituto de Ciencia y Tecnología del Carbono (INCAR), www.incar.csic.es

**Research Group/PI:** Functional Porous Materials Group, Gregorio Marbán Calzón.

#### **PROJECT SUMMARY**

The project focuses on the design, manufacture and use of optofludic catalytic microreactors active in the photodegradation of organic compounds in wastewater. To do this, computer-aided design and 3D printing will be used with the aim of manufacturing microreactors with unique shapes, whose flow dynamics will be analyzed using the most advanced digital applications. Our group has proven experience and all the necessary means to test these reactors in the photodegradation of different aqueous contaminants.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree in Physics, Chemistry, Mathematics, Chemical Engineering, Industrial Engineering or equivalent.
- Advanced level on reading and writing English. •
- Solid knowledge bases on computer programming.
- User-level learning ability of CAD geometric design programming applications (e.g. Autocad) and fluid dynamic analysis (e.g. Ansys Fluent).

#### Merits to be considered:

Official Master's Degree on a topic close to that studied in the project. Mastery of tools for computer-aided geometric design (e.g. Autocad) and fluid dynamic analysis (e.g. Ansys Fluent). Solid mathematical management. Knowledge of Chemical Engineering. Multidisciplinary work capacity.

#### WHAT IS OFFERED

Completion of a PhD Thesis in a multidisciplinary work that ranges from computer-aided design of microreactors to their use at lab scale in photocatalytic reactions of environmental interest. Teamwork, in a relaxed but efficient environment, in which the hired person will not only learn the techniques that will lead to the fulfilment of the proposed objectives, but will also actively participate in the generation of ideas, which will be discussed at the same level as those of the responsible researchers. The selected person will acquire exhaustive knowledge about the use of the extensive equipment in our laboratory, as well as all the characterization techniques available at the institute. The doctoral student will see his or her curricular background increased during the four years of the contract by completing Official Master's Degrees or specialization courses in accordance with the project, participating as an author in articles published in international journals with a high impact index, attending national conferences and filing potential patents, etc. The hired person will also benefit from training stays (maximum of three months each) in leading technological (Idonial) or scientific centers (University of Oviedo).

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: greca@incar.csic.es Phone: +34 985 119 090 (Ext.: 436831 - 436856)











Project: *MarIA - Artificial Intelligence for innovation of methodologies in Marine Conservation* 

**Technological and scientific fields:** Marine Protected Areas, Deep-learning for underwater image analysis, benthic ecology of deep seabeds

Location: Santander, Cantabria, Centro Oceanográfico de Santander (COST, IEO, CSIC), <u>https://www.ieo.es/es/</u>

Research Group/PI: ECOMARG, Elena Prado, <u>www.ecomarg.com</u>

#### **PROJECT SUMMARY**

This proposal aims to advance the development of innovative methodologies for the management and conservation of the marine environment through the application of AI techniques, mainly deep learning for underwater images and optimization algorithms and analysis of environmental data. The project is especially focused on biodiversity conservation, protected spaces, and benthic habitats.

#### PROFESSIONAL PROFILE

#### Minimum requirements:

- Graduate in Biology or in Marine Sciences
- Master in the field of Marine Biology
- English B2
- 6 months of professional experience related to programming algorithms for marine image analysis

#### Merits to be considered:

- Python programming knowledge
- Knowledge in Geographic Information Systems
- Experience in developing Deep-learning models applied to underwater images
- Publications, attendance at Congresses, participation in R&D projects

#### WHAT IS OFFERED

Integration into the ECOMARG research group and the possibility of pursuing a PhD related to the objectives of the contract: Develop methodologies based on image analysis techniques and environmental data for the management and conservation of the marine environment. Applying Deep Learning techniques and optimization algorithms for the analysis of marine environmental data to automate the descriptive and quantitative characterization of different marine ecosystems from data obtained during oceanographic research and evaluation campaigns. Associated training plan having the possibility of taking courses related to the object of the contract.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: elena.prado@ieo.csic.es Phone: +34 942 29 17 16











Project: *IBGM bioinformatics and genomics unit for multiomic analysis and the development of predictive algorithms and computational biology in cancer, prevalent diseases and aging* 

Technological and scientific fields: Biomedicine, Genomics, Computational Biology

**Location:** Valladolid, Castilla y León, Instituto de Biomedicina y Genética Molecular (IBGM) <u>http://www.ibgm.med.uva.es/</u>

Research Group/PI: Pathophysiology of Intracellular calcium @IBGM / PI Carlos Villalobos

#### **PROJECT SUMMARY**

The project consists of the implementation of a bioinformatics and genomics unit or service at the Institute of Biomedicine and Molecular Genetics of Valladolid (IBGM), a joint center of the University of Valladolid and the CSIC. The predoctoral researcher will carry out training stays at the Artificial Intelligence Center of the University of Valladolid and a predoctoral stay abroad to be determined. The doctoral thesis will be directed by the principal investigators and the postdoctoral researcher hired in charge of the same project on a topic to be determined related to cancer genomics and transcriptomics.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

• Master in Bioinformatics and Computational Biology or Similar

#### Merits to be considered:

- End of Master Thesis within the field of Bioinformatics
- English knowledge
- Grade in Biology or Similar

#### WHAT IS OFFERED

The predoctoral researcher will enroll in the doctoral program in Biomedical Research of the University of Valladolid and will receive intramural training from the doctoral school and the Artificial Intelligence Center of the University of Valladolid as well as external training stays including a 3-month stay in a foreign center. The predoctoral researcher will have the opportunity to develop a doctoral thesis work in the field of transcriptomics and cancer genomics and develop scientific collaborations with other IBGM research groups involved in the study of hereditary cancer genomics, Computational Biology and massive analysis of biomedical data.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: carlos.villalobos@uva.es Phone: 983184821











Project: Artificial Intelligence in Prediction Policy Problems: New Frontiers in Forecasting, Causal Inference and Ethics

**Technological and scientific fields:** Economic Analysis, Data Science , Statistical Methods Computational Economics

Location: Bellaterra, Catalonia, Institute for Economic Analyisis (IAE), https://www.iae.csic.es/

Research Group/PI: Economic Analysis, Hannes Mueller, https://www.iae.csic.es/

#### PROJECT SUMMARY

The project aims to advance the understanding of prediction policy problems. This research will explore the potential of AI-driven methods for dual systems of forecasting and causal inference while addressing ethical considerations in policy decisions. The candidate will utilize state-of-the-art data science tools and statistical methods to develop innovative dual models that can predict outcomes while considering forecasting problems simultaneously. The research will be conducted in a dynamic and interdisciplinary environment at the Institute for Economic Analysis, fostering collaboration with leading experts in economics and AI. This project promises significant contributions to both theoretical advancements and practical applications in the realm of policy making.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualification: Graduate degree in Economics, Data Science, Statistics, or a related field.
- Proficiency in English

#### Merits to be considered:

- Knowledge of econometrics, economic modeling and statistical analysis.
- Experience with data science tools and programming languages such as R, Python, or similar.
- Previous research experience in prediction policy problems.
- Familiarity with advanced computational methods in economic analysis and data science

#### WHAT IS OFFERED

- Opportunity to work with a leading research team in economic analysis.
- Use of innovative technologies and methodologies in data science and economics.
- Collaboration with other research groups and entities.
- Interdisciplinary research environment.
- Comprehensive training plan, including:
  - PhD courses (de 30 a 120 ECTS)
  - Complementary courses in programming languages, writing, presentation skills, and dissemination (10-30 ECTS)
  - Summer and winter schools in Data Science (60-100 ECTS)
  - Training placements at other institutions (total of 6 months = 30 ECTS)

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: hannes.mueller@iae.csic.es Phone: +34 935 929 780









Project: Application of digital techniques to establish cellular response profiles that determine the severity of cardiac arrhythmias and help personalize treatment

**Technological and scientific fields:** Biomedicine, Cell physiology, Artificial intelligence, Massive data processing, Advanced image analysis

Location: Barcelona, Catalunya, IIBB-CSIC, https://www.iibb.csic.es/es

**Research Group/PI:** Cardiac Rhythm and Contraction Group, Leif Hove-Madsen, <u>https://www.iibb.csic.es/es/research/1365</u>

#### PROJECT SUMMARY

The aim of this PhD project is to determine the relationship between the response of the heart and isolated cardiomyocytes from the same individual in order to establish profiles of the nature and progression of responses at different biological scales (molecule, cell, organ), that can predict the severity of the resulting cardiac arrhythmia and help establish personalized therapies. To achieve this, the candidate will learn acquiring data in experimental models prone to cardiac arrhythmia, develop and use advanced algorithms for signal detection in big data sets and implement deep learning techniques and genetic association techniques. The training includes short stays in international laboratories.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualifications required: Graduate in Biomedical Engineering, Biomedical Sciences or similar. The candidate will enroll in the Biomedical Engineering program at Universitat Politécinca de Catalunya.
- Language requirements: Spanish and English. The candidate will enroll in the Biomedical Engineering program at Universitat Politécinca de Catalunya and train in English speaking laboratories.

#### Merits to be considered:

Qualifications, knowledge and experience that are not essential, but valuable.

- Certificate of animal experimentation
- Knowledge of non-invasive electrophysiological or imaging techniques used in cells or in vivo
- Knowledge of programming in Matlab or Python

#### WHAT IS OFFERED

The candidate will participate in an international research project learning state-of-the art techniques:

- 1. Acquire and analyze large data sets using electrophysiological or imaging techniques in isolated cardiomyocytes or *in vivo*, supervised by experts in the field.
- 2. Develop algorithms for supervised or non-supervised analysis of the experimental data sets or data from biobanks, supervised by experts in the field.
- 3. Training includes 3 month stays with Prof. SW Chen, Univ. Calgary to analyze data from whole heart imaging techniques and with Prof. MS Olesen, Univ. Copenhagen to learn analyzing data from biobanks

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: leif.hove@iibb.csic.es Phone: +34 677535260











### Position Offered: PREDOCTORAL RESEARCHER Project: *bluePALEOeconomy: analysis of coastal socio-ecological systems in the long-term through data science*

**Technological and scientific fields:** Artificial Intelligence, Advanced Data Analysis, Climate change and biodiversity, Digital Humanities

**Location:** Barcelona, Catalunya, Institución Milà i Fontanals for Research in the Humanities, <a href="https://www.imf.csic.es/">https://www.imf.csic.es/</a>

**Research Group/PI:** HUMANE - Archaeology and Human Ecology, PI Débora Zurro, <u>https://www.imf.csic.es/areas-de-investigacion/arqueologia/arqueologia-y-ecologia-humana/</u>

#### PROJECT SUMMARY

Data science is used in this highly interdisciplinary study to examine the historical interactions between human societies, coastlines, and marine ecosystems. It focuses on the study of these blue economies by addressing different aspects ranging from the anthropological impact on marine resources to the analysis of the sexual division of labour in coastal societies. The contract will assess gender roles in the production and processing of marine products in blue economies. This objective will be addressed through cross-cultural analysis and data mining (ethnographic and archaeological) that will be confronted to illustrate how advanced digital skills complement traditional methodologies.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Graduate in a discipline of Humanities or Social Sciences
- Master in a discipline of Humanities, Social Sciences or Data Science
- Proficiency in English
- Good skills and/or willingness to learn how to handle computer tools/programming languages, along with analytical reasoning, scientific vocation and continuous improvement

#### Merits to be considered:

- Experience with databases (either in their analysis or generation) // Analysis and/or compilation of ethnographic/archaeological data // Quantitative Analysis in Social Sciences - Social Simulation // Gender Analysis Training // Programming Languages
- Knowledge of Spanish

#### WHAT IS OFFERED

The CSIC provides an optimal working framework that will enable the development of a hybrid profile with competences in different areas of knowledge. The designed training involves content aspects associated with textual criticism and a gender approach, along with Data Science methodologies that will enable the researcher to incorporate the quantitative dimension into Social Sciences and work with high volumes of information. A training of 240 ECTS is envisaged through supervision and regulated training in Data Science and other aspects necessary for the development of a competitive scientific profile. This doctorate involves research stays in the Dipartimento dei beni culturali of the Università di Bologna and in the Escuela Politécnica Superior of the University of Burgos, headquarters of the Co-IP, JM Galán Órdax.

Training in gender analysis, cross-cultural analysis, data mining, advanced statistics

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: debora@imf.csic.es / Phone: +34 93-4433818











### Project: *Machine Learning and Artificial Intelligence for the Optimisation of Nanomedicines (MELINA)*

**Technological and scientific fields:** Artificial Intelligence, Nanotechnology, Design of New Drugs

Location: Barcelona, Catalonia, Institut de Química Avançada de Catalunya - <u>https://www.iqac.csic.es/</u>

Research Group/PI: Nanomedicines for Therapeutic Applications (NM4T) / Ibane Abasolo

#### PROJECT SUMMARY

Artificial intelligence (AI) tools, and more specifically machine learning (ML), have accelerated the discovery of new chemicals and materials with unprecedented efficiency, resilience and precision. In recent years, these strategies have begun to be implemented timidly in the field of nanotechnology where multiple factors, from the synthetic process to the size or functionalization of the nanoparticle, have a relevant impact on the effectiveness of the final product. In the MELINA project, we seek to develop -and exploit- the full potential of ML tools towards the experimental design of new nanomedicines.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree in the field of bioscience (Nanotechonology, Biology, Biotechnology, Pharmacy, etc.).
- Master in biomedicine-related topics, in disposition to being admitted to a Doctorate program during the 2024-25 academic course.
- Proficiency in Spanish and English.
- Scientific Publications related to the application of Machine Learning tools.

#### Merits to be considered:

- Proven experience (>6 months) in cell culture, cell viability assays, flow cytometry and microscopy.
- Knowledge in the synthesis and biological evaluation of nanoparticles.
- Experience in Python programing.

#### WHAT IS OFFERED

We offer the participation in a multidisciplinary scientific project combining state-of-the-art technologies in the fields of artificial intelligence and nanomedicine, under the co-supervision of Dr. Sergi Vela (Theoretical and Computational Chemistry, IQAC). The project is associated with a comprehensive training plan (271 ECTS) in experimental methodologies and computational tools, which also includes short stays in renowned institutions abroad.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: ibane.abasolo@iqac.csic.es Phone: 934006165











Project: Advanced digital tools and their application in the development of key technologies for a sustainable energy transition (DigiTES)

**Technological and scientific fields:** Data analysis and integration, X-ray analytical techniques, batteries

Location: Bellaterra, Catalonia, Materials science institute of Barcelona https://icmab.es/

**Research Group/PI:** 1) Solid State Chemistry/Dino Tonti <u>https://icmab.es/ssc 2</u> 2) ALBA synchrotron <u>https://www.albasynchrotron.es/en/</u>. Laura Simonelli

#### PROJECT SUMMARY

Electrochemical processes are at the base of several applications in chemical and material synthesis, energy and environmental fields. Development of experiments at laboratory and in large facilities has allowed observation of processes in real time and under operation (i.e. operando), overcoming problems of reproducibility and providing finer detail on the mechanisms and transient species. Such experiments typically produce vast amounts of data that suppose a challenge for their organization, analysis and interpretation. We propose an initiative to streamline data processing from electrochemical operando experiments coupled with diffraction and spectroscopy analysis. The tools will visualize the parallel evolution of electrochemical parameters and material properties and evaluate the correlation degrees among a large set of descriptors of the physical phenomena. The successful candidate will contribute to the development and validation of these tools by setting up battery operando experiments based on different analytical techniques, and applying the received training on data science by writing own modules for the efficient analysis of large amounts of data.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Master's degree in Physics, Chemistry, Materials Science or similar
- Proficiency in oral and written English

#### Merits to be considered:

- Experience with electrochemical techniques, electrochemical energy storage, X-Ray analytical techniques, spectroscopic analysis methods
- Effective communication skills, team work, strong academic record

#### WHAT IS OFFERED

Strong training component, equivalent to 240 ECTS, including hand-on training on batteries, syncrotron x-ray techniques, IT techniques, and the award of a master's degree on data science, or similar degree. 9-month stays at ALBA synchrotron and other related research institutions

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *TETRIS: digital Tools for massivE daTa pRocessing in FIsheries AcousticS: leveraging repository access and global inferences* 

**Technological and scientific fields:** Massive data, Cloud computing, Artificial Intelligence, Advanced data analysis, Climate change and biodiversity, distributed computing.

Location: Palma, Islas Baleares, COB, Muelle de Poniente s/n 07015 http://www.ba.ieo.es/

**Research Group/PI:** ACUSDEEP, Marian Peña, <u>https://marianpena.github.io/ACUSDEEP/</u> part of multicentre group BEME, Mikel Latasa, <u>https://bemegroup.github.io/BEME/</u>

#### PROJECT SUMMARY

The project TETRIS aims to leverage the compilation and processing of large acoustic databases from public online repositories, which will improve the temporal and spatial scale of fishery acoustics, facilitating greater accuracy in the study of ecological processes influenced by climate change. TETRIS is a collaboration between IEO-CSIC (Marian Peña), University of Washington in Seattle (Wu-Jung Lee), NOAA (Carrie Wall) and Universitat de les Illes Balears (Carlos Guerrero). The three main objectives of the project are: 1) Development of acoustic downsampling algorithms, 2) Massive integration of data from acoustic repository networks and 3) Data mining and associating information from net and acoustic mesopelagic data.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree in marine science, physics or similar
- Proficiency in English required
- Disponibility to work in the USA for two internships
- High proficiency in programming languages, particularly Python

#### Merits to be considered:

- Previous experience in Fisheries acoustics
- A basic knowledge of Spanish is advisable
- Experience with algorithm development, cloud computing and machine learning
- Master in related subjects

#### WHAT IS OFFERED

The 4-year PhD will be based in Palma, Spain, but training includes two international internships at the University of Washington in Seattle (ML and scalable acoustic processing workflows) and at NOAA (acoustic repositories, cloud computing). Training on cloud computing will also be provided by the University of Baleares: master in Mass Data Analysis and Intelligent Systems (<120 ECTS) and a 1-month internship. Possibility to participate in research surveys. Acces to the NOAA cloud AWS and close collaboration with the UW team on development of open access acoustic tools. Participation in international conferences and working groups.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: marian.pena@ieo.csic.es Phone: +34 971 133 720











# Project: *Towards more efficient transportation systems: real-time data and advanced analyses*

#### Technological and scientific fields: Data analysis and integration

**Location:** Palma, Islas Baleares, Instituto de Física Interdisciplinar y Sistemas Complejos (IFISC), https://ifisc.uib-csic.es/

**Research Group/PI:** Dr. Massimiliano Zanin, https://ifisc.uib-csic.es/en/people/massimiliano-zanin/

#### PROJECT SUMMARY

Thanks to the technological advances in the last years, all modern transportation systems are generating large volumes of real-time information about their dynamics. Yet, their complexity results in a compartmentalisation of the associated insights, limited reproducibility, and that real implementations are seldom achieved. Given this state of affairs, we propose the development of an open-source software library. Among other functions, it will allow applying unified cleaning and pre-processing algorithms; executing advanced data analyses, inspired in statistical physics' principles, Machine and Deep Learning; and further perform such analyses on multiple transportation modes in an integrated fashion.

#### PROFESSIONAL PROFILE

#### Minimum requirements:

- Master's degree in Physics, with a focus on nonlinear or complex systems.
- Advanced programming skills, particularly in Python and related data analysis libraries, as well as experience with version control systems (e.g., Git) and data management.
- Proficiency in English, with excellent written and verbal communication skills.
- Experience with high-performance computing (HPC) and super-computing environments.
- Familiarity with machine learning (ML) and deep learning (DL) models.

#### Merits to be considered:

- Bachelor's degree in Computer Science or equivalent.
- Proficiency in advanced data visualization tools and techniques.
- Participation in international research projects or collaborations.
- Experience in preparing and delivering scientific presentations at seminars or conferences, and scientific publications.

#### WHAT IS OFFERED

We offer contributing to an innovative project that will leverage state-of-the-art techniques in data processing and analysis; a training program centred in the obtention of a doctorate (180 ECTS); multiple research stays in national and European centres (60 ECTS); and the integration in an international and multidisciplinary research group.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €. Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *Bioinformatics, data analysis and modeling for the advancement of vitiviniculture* 

**Technological and scientific fields:** Computational biology; Climate change and biodiversity; Digital tools for agriculture; Artificial Intelligence

Location: Logroño, La Rioja, ICVV, www.icvv.es/english

**Research Group/PI:** Structural Bioinformatics, Modeling and Biological Mechanisms (Model3DBio), Juan Fernández Recio, <u>www.icvv.es/english/3dbiowine</u>

#### PROJECT SUMMARY

The general goal is to develop and implement digital technologies of interest for the advancement of vitiviniculture towards its sustainability under the important challenges that the sector is facing. The tasks will include the application and interpretation of methods for the analysis of next generation sequencing (NGS) data, as well as genomic, metagenomic, transcriptomic and proteomic data from plants and microorganisms of interest for the winegrowing sector. One of the goals is to analyze the Iberian grapevine germplasm, using the collections at ICVV, as well as those from partner wineries and plant nurseries. These activities will be co-supervised by the Vitigen group from ICVV and the Genomics and Bioinformatics Platform from CIBIR.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Any of these degrees: Master or grade (at least 300 ECTS) in Bioinformatics, Biology, Biochemistry, Biotechnology or similar.
- High level of English (spoken and written)

#### Merits to be considered:

- Knowledge of several programming languages: bash, R, Python.
- Master or grade on Bioinformatics will valuated over other subjects.

#### WHAT IS OFFERED

The contract will allow the candidate to acquire specialized digital tools in the study and improval of grapevine and microorganism in fermentation, biocontrol, pathogens or plagues, as well as methods for the assembly and analysis of grapevine genomic variation, metagenomics analysis and multi-omic integrative methods and systems biology. Data obtained by NGS methods will be used (Illumina, Oxford Nanopore Technologies, PacBio). A total of 240 ECTS are expected to be completed in the 4 years of the contract, through a robust training plan, which includes a Master in Bioinformatics and Computational Biology, and courses in programming in bash, python, shell scripting, or R, as well as on population genomics, and the integration and visualization of multi-omic data. Several training stays are expected in research groups at national and international level, to learn and develop next-generation bioinformatics methods in pangenomics and metagenomics, and methods for data integration and systems biology. The candidate will be expected to supervise students in training and grade theses in Bioinformatics and similar subjects, as well as the attendance and communication of results in seminars, workshops, and national and international meetings.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: juan.fernandezrecio@icvv.es Phone: 941053081











Project: Bioinspired (multi)informed robotic controllers to improve human balance

Technological and scientific fields: Artificial Intelligence, Robotics, Medical Devices

Location: Arganda del Rey, Madrid, Center for Automation and Robotics

Research Group/PI: BioRobotics group / Cristina Bayón

#### **PROJECT SUMMARY**

Effective control of upright posture during standing and walking is crucial for performing daily activities. Humans control balance by controlling the center of mass. Our central nervous system integrates information from various sensory inputs, including visual, vestibular, and somatosensory signals. Due to deficiencies in the processing of one or more of these sensory inputs, people with neurological disorders often rely excessively on unimpaired sensory pathways to compensate for deficient ones. This may facilitate balance but also results in exaggerated responses, inappropriate modulation of muscle activity, and delayed balance reactions.

In this R&D project, we will use artificial intelligence (AI) techniques and non-invasive artificial feedback methods aimed at increasing the response of altered sensory inputs to answer various questions: What are the main alterations of the sensorimotor processes that lead to compromised balance control in neurological disorders? How can we predict loss of balance? Which artificial biofeedback techniques are most effective? How can we develop cooperative controllers that improve human-robot interaction? How can advances in biofeedback strategies along with assistive robotics be optimally combined and adapted to help improve human response?

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Bsc. in Engineering (Biomedical, Industrial, Electonical...)
- Msc. Related to the use of artificial intelligence in medical robotics
- Fluent in Spanish and English \_
- Knowledge on artificial intelligence, deep learning, neural networks...
- Previous experience with programming languages

#### Merits to be considered:

- It will be positively considered stays or periods abroad
- Internships in hospitals or companies related to the biomechanical engineering field
- \_ Other languages

#### WHAT IS OFFERED

4 years predoctoral contract in the BioRobotics group at the Center for Automation and Robotics, CAR-CSIC. Two predoctoral stays are considered along the project (3 months at the University of Aalborg, and 4 months at the University of Twente).

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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# Position Offered: PREDOCTORAL RESEARCHER Project: *Massive precise Phenotyping and digitalization to improve crops*

Technological and scientific fields: plant stress responses, plant phenotyping, molecular biology

**Location:** Madrid. Pozuelo de Alarcón. Centro de Biotecnología y Genómica de Plantas (CBGP) <u>https://www.cbgp.upm.es/index.php/en/about-us</u>

**Research Group/PI:** Regulation of lateral root development during nutrient deficiencies. <u>https://www.cbgp.upm.es/index.php/es/?option=com\_content&view=article&id=27</u>. IP: Juan Carlos del Pozo

#### PROJECT SUMMARY

In the field of plant biotechnology, numerous genomic and molecular analysis techniques are available to study plant responses to environmental changes, both biotic and abiotic. However, phenotypic analysis remains limited in technological terms. In this project, we propose implementing and developing new methodologies for high-precision quantitative analysis using the CBGP phenotyping platform. This state-of-the-art unique platform in Spain allows measurement of growth, photosynthetic capacity, water levels, and stress in the aerial part of plants, as well as root systems using rhizotrons. Its use will enable precise quantification of the effects of different stresses and bioproduct treatments on crops, with the goal of increasing agricultural production and crop tolerance to adverse conditions and to infectious diseases. The main objective for the doctoral thesis will be:

- Analysis of Germplasm Bank Varieties in Response to High Temperatures.
- Analysis of Plant Varieties' Response to Bio-Stimulant Microorganisms Application.
- Molecular Response of Selected Varieties through Transcriptomic Analysis.
- Microbiome Analysis Associated with Selected Varieties through Metagenomic Analysis.
- Analysis of Plant Varieties' Response to Infection by Phytopathogenic Organisms (Viruses).
- Investigating resistance and tolerance responses to viral infection in crop varieties conferred by bio-stimulant microorganisms.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Biology, biotechnology or science Bachelor
- High level of English

#### Merits to be considered:

Knowledge in statistics, skills in phyton programming and office. Communication skills and team work.

#### WHAT IS OFFERED

We offer a great opportunity to do the Thesis in two dynamic research groups, highly recognized at the national e international level, to work in an exclusive plant phenotyping platform in Spain. This will give you the opportunity to interact with diverse research groups and collaborate with ago-companies. We offer a specific training plan, taking courses in the biocomputational master of the UPM and also a training from Lemantec company for specific phenotyping programming.

The Total number ETC in the 4 years will be about 260, including a supervise a non-supervise research plant, master courses, seminars, formative stay abroad of at least 3 months, etc.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: pozo@inia.csic.es Phone: 679862001











Project: Artificial Intelligence to reduce CO2 process emissions of the metal production industry (AIdeal)

#### Technological and scientific fields: Green algorithms; Climate change

Location: Madrid, Centro Nacional de Investigaciones Metalúrgicas (CENIM), https://www.cenim.csic.es/

Group/PI: ALONSO Research MATERALIA, CAROLA DE CELADA CASERO, https://www.cenim.csic.es/materalia/

#### **PROJECT SUMMARY**

It is estimated that the application of Artificial Intelligence (AI) in conventional processes of heavy industry could reduce fuel combustion emissions by 20%. Additionally, AI also enables the design of new sustainable processes that surpass existing ones in quality. Copper producers are committed to adapting conventional anode furnaces to use hydrogen to ensure their competitiveness and sustainability in the future. How will hydrogen affect the process and quality of copper? To answer these questions, this project will apply AI to optimize the conventional thermal refining process of copper and study the physicochemical effects of replacing natural gas with hydrogen. This knowledge will help adapt existing technology to the use of hydrogen, reducing climate impact and increasing the competitiveness of the metallurgical industry.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

BSc. in Physics, Mathematics, Chemistry, Materials Engineering, or Industrial Engineering.

MSc. in Physics, Chemistry, Materials, Mathematics or in Computing.

High level of English.

Knowledge in thermochemical calculations, calculation techniques or computing, and programming languages: Python is essential.

#### Merits to be considered:

Knowledge of machine learning libraries, experience with techniques for chemical and structural characterization of metallic materials, basics of metallurgical process engineering, oral communication skills and scientific writing.

#### WHAT IS OFFERED

The project and the research group will provide professional and personal development in the use of Artificial Intelligence and Machine Learning techniques applied to solving the physicochemical problems posed by the replacement of fossil fuels with hydrogen in the metallurgical industry, a key sector for the energy and digital transition. The project will offer the predoctoral researcher access to cutting-edge laboratory equipment, close collaboration with the metallurgical industry (Atlantic Copper), and the appropriate scientific and working environment to ensure the successful development of a doctoral thesis. Competencies will be developed throughout the project, which will include significant training activities, both technical and in research career development, including stays at international research centers. The training plan will correspond to 240 ECTS.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: c.celada@cenim.csic.es Phone: +34 91 553 89 00 (Ext. 445141)











Project: *Digital Technologies Applied to Epidemiology and Risk Analysis* in Health Emergencies

**Technological and scientific fields:** Digital tools for agriculture, livestock, aquaculture, etc. Technologies for massive data and information processing. Artificial intelligence. Data analysis and integration. Cybersecurity. Cloud computing. Advanced data analysis/edge computing. Digital twins. Others: Development and deployment of web applications. Geographic Information Systems (GIS).

Location:Valdeolmos,Madrid.CISA-INIA,CSIC.https://www.inia.es/unidades/Institutos%20y%20Centros/CISA/Pages/Home.aspxCSIC.

**Research Group/PI:** Epidemiology and Environmental Health/Irene Iglesias Martín/ <u>https://www.inia.es/investigacion/animal/sanidad/Epidemiolog%C3%ADa%20y%20sanidad%2</u> <u>0ambiental/Pages/Home.aspx</u>

#### PROJECT SUMMARY

Emerging and re-emerging infectious diseases and antimicrobial resistances are an increasing threat to public health, animal health, and biodiversity, necessitating improved surveillance and prevention systems. The Epidemiology and Environmental Health group is a pioneer in developing advanced epidemiological systems and models. Using conventional and spatial epidemiology, risk assessment, viewers, and real-time alert systems to address significant diseases (HPAI and ASF among others) and AMR with a One Health approach. This project aims to leverage technological innovations in the digital realm, including advanced spatial analysis techniques, rapid risk assessment, artificial intelligence, and machine learning to develop predictive models for infectious diseases, improve existing ones, and advance digital competencies in outbreak research. It will also optimize control panels for disease control and early warning systems, transferring knowledge and technologies to health authorities and other organizations.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduate in Geography, Physics, Computer Science, or related field.

#### Merits to be considered:

Experience in programming (Python, Java). Proficiency in GIS tools (ArcGIS, QGIS). Communication skills in Spanish and English.

#### WHAT IS OFFERED

A cutting-edge project in the field of epidemiology and risk analysis of emerging diseases and zoonosis. The training plan includes a total of 256 ECTS and ranges from advanced digital competencies to training in programming and modeling tools, with planned stays at renowned national and international institutions such as the Complutense University of Madrid and the Royal Veterinary College in London.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: iglesias@inia.csic.es; martinez.marta@inia.csic.es Phone: 91 6202300 Ext 2126 Ext 2185











# Position Offered: PREDOCTORAL RESEARCHER Project: *Quantitative Analysis of Advanced Optical Microscopy Images*

**Technological and scientific fields:** Image Analysis and Computer Vision, Artificial Intelligence.

Location: Madrid, Natl. Center of Biotechnology, http://www.cnb.csic.es

**Research Group/PI:** Biocomputing Unit, Carlos Óscar Sorzano, <u>https://biocomputingunit.es/</u>

#### **PROJECT SUMMARY**

The project "Quantitative Analysis of Advanced Optical Microscopy Images" focuses on the development and improvement of advanced techniques for the analysis of fluorescence microscopy images, utilizing the latest innovations in artificial intelligence and computer vision. This project offers an exceptional opportunity for young researchers who wish to engage in cutting-edge technology and science. The main objective of the project is to enhance the accuracy and efficiency of analyzing complex biological images, addressing significant challenges such as variability in sample preparation techniques and lighting conditions. To achieve this, the project will focus on two key areas:

Spatio-Temporal Analysis: 1. Develop methods to precisely track the trajectories of multiple fluorescent biomarkers within living cells. This will allow for better interpretation of intracellular movements and locations, facilitating detailed studies on molecular interactions and cellular processes. 2. Refine image processing algorithms to analyze the spatial relationships between multiple markers, beyond simple colocalization. This will provide a deeper understanding of molecular organizations and their impact on cellular function.

Correlative Microscopy: Implement correlative microscopy techniques that integrate data obtained from different modalities of fluorescence microscopy and electron microscopy. This will allow for a more comprehensive interpretation of biological problems. This multidimensional approach will offer a holistic view of biological processes at the molecular and cellular levels.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Master in any domain related to image processing or data analysis.

#### Merits to be considered:

Ability to develop software in C, C++, Python, or Java. Knowledge of Linux.

#### WHAT IS OFFERED

The project includes a robust training plan that includes:

- Training stays at international research centers, allowing the candidate to gain experience and knowledge in different contexts and with complementary technologies.
- Regular workshops and seminars on the latest trends and advancements in the field of microscopy and image analysis, facilitating continuous knowledge updating.
- Intensive practical training in the use of programming platforms such as Java and Python, and in handling specialized libraries, ensuring that the candidate develops solid and applicable technical skills.
- The project also encourages participation in renowned scientific conferences and congresses, such as the International Symposium on Biomedical Imaging (ISBI), promoting the dissemination of research results and the establishment of professional networks.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: coss@cnb.csic.es Phone: 915854510











### Project: Development of cross-cutting artificial intelligence services

#### Technological and scientific fields: Artificial Intelligence, High Performance Computing

Location: Madrid, Comunidad de Madrid, ICMAT, https://www.icmat.es

**Research Group/PI:** Algebra and Geometry, <u>https://www.icmat.es/researchers/groups/group-</u> <u>a</u> David Martín de Diego.

#### PROJECT SUMMARY

The importance of AI can be seen in its application in socially relevant areas such as drug development, the introduction of autonomous vehicles, or predictive medical systems. To support this fundamental discipline, the CSIC created the AIHUB connection that has identified several transversal aspects of interest in this community, one of them being high performance computing, especially in relation to massive AI models and machine learning, which is the subject of this project. In the pre-doctoral training project, the person involved will be trained in HPC and AI, learning to master the related techniques and will know first-hand the HPC needs of the AIHUB community to transversally support such needs.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Graduate or Bachelor's degree in Mathematics and related subjects.
- Master's degree in Mathematics, Artificial Intelligence and related subjects
- Knowledge of English and Spanish.

#### Merits to be considered:

- Proficiency in Python programming language.
- Training in Bayesian analysis and machine learning techniques.
- Proven experience with research contracts.

#### WHAT IS OFFERED

State-of-the-art training in Artificial Intelligence and High Performance Computing is offered, as the ultimate goal of the project is to provide cross-disciplinary HPC support to the AIHUB connection. The successful candidate will receive pre-doctoral training in both disciplines with a view to perform his/her PhD thesis on HPC and AI related issues with the focus on improving the fundamentals of large-scale computational methods in Bayesian machine learning and, at the same time, providing HPC support to the members of the AIHUB connection. The candidate will learn about the HPC infrastructures of the groups integrated in AIHUB and will receive training at CESGA and international institutions, foreseeably Duke University and Aalto University, as well as participate in the dissemination and transfer tasks of ICMAT and AIHUB.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: marta.sanz@icmat.es Phone: +34 91 29 99 743 / +34 607 40 77 00











Project: Development and Implementation of AI for animal behavior and neuronal activity analysis and integration

**Technological and scientific fields:** Artificial Intelligence, Massive data and information processing technologies, and Image analysis and computer vision

Location: Av. Del Dr Arce 37, Madrid, Madrid. Instituto Cajal (IC) https://cajal.csic.es/

Research Group/PI: Jercog Team/ IP: Pablo E. Jercog (co-PI: Liset M. de la Prida)

#### **PROJECT SUMMARY**

This project aims to develop sophisticated tools for analyzing animal behavior coupled to brain activity in neuroscience labs. This project also aims training the PhD student candidate to create and implement cutting-edge AI technologies for animal behavior and its integration with neuronal activity, seeking to provide deeper insights into the neural mechanisms in health and disease. The applicability of these techniques span a large range of research areas from neuroscience to ecology, from clinical research to shoppers behavior in retail stores. The training can significantly change the future professional career for the applicants.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Candidates must have a Masters in neuroscience, bioinformatics ingeneering, computer science, physics, math or related fields. Should have a mínimum level of programming skills, in Python, Matlab or R. Should be proficient in english

#### Merits to be considered:

- Experience using mathematical or machine learning tools for data analysis
- Master research project (e.g. TFM) related the the analysis of real data.

#### WHAT IS OFFERED

The training scheme is designed to train predoctoral students with the necessary skills and knowledge to achieve the objectives of developing AI tools for analyzing animal behavior in a neuroscience lab. The program will combine theoretical instruction with hands-on experience, covering essential topics in AI, machine learning, computer vision, data processing, and neuroscience. Candidates will be trained in Introduction to Artificial Intelligence and Machine Learning, Deep Learning for Behavioral Analysis, Computer Vision and Image Processing, Data Collection and Annotation. The candidate will also participate in conferences and visits to our collaborators labs.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €. Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: pjercog@cajal.csic.es; pjercog@gmail.com (preferable) Phone: +34 620562808 Pablo Jercog's cell-phone










Project: *Phenotypic modeling through computation of massive complemented genomic data and its applications to forest genetic resource conservation and breeding in the face of global change* 

**Technological and scientific fields:** Digital tools for agriculture, livestock and aquaculture; Climate change and biodiversity; Computational Biology; Artificial intelligence; Data analysis and integration

**Location:** Madrid, Madrid, ICIFOR-INIA, https://www.inia.es/unidades/Institutos%20y%20Centros/ICIFOR/Pages/Home.aspx

**Research Group/PI:** Population Genetics and Evolution Group / PIs: Juan José Robledo Arnuncio and Ricardo Alía,

https://www.inia.es/investigacion/forestal/Ecolog%C3%ADa%20y%20Gen%C3%A9tica/Gen% C3%A9tica%20de%20poblaciones%20y%20evoluci%C3%B3n/Pages/Home.aspx

#### **PROJECT SUMMARY**

Based on the computational analysis of massive genomic and phenotypic data sets from several forest tree species, we will evaluate the genomic architecture of phenotypes of ecological and economic interest (biomass, resistance to biotic and abiotic factors, etc.) and train genomic selection models to predict related phenotypic values. Results will be transferred to public and private stakeholders involved in forest genetic resources conservation and breeding

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree(s) in Biology, Forest Engineering, Environmental Sciences, Pharmacy, Computer Engineering or similar, totalling 300 ECTS credits, of which at least 60 credits must correspond to an official master degree
- Proficiency in English language

#### Merits to be considered:

- Proficiency in Spanish language
- Knowledge of population genetics, bioinformatics and/or computational models
- Experience with R, SAS or other statistical software packages
- Experience with programming languages
- Knowledge of forest sciences

#### WHAT IS OFFERED

Training and supervision within an interdisciplinary team (molecular and quantitative geneticists, evolutionary ecologists, ecophysiologists) with extensive international contacts (EUFORGEN and EVOLTREE networks, European FORGENIUS and OPTFOREST projects, etc.) and continuous outreach activity (e.g. project with MAPAMA in forest genetic resources conservation and breeding). Co-supervision of doctoral thesis by two members of the host team. Support for the completion of a related doctoral program at the UCM, URJC, UPM or others. Access to genomic and phenotypic data sets from natural populations and genetic trials. Training in using and developing AI-based models. Access to high-performance computing facilities (CESGA and DRAGO). Training plan in digital skills (100 ECTS), research visits in international labs (3 months).

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: robledo.juan-jose@inia.csic.es / Phone: 913478719











#### Technological and scientific fields: Artificial Intelligence and Cybersecurity

Location: Madrid, Comunidad de Madrid, ICMAT, https://www.icmat.es

Research Group/PI: DataLab, IP: David Ríos Insua. https://datalab.icmat.es

#### **PROJECT SUMMARY**

Besides the benefits brought by artificial intelligence, a series of associated risks have been identified, focusing mainly on attacks against machine learning algorithms due to their potentially very negative impacts. Such threats are exacerbated by the massive adoption of these technologies, particularly since the rise of LLMs. From a regulatory and public policy perspective, the importance of this problem is well reflected in the EU AI Act. From a technical perspective, the growing importance of the field of adversarial machine learning is highlighted, primarily based on game theory methods under unrealistic common knowledge assumptions in the realm of security and cybersecurity.

Within the SECURIA project, this position will develop more rigorous methods and algorithms to strengthen machine learning algorithms against targeted attacks, which will converge into operational pipelines for their implementation in real-world AI-based systems. The methodology and software produced will be made available to the community to promote a more responsible and secure development of AI.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Graduate or Bachelor's degree in Mathematics or Physics.
- Master in Statistics and Data Analysis.
- Knowledge of English and Spanish.

#### Merits to be considered:

- Proficiency in Python programming language.
- Training in Bayesian analysis and machine learning techniques.
- Proven experience with research contracts.

#### WHAT IS OFFERED

Cutting-edge training is offered in such current topics as Artificial Intelligence and Cybersecurity, aimed at pursuing a doctoral thesis in the area of Adversarial Machine Learning (AML), a fundamental pillar for developing a rigorous risk management framework in AI. The training program includes stays in leading AML laboratories such as Cagliari and Urbana Champaign, training in digital skills associated with the activities of the DataLab, as well as training in market transfer and dissemination of research within the activities of the aforementioned group integrated into the ICMAT, a reference center in mathematical research in Spain.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: marta.sanz@icmat.es Phone: +34 91 29 99 743 / +34 607 40 77 00











## Project: Development and application of virtual environments in sensory and consumer analysis

Technological and scientific fields: Virtual and Augmented Reality, Biometrics, Sensory and Consumer Science

Location: Madrid, Madrid, ICTAN, https://www.ictan.csic.es

Research Group/PI: DIGISEN, Gonzalo Delgado Pando, https://www.ictan.csic.es/grupos-deinvestigacion/tecnologias-digitales-analisis-sensorial-carne-y-derivados-digisen

#### **PROJECT SUMMARY**

When consuming or choosing a food product, we follow a multifactorial process of great complexity. This sensory perception is affected not only by the informational context but also by the external environment. Thanks to the recent development and use of digital technologies in sensory science, exploring the connections between participants' subconscious reactions and their hedonic responses in immersive environments is becoming easier. Through this project, virtual environments will be created using extended realities (XR) to recreate contexts closer to consumer reality and/or facilitate controlled sensory evaluation. Biometric devices (such as eye-tracking, galvanic skin response, etc.) will also be used to capture subconscious responses during the analysis. The main objective is to improve the understanding of sensory perception in food choice and consumption.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

To possess or be in the process of obtaining a Bachelor's degree, Engineering degree, or a degree of at least 300 ECTS credits, or a Master's degree, or an equivalent degree related to Computer Engineering. A minimum grade of 6.5 on a 0-10 scale is required. Degrees related to life or social sciences will be considered if the candidate has additional experience and/or training in digital technologies or computer science. English proficiency B2 level.

#### Merits to be considered:

Experience with sensory/consumer studies. Experience with extended reality (XR): graphics engine software (e.g.: Unity) and/or 3D modeling (e.g.: Autodesk, 3ds Max, Blender). Programming languages C++/ C# / Python / R. Experience/knowledge in data analysis. Spanish proficiency.

#### WHAT IS OFFERED

Participation in an innovative project that will aid in your training as a research personnel and in obtaining a PhD, enhancing your scientific career and employability. You will utilize novel XR and biometric techniques, assist in the development of virtual environments applied to consumers, contribute to scientific publications, and attend national and international conferences. Training will be provided for a total of 240 ECTS, including digital topics (Master's in Artificial Intelligence), training stays abroad (Dublin and Parma), and courses on various topics. You will be part of a multidisciplinary, ambitious, and active team located in the vibrant campus of Moncloa close to the centre of Madrid.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Application of machine learning in the optimization of inks and 3D designs of ceramic materials obtained by direct ink writing (robocasting)

Technological and scientific fields: Artificial intelligence, advanced data analytics, 3D printing and additive manufacturing, novel materials, data analysis and integration, image analysis and computer vision.

Location: Cantoblanco, ICV-CSIC, Madrid, Institute of Ceramics and Glass https://www.icv.csic.es/

Group/PI: Research Technical Ceramics Cristina Maglione, Group, Ramírez http://www.gct.icv.csic.es/es/home/

#### **PROJECT SUMMARY**

The Technical Ceramics Group (GCT) of the Institute of Ceramics and Glass offers a research contract for the completion of a doctoral thesis in the application of machine learning (ML) in the optimization of the 3D printing process of ceramic materials by robocasting. The group is looking for a physics, engineering, mathematics (or related fields) graduate to develop a multidisciplinary training program that includes completing a master's degree in ML, in combination with experimental activities in the fields of processing and characterization of ceramic materials and 3D printing. ML algorithms will be developed for the optimization of 3D printing inks and image analysis methods will be used to correlate printed structures with their properties. The TCG has a recognized track record in the design and manufacturing of 3D ceramic materials as well as composite materials with carbon nanostructures through DIW.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

-Degree in Physics, Engineering, Mathematics or Artificial Intelligence, with high motivation in the application of data analytics in Materials Science and Engineering. -Proficiency in English (preferably level B2)

#### Merits to be considered:

Knowledge in Python, R, C++, Java, data analytics, modelling, artificial intelligence, machine learning, as well as experience in laboratoty tasks will be valuable.

#### WHAT IS OFFERED

This project provides the opportunity to develop a scientific career in two novel areas of knowledge, such as machine learning and 3D printing, with a great projection on the current and future needs of the R&D and industrial production sectors. The researcher will cover a program of 240 ECTS, focused on completing a master's degree in ML, specific courses in data analytics, 3D printing and materials science, and on the achievement of research capabilities that lead to obtaining the doctorate degree. This program will allow the development of specific research activities in national and international centers of recognized prestige through short stays.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: cristina.ramirez@icv.csic.es Phone: 917355840 ext. 441904











Project: Control of spin waves in two-dimensional antiferromagnetic materials by light for the development of future devices in spintronics, LUMINA

Technological and scientific fields: nanotechnology; massive data and information processing technologies.

Location: Madrid, Comunidad de Madrid, Instituto de Cerámica Vidrio ICV, V https://www.icv.csic.es/

Group/PI: Research Ceramics for Smart Systems Aída Serrano Rubio, group, http://www.css.icv.csic.es/

#### **PROJECT SUMMARY**

The aim of this project is to optically manipulate spin waves in bidimensional antiferromagnetic materials by means of light through the excitation of localized surface plasmons of plasmonic nanoparticles incorporated into the magnetic system. For this purpose, different hybrid nanoheterostructures will be designed and developed, in which an exhaustive investigation of their physical properties will be carried out by controlling the plasmon resonance and therefore the plasmon-magnon hybridization through intrinsic and extrinsic parameters of the systems. Furthermore, the plasmon-magnon hybridization will be analysed and modelled according to the plasmon resonance.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree in Physics or Materials Engineering with a Master's degree. •
- Good knowlodge of English and Spanish (spoken and weitten).
- Availability to travel.

#### Merits to be considered:

- Skills in digital tools such as Matlab, Python, Comsol, Labview.
- Experimental skills in the laboratory and in the realization of presentations.
- Skills in the use of software for data processing. •

#### WHAT IS OFFERED

Work is offered within a research project of great relevance for the field of spintronics that will allow the development of new state-of-the-art intelligent nanodevices to transmit and process ultra-fast information. Two pre-doctoral stays are foreseen at the Helmholtz-Zentrum Dresden-Rossendorf in Dresden, Germany and at The European Synchrotron Radiation Facility (The ESRF) in Grenoble, France for 3 months each. In addition, the pre-doctoral student will carry out short training stays for the use of advanced characterisation techniques: at The ESRF (France), Alba (Spain), Soleil (France), Sesame (Jordan), Solaris (Poland) or CMAM (Spain) by request of measurement time. In addition, a number of training courses and micro-credentials in advanced digital skills will be carried out, as well as attendance at national and international congresses.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: aida.serrano@csic.es Phone: +34649116894











Technological and scientific fields: Artificial Intelligence, experimental nuclear physics

**Location:** Madrid, Comunidad de Madrid, Instituto de Estructura de la Materia IEM – CSIC <u>https://www.iem.cfmac.csic.es/</u>

**Research Group/PI:** Group of Experimental Nuclear Physics, IP Christophe Rappold & Luis Acosta <u>https://fnexp.iem.csic.es/</u>

#### PROJECT SUMMARY

The stellar properties of a neutron star are widely affected by the baryonic interactions. The constraints from heavy-ion experimental observations show remarkable consistency with the astrophysical measurements, providing complementary information at intermediate densities. In that aspect, the production of exotic hypernuclei in ion-induced reaction is envisioned to add precise observables at higher density. The PhD project aims to enhance our understanding of hypernuclear events in ion-induced reactions and nuclear emulsions by leveraging Artificial Intelligence techniques. The research will focus on two key experiments: the WASA-FRS experiment at GSI-FAIR (Germany) and the E07 emulsion experiment at JPARC (Japan). The primary objectives are to develop innovative AI approaches for hypernuclear spectroscopy experiments, with the goal of improving the separation of the background contributions from the hypernuclear signal. By applying segmentation models and graph neural networks, we expect to enhance observation efficiency for various hypernuclei, including potentially unknown doublestrangeness hypernuclei. Through clearer observations, this project aims to shed light on the structure of hypernuclei and baryon-baryon interactions. Specifically, It will address existing puzzles surrounding light hypernuclei, demonstrating the viability of those innovative experimental approaches.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

\* Master's degree in Nuclear Physics recognized by Spanish institutions. \* Strong foundation in nuclear and hypernuclear physics. \* In-depth knowledge of ion optics, particle tracking in magnetic fields, and data analysis techniques for nuclear collisions. \* Proficiency in machine learning development and data analysis. \* Mandatory programming skills: Python and C++. \* Excellent English language proficiency (fluent) and ability to work effectively in an international environment

#### Merits to be considered:

\* Familiarity with high-energy nuclear physics data analysis techniques. \* Practical experience with machine learning models, including: Supervised learning for classification, regression and Automatic Machine Leanring. \* Proficiency in popular machine learning development frameworks: scikit-learn, Pytorch. \* Working knowledge of Linux operating systems.

#### WHAT IS OFFERED

As a successful candidate in this PhD program, you will have the opportunity to work in an international environment, applying innovative AI methods to data analysis in experimental nuclear physics. During the four-year program, you will gain valuable experience in international research at renowned institutions. Primary destinations for your research stay will be leading international partners, including: GSI-FAIR International Facility in Germany, collaborating with the SuperFRS experiment and HENP Laboratory of RIKEN in Japan. In addition to these research opportunities, you will also have the chance to participate in various summer schools and expert workshops on machine learning, deep learning, and AI. Throughout the program, you will be expected to complete a total of 260 ECTS credits within four years.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: christophe.rappold@csis.es / Phone: +34 917 040 797 (Ext: 442407)











## Position Offered: PREDOCTORAL RESEARCHER Project: Integral Electrokinetic Decontamination of Dredged Sediments by Artificial Intelligence (DESedIA)

Technological and scientific fields: Artificial Intelligence, Massive Data and Information Processing Technologies, Sensorisation, Digital Tools, Dredged Sediment, Decontamination, Circular Economy

Location: Madrid, Madrid, IETcc, https://www.ietcc.csic.es/

**Research Group/PI:** Sustainable Interaction of Construction Materials with the Environment (ISCMA)/ Marta Castellote/ https://www.ietcc.csic.es/en/construction-department/sustainableinteraction-of-construction-materials-with-the-environment/

#### **PROJECT SUMMARY**

The volume of material dredged just in Spanish ports is around 334 Mm3, of which barely a 50% can be reused due to its high level of contamination, which has a major impact on human health and marine ecosystems, as pollutants accumulate in living organisms and reach the food chains. There is currently no technology capable of decontaminating them to acceptable limits, which prevents them from being considered a valuable resource instead of toxic waste and from being incorporated into the principles of the circular economy. In this context, the objective of the project is the development, using machine learning techniques, of a decision support tool that will enable the comprehensive decontamination of dredged sediments for their reuse as construction material. This tool will offer, for each specific case, the optimal option for complete decontamination, including not only the degree of cleanliness but also the sustainability of the process in terms of resources (reagents, time, energy) as well as economic and social efficiency.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

momentum@csic.es | https://momentum.csic.es/

- Graduate in science (physics, chemistry), mathematics, computer science or degree in • engineering (civil, materials, industrial or equivalent).
- Master's in science, computer science, mathematics or engineering in any specialisation

#### Merits to be considered:

- Knowledge of AI .
- Programming skills in PHYTON or equivalent programmes
- Accredited English level minimum B2 (Cambridge, TOEIC, TOEFL or equivalent) •

#### WHAT IS OFFERED

The completion of a doctoral thesis in a field that constitutes a social challenge of first level, carrying out a project that represents an advance in the frontiers of knowledge in relation to the applicability of electrokinetic methods for the decontamination of complex granular mixtures. It has a multidisciplinary character as it is co-directed by researchers from 2 CSIC centres -IETcc and ITEFI- specialists in the fields of decontamination and IA respectively, recognised at international level. During these 4 years, intensive training in digital competences will be carried out, including a master's degree in AI, as well as complementary training and training stays both nationally and internationally. The PhD is expected to be awarded with an international mention.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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### Project: Machine Learning and Digital Twins in Earth Sciences (GEODA)

**Technological and scientific fields:** Advanced Earth Observation Techniques; Data Integration; Artificial Intelligence; High-Performance Computing; Digital Twins

Location: Madrid, Instituto de Geociencias (IGEO, CSIC-UCM), https://igeo.ucm-csic.es/

Research Group/PI: Dynamics and Structure of the Earth, María Charco/Javier Fullea

#### **PROJECT SUMMARY**

This project focuses on the development and use of Machine Learning techniques for the study of earth dynamics. Physically Informed Neural Networks are a viable alternative for the resolution of inverse problems in geophysics and geodesy such as the characterization of volcanic deformation sources and the estimation of surface heat flow in areas without direct measurements based on other complementary geophysical observations. Thus, the project has as fundamental two objectives: (1) Increasing the credibility levels of eruption forecasting by building a digital twin of volcanic unrest combining real-time data and realistic interpretation models; (2) Predicting surface heat flow and optimizing geophysical-petrological inversions to characterize the temperature and lithology of the upper crust and sediments in Iberia.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Degree in Physics, Mathematics, Mathematics and Data Science, Mathematical Engineering, Computer Engineering, Data Engineering and Artificial Intelligence, Data Systems and Engineering, Industrial Engineering, Mechanical Engineering, Mining Engineering;

English proficiency: B2 level minimum.

#### Merits to be considered:

Master's degree in Earth science/data science and related fields; Background in Earth science: Geophysics, Geodesy, Geology; Computer skills in Python, Matlab/Octave, C, Fortran, R, Java...; Linux; GIS; Latex.

#### WHAT IS OFFERED

Training plan in Machine Learning techniques, Advanced Earth Observation Techniques and Data Integration, simulation and modeling using High Performance Computing. Integration in a collaborative and interdisciplinary research group (CSIC-UCM), with extensive experience in consulting for Spanish national volcano monitoring authorities (e.g., IGN) and public/private entities related to geothermal energy exploitation (e.g., IGME-CSIC; REPSOL). Visiting leading international research institutions in the field.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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## Position Offered: PREDOCTORAL RESEARCHER Project: *Voice and speech deepfake detection*

**Technological and scientific fields:** Voice biometrics and digital identity, Ethical aspects of AI, Digital humanities, Cybersecurity, Forensic Sciences

**Location:** Madrid, Community of Madrid, Institute of Language, Literature and Anthropology (ILLA) (Center for Human and Social Sciences, CSIC), <u>https://illa.csic.es/es</u>

**Research Group/PI:** Spanish, Language Variation and Linguistic Technologies / Eugenia San Segundo Fernández

#### PROJECT SUMMARY

This project seeks to integrate the development of automatic speaker verification systems (ASV) and advances in linguistic-phonetic scientific knowledge that can help distinguish real voices from deepfakes. Biometric systems, as well as people, are vulnerable to spoofing attacks through AI voice cloning, which also jeopardizes the use of recordings as expert evidence in the forensic field. Therefore, it is of utmost importance to implement a methodology to distinguish deepfakes from authentic audios. Project aims: (1) Integration and validation of spoofing attack detection systems and ASV systems by extracting phonetic-acoustic features that improve combined systems; (2) Proposal for a regulatory framework and code of ethics to address legal and ethical issues arising from AI applications, in relation to voice deepfakes and spoofing attacks.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

• Degree in Computer Engineering, Degree in Telecommunications Systems Engineering, Degree in Sound and Image Engineering, Degree in Data Science, or similar qualifications.

#### Merits to be considered:

- Additional training (master's degree) and/or experience in the specific topics of the project.
- Knowledge of tools, programming languages (Python, R) and Artificial Intelligence frameworks, such as Pytorch, TensorFlow, SageMaker, etc.

#### WHAT IS OFFERED

Scientific-technical opportunities: joining an interdisciplinary work team, with two PIs: Eugenia San Segundo (Phonetics Laboratory, CSIC) and Joaquín González Rodríguez (AUDIAS-UAM Research Group: http://audias.ii.uam.es/). The predoctoral candidate will develop (1) a system for detecting spoofing attacks, testing different architectures and evaluating their performance with different databases, and (2) phonetic experiments.

Training opportunities: writing a doctoral thesis in the field of AI and forensic acoustics; publishing scientific articles, attending conferences, carrying out research stays, as well as receiving digital skills training.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €. Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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# Project: Integrated on-chip photonic sensors powered by artificial intelligence and nanostructured metamaterials

#### Technological and scientific fields: Sensors / Artificial Intelligence / Nanotechnology

Location: Madrid, Institute of Optics (IO) (https://www.io.csic.es/)

Research Group/PI: Non-linear and nanoscale guided optics (N2GO) / Aitor Villafranca

#### **PROJECT SUMMARY**

The main objective of the project is the development of integrated on-chip photonic sensors through the synergistic combination of nanostructured metamaterials and artificial intelligence techniques. More specifically, high-resolution Fourier Transform microspectrometers will be developed by combining waveguides with sub-wavelength nanostructuring and artificial intelligence techniques for the optimization of the functional blocks that make up the spectrometer and for the processing of the data generated by it.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- BsC in physics, telecommunication engineering, electric/electronic engineering or computer engineering (or related topics)
- MsC in photonics (or related topics)

#### Merits to be considered:

- Knowledge of waveguides
- Knowledge of spectroscopy
- Laboratory experience with optical equipment
- Knowledge of simulation in Lumerical
- Proficiency in Matlab, Python, and Labview

#### WHAT IS OFFERED

The project includes a training plan of 260 ECTS over the four years. In addition to acquiring technical skills directly related to the project objectives (design, simulation, and characterization of waveguide devices; optimization through artificial intelligence; use of integrated sensors...), the training plan includes acquiring transversal skills for the professional development of the contracted person (industrial transfer, dissemination, networking, leadership with a gender perspective...). The project will be carried out in collaboration with the University of Malaga, where two research stays are planned. Additionally, two international research stays are planned: one at C2N-CNRS (France), and another to be determined between the Royal Institute of Technology (Sweden) or Aristotle University of Thessaloniki (Greece), depending on the project's progress and the training needs of the contracted person. The PI and the hosting group have a strong commitment to gender equality and diversity.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Analysis of the interconnections between voluntary forest carbon markets, corporate climate neutrality efforts, and consumer preferences in the digital age.

**Technological and scientific fields:** Environmental Economics, Economics and Econometrics (Climate and Biodiversity)

Location: Madrid, Institute for Public Goods and Policies (IPP), www.ipp.csic.es

**Research Group/PI:** GEA: Environmental Economics Group, PI: Paola Ovando, co-PI: Kenedy Alva (UCM), <u>https://ipp.csic.es/es/org-structure/grupo-economia-ambiental-gea</u>.

#### PROJECT SUMMARY

The emergence of voluntary carbon markets is creating new funding opportunities through the issuance of carbon certificates (CCs) to support decarbonization processes. The conceptualization of the quality levels of these CCs, including considerations of their additionality, permanence, and social and/or environmental co-benefits, and how these quality notions affect the preferences and responses of demanding organizations and consumers, has not been studied in depth. This project proposes to develop and employ methods, tools, and systems for massive and automated web data processing and online surveys aimed at consumers to gather information that will allow analyzing corporate and consumer responses to the credibility and quality of CCs offered in major global carbon markets. The research will use quantitative methods, including web scraping and machine learning techniques, and advanced econometric methods to identify the factors influencing investment and consumption decisions and their relationship with decarbonization efforts. This will be complemented by online interviews with experts to gather different perspectives on the functioning and challenges voluntary carbon markets face today.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The beneficiary should have an official master's degree with a research profile, competencies in applied economic analysis, econometrics or related fields, and a high level of Spanish and English experts to gather different perspectives on the functioning and issues of voluntary carbon markets.

#### Merits to be considered:

Positive consideration will be given to: i) advanced knowledge and/or accredited training in the use of database management programs and econometric analysis (e.g., R, STATA, Matlab); ii) previous experience in survey design and/or analysis and development of quantitative research; and iii) prior research in topics related to the project (scientific articles, reports, master's theses, bachelor's theses, etc.).

#### WHAT IS OFFERED

The project will enable the PhD Student to gain advanced skills in using innovative tools and techniques for large-scale data collection, content extraction, text coding tools, and their integration with advanced econometric models. They will join an interdisciplinary research team in applied economics, social sciences, and environmental studies, contributing to the development of a novel research line addressing the analysis of individual and corporate perceptions and responses to the quality, credibility, and co-benefits associated with voluntary carbon markets. This research aims to guide the formulation of effective decarbonization policies and corporate strategies to ensure the quality and credibility of corporate climate actions.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: paola.ovando@csic.es

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Phone: +34 916 02 23 00 (ext 441208)

CSIC

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Project: Implementation of Machine Learning techniques for the design of new photonic materials

Technological and scientific fields: Artificial Inteligence, Machine Learning, Computational Chemistry and Physics

Location: Madrid, Spain, Instituto de Química Física Blas Cabrera, https://www.igfr.csic.es/es/

Research Group/PI: Molecular Simulation & Modelization group, Grupo de Simulación molecular y Modelización, Lara Martínez Fernández, https://www.smcm.igfr.csic.es

#### **PROJECT SUMMARY**

This project will study how DNA origami can be used as building blocks to form low-density crystalline structures with optical properties suitable for applications in high-resolution imaging, big data storage, or (bio)sensors. To this aim, challenging simulations that capture the fundamental ingredients of the interactions between blocks and between them and light, will be carried out through the implementation of Machine Learning techniques. The candidate will explore a wide range of simulation methods from Monte Carlo and Molecular Dynamics to Quantum mechanics. The experience of both PIs in these fields, together with the multidisciplinary team provided by the possible collaborations/short stays, will provide a unique environment for the candidate from both scientific and personal points of view.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree in Chemistry/Physics/Informatics, Mechanical/Telecommunications Engineering or equivalent qualifications.
- Proficiency in English.

#### Merits to be considered:

- Programming skills. •
- Knowledge in guantum chemistry and/or classical simulations.

#### WHAT IS OFFERED

This project offers many opportunities to the candidate. From the scientific and technological point of view it will allow the candidate to learn different programming languages, techniques, and methods that are commonly used in a broad range of areas, from Chemistry and Biology to Physics. This knowledge is highly demanded by companies, so this project will be very useful for the candidate's future employability, whether the student continues in research or in pharmaceutical, consulting and/or software development companies. In addition, during the project, other transversal aspects will be encouraged: i) mobility and internationalization, through short stays in groups of recognized experts in the fields, ii) strategies for the design and implementation of research projects, through the writing of reports and articles, and iii) dissemination and presentation of results through the participation in conferences. With these aims in mind, a thorough training plan has been designed with a total of 278 ECTS.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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### Project: Design of PROTACs for the validation of novel therapeutic strategies

#### Technological and scientific fields: New medicines design

Location: Madrid, Comunidad Autónoma de Madrid, C/Juan de la cierva, 3, 28006; Instituto de Química Médica (IQM) https://www.igm.csic.es/

Research Group/PI: Grupo de Moduladores del Sistema Endocannabinoide. Paula Morales Lázaro

#### PROJECT SUMMARY

Proteolysis-targeting chimeras (PROTACs) are small molecules that induce the degradation of a target protein, allowing for the design of innovative chemical probes and drugs for previously inaccessible targets. PROTACs are heterobifunctional chemical entities composed of two ligands or active groups (one binding to an E3 ligase and the other to the protein of interest) connected by a linker. These proteolysis-targeting compounds represent a significant advancement in the development of new drugs for oncological pathologies. However, due to their molecular complexity, designing such chemical entities poses numerous challenges. This project aims to combine bioinformatics, molecular modeling, and artificial intelligence to develop new in silico approaches for designing PROTACs. As a proof of concept, three targets that have not yet been explored using this strategy will be studied: two mitotic cytosolic proteins (Cdc20 and Mps1) and a membrane protein, the cannabinoid receptor type 1 (CB1R), which have proven to be privileged targets for cancer treatment.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Bachelor's Degree in Biochemistry, Master's Degree in Biochemistry, Molecular Biology, and Biomedicine. Proficient in Spanish and English.

Experience with scientific software such as Schrödinger Suite and DataWarrior.

Knowledge of computer-aided drug design tools and techniques (docking, virtual screening, scaffold hopping).

#### Merits to be considered:

- Experience in molecular modeling and cancer biology
- Drug design techniques and computational chemistry
- Basic knowledge of programming in R and Python •
- Conference presentations
- Courses in molecular biology, databases, and artificial intelligence will be valued

#### WHAT IS OFFERED

We offer multidisciplinary training in the area of new drug discovery. Through this project, the predoctoral researcher will be trained in the comprehensive use of bioinformatics tools, artificial intelligence, and computational chemistry. Additionally, they will have the opportunity to undertake three internships that will complement their training: one with Javier de la Rosa's group (CIC-IBMCC) for training in server development, another with Dr. Antonio J. Pérez Pulido (UPO) for handling bioinformatics analyses, and another with Professor Victor Bolanos' group at Brookes University, UK, for training in structural biology. The predoctoral researcher will be able to attend various national and international conferences.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *Development of PET-US imaging for monitoring cellular processes in organ analogs* 

#### Technological and scientific fields: medical imaging; medical devices

**Location:** Madrid, Madrid, Instituto de Tecnologías Físicas y de la Información "Leonardo Torres Quevedo" <u>https://www.itefi.csic.es/es</u>

**Research Group/PI:** Multichannel ultrasonic signal processing group, Oscar Martínez Graullera, <a href="https://www.itefi.csic.es/en/dtic/musp/presentacion">https://www.itefi.csic.es/en/dtic/musp/presentacion</a>

#### **PROJECT SUMMARY**

This project proposes the development of imaging techniques that merge high-frequency ultrasound imaging with positron emission tomography (PET) to study complex biological models such as organoids, organs-on-chip, bioprinted tissues. The combination of these techniques will allow a more accurate and complete evaluation of the functionality of the models studied, using advanced signal processing techniques and artificial intelligence.

Objective 1: Design and develop imaging instrumentation (US and PET) specifically adapted to the unique geometries and dimensions of organoids, artificial organs and bioprinted tissues, non-invasive and compatible with their survival systems.

Objective 2: Combined multimodal PET and ultrasound imaging for active and non-invasive monitoring of cellular processes.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- University degree in Physics or Engineering.
- Master degree.
- Knowledge of programming and signal processing

#### Merits to be considered:

- Knowledge of biomedical imaging techniques.
- Master's degree in Biomedical Physics, Nuclear Physics or similar is an asset.
- Knowledge of computing and artificial intelligence techniques
- Experience with Python would be welcome.
- Scientific publications and presentations at conferences would be an asset.

#### WHAT IS OFFERED

The work will allow the candidate to develop a doctoral thesis, covering very broad aspects of the technologies under study such as instrumentation, signal processing, image reconstruction and the use of artificial intelligence techniques. Training activities will be funded by the project and include a university master's degree related to bioengeneering or computing technologies applied to health as well as several internal CSIC training courses for a total of 62 ECTS credits. Three training stays in expert groups in ultrasound and PET imaging are planned, including one national and two international stays.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *PTI AGRIAMBIO. Development of relational software for the adaptive improvement of the socio-environmental effectiveness of the Common Agricultural Policy (CAP) in Spain.* 

**Technological and scientific fields:** Digital tools for agriculture, livestock, aquaculture, etc. Massive data and information processing technologies. High performance computing.

Location: Madrid / Community of Madrid / Museum of Natural Sciences / <a href="https://pti-agriambio.csic.es">https://pti-agriambio.csic.es</a>

Research Group/PI: PTI AGRIAMBIO / Mario Díaz Esteban / www.pti-agriambio.csic.es

#### **PROJECT SUMMARY**

The project aims to a) develop the basic structure of the relational databases of environmental, social and agronomic indicators for the adaptive improvement of the socio-environmental effectiveness of the Common Agricultural Policy (CAP), in close collaboration with the Ministry of Agriculture, Fisheries and Food and other relevant entities (NGOs, research groups); b) build it under the supervision of PTI AGRIAMBIO researchers (for the adaptive improvement of the socio-environmental effectiveness of the Common Agricultural Policy (CAP); c) design measurement protocols for its routine application and d) carry out analysis of the results of the first years of application of the CAP in Spain. Both the protocols and the results of the analyzes will give rise to publications, both scientific and technical (reports, presentations, or patents).

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree in Agricultural Sciences, Environmental Sciences, Biology or Economics.
- Master's degree
- Fluency in English

#### Merits to be considered:

Experience in projects related to sustainable agriculture, management and conservation of natural resources and/or environmental socio-economics. Knowledge and handling relational databases. Familiarity with analysis of large volumes of data and ability to work in multi-disciplinary teams. Experience with Geographic Information Systems, especially ArcGIS.

#### WHAT IS OFFERED

Interdisciplinary training in advanced analysis techniques based on Artificial Intelligence, Machine Learning and Deep Learning.

Periodic stays at the Ministry of Agriculture, Fisheries and Food (MAPA) with the teams that will provide a large part of the raw data sets of interest for the thesis project (20-30 ECTS), short stays (5-10 ECTS) in other research groups and NGOs and in relevant European centers.

Courses in data management with SQL technologies, programming and analysis using programming with R and/or Python, management of spatio-temporal data and remote sensing images, and modelling with Machine and Deep Learning techniques specific to the agricultural field.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33  ${\ensuremath{\in}}$  .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *Digital Transformation of conservation and plant breeding activities by* high-throughput phenotyping

**Technological and scientific fields:** Computer Vision Image Analysis Robotics, Big Data and Information Processing Technology

**Location:** Alcalá de Henares, Madrid, Centro de Recursos Fitogenéticos, INIA-CSIC <u>https://www.inia.es/en-en/units/Institutes%20and%20Centres/CRF/Paginas/Home.aspx</u>

**Research Group/PI:** Conservation of Plant Genetic Resources Luis Guasch Pereira.

#### **PROJECT SUMMARY**

The project consists of implementing, in collaboration with the company INYCOM, high throughput phenotyping systems for planta characterizations consisting of two field robots equipped with several hyperspectral image sensors and artificial intelligence tools. By combining various RGB cameras, RGB-D and LIDAR sensors, the aim is to reconstruct a three-dimensional model of the crops inspected by the robots from autonomous navigation. The reconstructed 3D point cloud model will include the spectral response (reflectance) of the cultures in more than 270 different wavelengths or channels (350 - 2000nm) taken with dedicated hyperspectral equipment. To this end, different methods and tools will be evaluated: artificial intelligence, 3D artificial vision and machine learning/deep learning. Morphological characters would be annotated on this system by segmentation both in plane and in 3D vision, as well as estimating biochemical parameters through the reflectances. The last phase would be the development of predictive models from spectral images to relate it to yield, drought tolerance, relationship with photosynthetic capacity, etc.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

To carry out the doctorate, it is necessary to have a bachelor's degree and a master's degree in a degree related to data science, mathematics, physics, biology, engineering or others.

English (B2) is required for the mobility stays in other research centers.

#### Merits to be considered:

Knowledge of 3D artificial vision, machine learning, deep learning, plant characterization and Python and/or C++ programming language. English C1 or C2

#### WHAT IS OFFERED

The 130 ECTS training project would include navigation and self-guidance tests of the robots and the integration of the 3D models that would be carried out in the company. Later, the integration of data and annotation would be done. Finally, the models and the relationship between agronomic traits and spectral data and images would be carried out with field trials. Depending on the candidate's previous training, it is proposed to study the doctoral program in Automation and Robotics at the Polytechnic University of Madrid (in collaboration with the CAR-CSIC). Visits are planned to both CSIC, IAS centers; MBG, as European centres belonging to ESFRI EMPHASIS or with which we collaborate such as the IPK.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Multi-scale integration of proximal and remote sensing data for the efficient implementation of artificial intelligence algorithms in environmental

applications

Technological and scientific fields: Remote sensing, multiscale integration, artificial intelligence

**Location:** Madrid, Comunidad de Madrid, Institute of Economics, Geography, and Demography **Research Group/PI:** Environmental Remote Sensing and Spectroscopy Laboratory (SpecLab, https://speclab.csic.es) / Javier Pacheco-Labrador and M. Pilar Martín

#### PROJECT SUMMARY

The Ph.D. candidate will develop new approaches to integrate multi-scale proximal and remote sensing data that enable, improve, or optimize the application of artificial intelligence algorithms in the context of environmental applications and vegetation monitoring. The candidate will integrate into SpecLab, a reference laboratory in the context of proximal sensing and the acquisition and analysis of multi-scale spectral data, and will closely collaborate with members of the CSIC's interdisciplinary thematic network TELEDETECT (<u>https://pti-teledetect.csic.es</u>). The candidate will follow a tailored training program to acquire the scientific and technological skills necessary to achieve these aims, perform research stays in national and international laboratories, and develop open-source applications to facilitate the use and maximize the impact of his/her research.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The candidate should feature

- Bachelor or engineering degree in computing science or natural/environmental sciences
- M.Sc. in geographical information technologies, remote sensing, or similar
- Proficiency in written and spoken English •
- Basic programming skills •

#### Merits to be considered:

We will also value

- Research experience
- Publications •
- Application development experience •
- Knolwedge on statistics, geostatistics, or database management

#### WHAT IS OFFERED

This position offers the candidate specialization in transversal topics to remote sensing: multiscale data integration, and artificial intelligence, which will maximize future opportunities in the academy and industry. The project will take place in a reference laboratory specialized in remote sensing and field and laboratory spectroradiometry, where the candidate will be able to diversify and enlarge his/her CV. The interactions with national networks and a research stay at an international research institute of excellence will provide an above-average number of scientific connections. The tailored research program (240 ECTS) will be reviewed and agreed upon with the supervisors to identify gaps and avoid unnecessary efforts where knowledge already exists. The results will be useful for the remote sensing community and the TELEDETECT network, which will maximize the impact and visibility of the candidate.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: javier.pacheco@csic.es Phone: +0034 916022742 / Ext. 441399











Project: Establishment of the digital ecosystem for the genetic improvement of fruit trees.

Technological and scientific fields: Big data and information processing technologies, Advanced data analytics/edge computing, Climate change and biodiversity, Data analysis and integration, Image analysis and computer vision, Remote sensing, Artificial Intelligence.

Location: Murcia, Región de Murcia, CEBAS-CSIC, http://www.cebas.csic.es

Research Group/PI: Fruit Breeding Group, Pedro José Martínez García, http://www.cebas.csic.es/dep spain/mejora/mejora genetica/mejora lineas.html

#### **PROJECT SUMMARY**

The general objective of this project is to enable a digital ecosystem that allows the implementation of smart breeding. To do this, it is necessary to analyze and interpret large volumes of data (Big Data), develop code, applications and software systems in various programming languages and frameworks, implement and maintain technological infrastructures, such as networks, servers and cloud services and the ability to work with emerging technologies such as the Internet of Things (IoT), virtual and augmented reality, blockchain and artificial intelligence. This digital innovation will allow us to generate more precise decision-making, as well as implement much more efficient improvement strategies.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Candidates should have a University Degree and a master's degree in mathematics, statistics, physics or computer science.

Excellent written and oral communication skills in English are essential.

#### Merits to be considered:

- Excellent academic grades will be highly valued. •
- Previous experience in research projects and team.
- Highly motivated and eager to work on biological problems (in plants) using theoretical and • computational approaches.
- Good teamwork ability •
- Good communication skills, verbal and written, will be valued •
- Knowledge of programming languages, databases (relational and non-relational), AI, digital twin, web • page designs and algorithm development.
- High level of enthusiasm and motivation; passion for research! (essential!) •

#### WHAT IS OFFERED

The PhD candidate will perform digital and computer work to develop a Doctoral Thesis. Acquisition of knowledge applicable to different research disciplines. Attending national and/or international conferences to present the Thesis outcomes. Collaboration in national and/or international projects. Collaboration with national and/or international researchers.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: pjmgarcia@cebas.csic.es Phone: 968396200 ext 445518



momentum@csic.es | https://momentum.csic.es/









Project: Broad transformation of CSIC Digital Capabilities through dedicated AI support from BCBHub

Technological and scientific fields: Artificial Intelligence, High-Performance Computing, Edge Computing, Data Analysis and Integration, Ethical Aspects of AI, Green Algorithms

Location: Paterna, Comunidad Valenciana, I2SYSBIO, https://www.uv.es/instituto-biologiaintegrativa-sistemas-i2sysbio/es/instituto-biologia-integrativa-sistemas-sysbio.html

**Research Group/PI:** Genomics of Gene Expression, Ana Conesa, http://conesalab.org/

#### **PROJECT SUMMARY**

The project aims to address the needs for improvement, standardization, and FAIRification of the bioinformatics tools of the CSIC Bioinformatics Community and the workflows of their Bioinformatics Services. A detailed study and implementation of workflow control applications (Netwflow, n-flare, Snakemake), containerization systems (Docker, Singularity, Conda), and the most suitable parallelization for the tools will be carried out. Solutions will be developed for the incorporation of artificial intelligence functionalities into them and intelligent systems for training, monitoring, and publication.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Higher degree in Computer Science or Engineering with a Master's degree in Bioinformatics, Biotechnology, Molecular Biology or similar.
- English proficiency.

#### Merits to be considered:

- Knowledge of programming languages used in Bioinformatics such as R, Perl, Java
- Previous experience in Bioinformatics •
- Basic knowledge of biology. •
- Knowledge of Systems Administration and machine learning methods

#### WHAT IS OFFERED

Incorporation into the PhD program in Information Technologies, Communications, and Computing at the University of Valencia, with a training package of 240 credits that includes two stays abroad and attendance at international courses and conferences. The program offers extensive and diverse training in the field of bioinformatics, led by top researchers in this area within CSIC. This training includes elements of artificial intelligence, analysis of genomic and molecular data, development of user-friendly software for the scientific community, and standardization of workflows. Additionally, the candidate will be integrated into the Computational Biology and Bioinformatics Connection (BCB), which will allow them to get to know and interact firsthand with the entire scientific community of CSIC in BCB. Specifically, the person will develop their thesis by integrating into a research center in Systems Biology and Bioinformatics, which is multidisciplinary and international in nature, comprising engineers, biotechnologists, bioinformaticians, biologists, physicists, and mathematicians.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: ana.conesa@csic.es Phone: (+34) 963544771













## Position Offered: PREDOCTORAL RESEARCHER Project: *Digital Techniques in Medical Devices*

Technological and scientific fields: Artificial intelligence, Medical Imaging, Medical Devices

**Location:** Valencia, Comunidad Valenciana, Instituto de Instrumentación para Imagen Molecular (I3M), <u>www.i3m.upv.es</u>

**Research Group/PI:** X-ray Imaging Laboratory (XLab). Prof. Jose Maria Benlloch Baviera (<u>https://i3m.csic.upv.es/research/stim/xraylab/</u>)

#### PROJECT SUMMARY

Ionising radiation is widely used in modern medicine. These techniques deliver radiation doses to the patient, providing valuable diagnostic information, and are also a specific type of therapy in themselves. One of the main research challenges is to reduce doses while maintaining therapy results and image quality. This is the context of this project, which takes a multidisciplinary approach to dose reduction. In the PET imaging modality, AI techniques will be applied that have a direct impact on image quality, and thus on potential dose reduction, such as: (i) Addressing the main corrections (normalisation, attenuation, sparse matching and random matching) (ii) Improving Mass Data Processing, Management and Storage; (iii) Improving the determination of Gamma Ray positions and Interaction time in the Detector; (iv) Optimising Image Reconstruction Algorithms; (v) Improving Process Automation in the PET-CT co-registration process.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- BSc in Biomedical Engineering
- Proficiency in English and Spanish (B2 required)

#### Merits to be considered:

- MsC in Medical Imaging
- Experience in Medical Imaging projects, especially in PET
- Knowledge of Artificial Intelligence techniques, especially in convolutional neural networks.
- Python programming

#### WHAT IS OFFERED

Participation in high-impact research projects in the field of medical imaging, with direct transfer to society, together with a group of professionals with extensive experience in the field. During the contract, specific training activities will be carried out, such as a master's degree in AI or cloud computing, as well as training stays in companies, both in Spain and in Germany.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: benlloch@i3m.upv.es Phone: +34 615182946 (Laura Moliner)











Project: DigiAcuaSOS: Application of digital tools and artificial intelligence techniques for the development of sustainable and precise aquaculture in the context of climate change

Technological and scientific fields: Aquaculture, Digital tools for aquaculture, Computational biology, Bioinformatics, Massive data integration, Artificial Intelligence

Location: Cabanes, Castellón, Institute of Aquaculture Torre de la Sal (IATS), https://iats.csic.es/, https://nutrigroup-iats.org/

Research Group/PI: Nutrigenomics and Fish Growth Endocrinology Group, PI: Jaume Pérez Sánchez, https://nutrigroup-iats.org/; Co-PI: Juan Alberto Falcó Graciá

#### **PROJECT SUMMARY**

Aquaculture is the fastest growing animal production sector in the world, but it faces threats such as production intensification, climate change and pollution. The diversity and confluence of factors involved widen the range of possible scenarios, requiring holistic and versatile solutions to address this complexity. One approach to meet this challenge is the implementation of new (micro)electronic and digital technologies, already available by the PI of this proposal, for the development of advanced tools with massive, automated and continuous capacity for the acquisition, recording, integration and analysis of multifactorial data, with the ultimate goal of improving the monitoring, management and forecasting of aquaculture production in real time.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree in biology/biotechnology and knowledge of bioinformatics.
- Master's degree in Bioinformatics, Biostatistics or equivalent.
- English comprehension/writing skills and scientific motivation.

#### Merits to be considered:

- Programming language skills (Python, R, SQL, Java).
- Knowledge of code control (Linux, Git, Nextflow, Nf-core).
- Experience in data analysis (omics and big data) and statistics.
- Web application development is a plus.

#### WHAT IS OFFERED

An employment contract is offered, under the conditions described herein, for the development of a doctoral thesis and training in digital literacy applied to aquaculture. This specialized training will be official and will consist of a series of courses related to the tasks proposed in the project, concerning database design, statistical analysis and artificial intelligence, programming, use and management of computational resources and multi-omics integration. He/she will also carry out several stays of at least 3 months in national and international reference facilities, in addition to attending specialized congresses in aquaculture, hologenomics and bioinformatics.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: jaime.perez.sanchez@csic.es; alberto.falco@csic.es Phone: + 34 964 319500 ext 233; +34 964 187477











Project: MACHINE LEARNING ASSISTED COMPUTATIONAL INVESTIGATION OF METAL OXIDE CATALYSTS FOR CHEMICAL LOOPING APPLICATIONS

**Technological and scientific fields:** New Materials, High Performance Computing, Artificial Intelligence

**Location:** Valencia, Comunidad Valenciana, Instituto de Tecnología Química (ITQ) <u>https://itq.upv-csic.es/</u>

Research Group/PI: Molecular Design of Catalysts / Mercedes Boronat Zaragozá

#### PROJECT SUMMARY

In this period of transition towards a sustainable society, it is necessary to develop new technologies for the efficient production of energy and chemicals. In chemical loop processes, a chemical reaction is divided into two separate steps mediated by a metal compound that reacts and regenerates reversibly in cycles, allowing for smoother reaction conditions and energy-intensive gas separation. The design of tailor-made materials for chemical loop applications, based on a deep understanding of the structural evolution of the catalyst under operating conditions, requires the development of new and faster computational methods capable of achieving sufficiently large time and length scales. It is necessary to incorporate Artificial Intelligence techniques and, more specifically, Machine Learning to reproduce the precision of quantum chemistry at a much lower computational cost. The goal of this proposal is to develop applications. The theoretical study of the thermodynamics and kinetics of such profound transformations of solid materials (complete reduction and oxidation under different conditions) will open up the possibility of making more accurate computational predictions of catalyst behavior under realistic conditions, for these oxides and for other types of solid materials.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Academic qualifications required:

• Bachelor's Degree in Chemistry

#### Merits to be considered:

Master's degree in Theoretical Chemistry, Materials or related topics, previous experience in computational studies related to catalysis and/or materials, and basic knowledge of programming languages will be valued.

#### WHAT IS OFFERED

Incorporation into a multidisciplinary group to study the Doctoral Programme in Sustainable Chemistry at the Universitat Politècnica de València (UPV). Learning of computational methods applied to catalysis and machine learning techniques. Two training stays are planned in prestigious research centers. 150 ECTS expected at the end of the contract.

#### Contract conditions:

Predoctoral Researcher contract of 4 years' duration. Gross annual salary of 23,871.33 €.

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: boronat@itq.upv.es Phone: +34 96 387 9445











## **UNIVERSITY GRADUATE** POSITIONS



## 62 Contracts

## **14 CCAA**

4 PTI / HUBS

## **56 CENTRES**

## **28 CITIES**

Andalucía Aragón Asturias **Islas Canarias** Castilla y León Cataluña **Extremadura** Galicia **Islas Baleares** La Rioja Madrid Navarra País Vasco **Comunidad Valenciana** 



Financiado por la Unión Europea NextGenerationEU













Plan de Recuperación, Transformación y Resiliencia



Proyecto: Digital twins in Heritage. Digital documentation and HBIM integrated methodologies

Ámbitos tecnológicos o científicos: Digital Twins; Digital Humanities; others: HBIM, GIS

Localización: Granada, Andalusia, School of Arabic Studies, https://www.eea.csic.es/

Grupo de Investigación / IP: Laboratory of Archaeology and Architecture of the City, Luis José García Pulido

#### **RESUMEN DEL PROYECTO**

The project addresses the integration of emerging technologies in the field of graphic documentation of Architectural and Archaeological Heritage, oriented both to research projects and architectural restoration projects. The aim is to implement a combined methodology of digitalization, analysis and monitoring of Historical Heritage to serve as a basis for its study, conservation and planned management, joining the different technologies and digital tools digital twins generation, with GIS and HBIM methodologies.

#### PERFIL PROFESIONAL

#### Requisitos mínimos:

- Academic qualifications required: Architecture; degree in Architecture + Master's degree in Architecture.
- Specialised training in: (1) graphic and photogrammetric survey techniques of architectural heritage; (2) Geographic Information Systems; (3) Archaeology of Architecture.
- 3 years of accredited experience in graphic documentation works related to restoration and recovery of architectural and archaeological heritage.
- Accredited experience in: (1) fieldwork architectural survey data acquisition; (2) analysis and acquisition of historic archive documentation.
- Fluency in Spanish (level C1) and intermediate level of English (B1).

#### Méritos valorables:

Specific training in Andalusi Heritage. (2) Coordinating role and participating experience in graphic documentation works in archaeological interventions. (3) Experience in: transfer activities in subjects directly related to the researches carried out in the EEA; dissemination activities in the educational and social field; organisation role in scientific dissemination events.
Scientific publications in subjects directly related to the researches carried out in the EEA.

#### QUÉ SE OFRECE

The Laboratory of Archaeology and Architecture of the City (School of Arabic Studies, CSIC) carries out a relevant research work on Islamic Heritage through the implementation of numerous R+D+i projectcs and architectural restoration projects that have led to significant progress in both knowledge and conservation of this cultural legacy. This project includes an important training plan (min. 65 ECTS) in advanced technologies and digital tools for documentation and data management (graphic documentation, HBIM and GIS), allowing the implementation of an integrated methodology.

#### Condiciones de contrato:

Contrato indefinido de Titulado Superior asociado al Proyecto Momentum de 4 años de duración, de acuerdo a la Ley de la Ciencia española.Salario anual bruto (37.000 € - 41.000 €).

#### Inicio del contrato: antes del 31 de diciembre de 2024

#### CONTACTO DEL INVESTIGADOR PRINCIPAL

E-mail: luis.garcia@eea.csic.es Teléfono: 958222291











## Position Offered: UNIVERSITY GRADUATE Project: Development, implementation and commissioning of an open Virtual Research Environment for monitoring greenhouse gases (EVI-GEIs)

Technological and scientific fields: Data Analysis and Integration, Massive data and information processing technologies, Remote Sensing, Climate Change and Biodiversity

Location: Almería, Andalucía, Estación Experimental Áridas de Zonas (EEZA), http://www.eeza.csic.es/es/default.aspx

**Research Group/PI:** Desertification and Geoecology group / Francisco Domingo Poveda

#### **PROJECT SUMMARY**

For more than 20 years, the Desertification and Geoecology group of the Experimental Station for Arid Zones (EEZA-CSIC) has been studying, in collaboration with the Universities of Granada (UGR) and Almería (UAL), the fluxes and balances of Greenhouse Gases (GHGs) in terrestrial ecosystems through measurement of soil fluxes and the Eddy Covariance (FS-EC) technique, along with auxiliary meteorological, edaphic and phenological variables. FS-EC generates enormous amounts of data and information as it measures a multitude of variables in a stable and continuous manner every tenth of a second. Non-harmonized and dispersed data from various ecosystems have been generated and available since 2004. The candidate will work on the development and implementation of a virtual research environment for "open" use and consultation, and will incorporate the data into national and international networks, to promote and improve the use and efficiency of scientific data and information, encourage and strengthen collaboration, transfer and dissemination, as well as the positioning and global visibility of the EEZA-CSIC and its experimental field sites.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduated in Environmental Sciences. Fluency in Spanish and English

#### Merits to be considered:

Computer knowledge at a technical level. Knowledge in Geographic Information technologies. Experience in the formation and manipulation of databases, in the operation of greenhouse gas analyzers (e.g. Eddy Covariance systems and others).

#### WHAT IS OFFERED

The candidate will participate in scientific publications of high international impact, will carry out training stays in highly prestigious national Institutes, such as the Interuniversity Research Institute of the Earth System in Andalusia (https://www.iista.es/), the Global Change Observatory of Sierra Nevada (https://obsnev.es/), and international, such as the Euro-Mediterranean Center on Climate Change (CMCC) in Viterbo (Italy), at Columbia University in New York (USA) (60 ECTS). You will work in the ERIC (European Research Infrastructure Consortium) networks of the ESFRI (European Strategy Forum on Research Infrastructures) program, such as ICOS (Integrated Carbon Observation System), LifeWatch (Science and Technology Infrastructure for Biodiversity Data and Observatories) or ACTRIS (Aerosol, Clouds and Trace gases Research Infrastructure). In addition, the candidate will receive extensive training in digital skills through master's degrees and courses (between 123-141 ECTS).

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: poveda@eeza.csic.es Phone: 618642600











## Position Offered: UNIVERSITY GRADUATE Project: *Development of bioinformatic tolos to improve resilience in crops in Mediterranean area*

#### Technological and scientific fields: Digital Tools for Agriculture

Location: Córdoba, Andalucía, Institute for Sustainable Agriculture, https://www.ias.csic.es/

**Research Group / PI:** Resistance for biotic and abiotic stresses; <u>https://www.ias.csic.es/investigacion/departamentos/mejora-genetica-vegetal/mejora-vegetal-por-resistencia-a-estreses/elena-prats-perez/</u>. Elena Prats Pérez

#### PROJECT SUMMARY

This project's aim to use advanced bioinformatics techniques to identify and promote more resilient crops. The project aims to provide support through the use of these bioinformatics tools to the different IAS-CSIC researchers, with objectives such as:

- Modeling through bioinformatic: to develop computational models to simulate and predict how plants will respond to different environmental conditions.
- Database Searches: Explore genomic databases to identify genes and sequences relevant to resilience to environmental stresses.
- Search for Molecular Markers through genome-wide association studies (GWAS) to identify molecular markers associated with resistance characteristics.
- Study of Structural Variants prior assembly of genomic sequences that allow us to understand the role of these variations in adaptation to the environment.
- Genetic diversity and/or Evolutionary Genomics studies: which allow us to identify useful sources of variability and identify genes that have conferred adaptive advantages.
- Landscape Genomics Studies: which allows us to integrate genomic data with environmental information to understand how it influences the distribution and adaptation of crops.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduated in a Science carrer (e.g. Biochemistry, Biology, Biotechnology, etc.) Master in bioinformatics B2 in English

#### Merits to be considered:

- Knowledge of R, Python, Linux, LaTeX, Perl, etc.
- Experience in data processing, GWAS, sequence assembly and annotation, statistical analysis, population genomics, etc.
- Work experience in the subject of the contract of at least 1 year.
- Knowledge of specific bioinformatics software such as BLAST, Kraken2, Admixture, Structure, SPAdes, MAKER, TASSEL, etc.

#### WHAT IS OFFERED

The candidate with prior knowledge in bioinformatics will obtain advance, detailed and complete training in bioinformatics and biostatistics, big data analysis, programming, machine learning, etc., including (but not only) courses, stay abroad, work experience etc

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: elena.prats@ias.csic / Phone: 957499291











Project: Development of a Platform for the Multiomic Analysis of the Response to Climate Change in Photosynthetic Organisms, the green microalgae Raphidocelis subcapitata as a case study of biotechnological interest.

Technological and scientific fields: Climate change and biodiversity/ Data analysis

**Location:** Sevilla, Andalucía, Institute of Plant Biochemistry and Photosynthesis, <u>https://www.ibvf.us-csic.es</u>

**Research Group/PI:** Biología y biotecnología de sistemas en microalgas/Inmaculada Couso Liañez y Francisco J. Romero Campero/(<u>https://www.ibvf.us-csic.es/l1g6-biotecnolog%C3%AD-</u> <u>de-microalgas</u>)

#### **PROJECT SUMMARY**

Regarding the climatic emergency conditions (temperature and CO2 levels), we aim to integrate multi-omics data that includes transcriptomics, proteomics and metabolomics in the microalga Raphidocelis subcapitata under different conditions of temperature and CO2 availability. This microalga is well known for its adaptation to toxic conditions, which represents a biotechnological advantage for its continuous large-scale cultivation. Our objective is to analyze the presence of genes related to the biosynthesis of InsPs and transcription factors that have a fundamental role in the response of this organism to changes in temperature and carbon availability. Finally, we intend to develop a web tool where this data can be consulted in a simple and accessible way based on the tools developed in our group (ALGAEFUN, PHARAOHFUN). The selected candidate will be part of a training process that includes the MADOBIS master's degree from the US-UNIA, with specific teaching on topics related to omics and systems biology that it will be complemented by external stays (USA), UK) and specialization courses.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduated in Biochemistry/Biology and good level in English (written and spoken)

#### Merits to be considered:

Use of the R language and knowledge of Python, Machine Learning and Big Data. Demonstrable experience in the cultivation of microalgae and molecular biology.

#### WHAT IS OFFERED

The work will be carried out in the context of a multidisciplinary research group that have extensive experience in omics approaches and biological validations for the study of different processes in photosynthetic microorganisms. We offer an excellent work environment where we have very close supervision of the students and we offer them the opportunity to participate in national and international projects. This training will consist of about 320 ECTS credits between technological activities, digital training (master's degree) and complementary training (courses and stays).

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: inmaculada.couso@ibvf.csic.es Phone: 954489508











Project: A Machine Learning Approach to the Description of Carrier Dynamics in Quantum Dot Solids - ML4QD

Technological and scientific fields: Artificial Intelligence; Mass data and information processing technologies; High-performance computing; New materials

Location: Seville, Andalusia, Institute of Materials Science of Seville (https://www.icms.uscsic.es)

Research Group/PI: Multifunctional Optical Materials, Prof. Hernán Míquez (https://mom.icms.us-csic.es)

#### PROJECT SUMMARY

The ML4QD project is developed within the framework of a collaboration between the group of Prof. Hernán Míguez at the Institute of Materials Science of Seville (ICMS) and the team of Prof. Ivan Infante at BCMaterials. The project aims to develop advanced simulation tools leveraging machine learning (ML) to analyze carrier dynamics in quantum dots (QDs) of semiconductors with a perovskite structure. By employing ultrafast spectroscopy, the project investigates photoemission, hot carrier cooling, charge transport, and non-radiative recombination in QDs. Activities include generating experimental data, developing ML-based force field models, and validating these models. The ML models will be trained using data from Density Functional Theory (DFT)-based calculations to simulate electronic properties and guide future experiments. This project offers the opportunity to work with cutting-edge optical technologies and develop skills in advanced computing and ML techniques.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Academic degree: Bachelor's degree in Physics, Chemistry, Materials Engineering, or related fields. Proficiency in Spanish and English.

#### Merits to be considered:

The academic records, previous experience in computer simulations and/or the preparation and characterization of materials will be positively valued, as well as any other training related to the project activities.

#### WHAT IS OFFERED

The ML4QD project integrates advanced computing, machine learning (ML) techniques, and cutting-edge optical characterization methods. The selected candidate will spend three months annually at BCMaterials and will have the opportunity to participate in all activities of the "Track the Twin" Doctoral Training Network. This network focuses on developing digital twins of quantum dots to enhance the efficiency of optoelectronic devices. The comprehensive training program, equivalent to 240 ECTS over four years, includes workshops, summer schools on advanced computing, participation in international conferences, and courses in advanced ML and artificial intelligence.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: h.miguez@csic.es Phone: +34 954489581











### Project: Strengthening SILICE: advanced indicators and new functionalities

#### Technological and scientific fields: Data analysis and integration

Location: Córdoba, Andalusia, Institute for Advanced Social Studies (IESA), www.iesa.csic.es

**Research Group/PI:** Innovation sociology, José Luis Ortega, <u>www.uco.es/uco-csic-innovacion/en/home-en/</u>

#### PROJECT SUMMARY

This project is framed on the need of developing open applications that support Open Science policies (National Open Science Strategy, Barcelona Declaration). SILICE (silice.csic.es) (Sistema de Información sobre Literatura Científica Española) aims to describe the Spanish research production (publications, authors, organizations) exclusively from open sources (ORCID, Crossref, OpenAlex, ROR). In this way, the main objective of this project is to progress SILICE web application developing scholarly profiles by users, adding new and rigorous quality indicators about research activity, a monitoring dashboard and a registration service. To do this, the project foresees a massive data download form the selected sources and the processing of these data (MySQL, OpenRefine, R Studio) addressed to design and built research indicators.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Bachelor's degree (recommendable Computer Sciences) Knowledge in English language (writing, reading)

#### Merits to be considered:

Training or experience in web applications design and development (HTML, PHP, JavaScript). Knowledment in Data science (Python, R, OpenRefine, etc.).

Knowledment in databases design and management (MySQL, MongoDB, linked data). Statistics and Machine learning.

#### WHAT IS OFFERED

This position provides a only opportunity to develop a technical-scientific career in one of the leading CSIC research groups working in the study of research production, sociology of science and bibliometrics. As technician, he/she would acquire experience as web developer, database manager and designer, and as data scientist extracting and processing large datasets. From a scientific perspective, he/she would collaborate in other studies performed by the group, taking part in articles, projects and attending conferences. A key element is the training, offering:

- Master's degree (60 ETC) in data science or web development.
- Three months research stay in a national or international research centre.
- Attending CSIC internal training courses.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: jortega@iesa.csic.es Phone: 957240021











## Position Offered: UNIVERSITY GRADUATE Project: *High resolution agroclimatic variables for field trials and adaptation* of cereal crops (CLIMACER)

**Technological and scientific fields:** Climate change and biodiversity, platform of climate services, high-throughput data processing, adata integration and analysis, computational biology

Location: Zaragoza, Aragón, Estación Experimental de Aula Dei-CSIC, https://www.eead.csic.es

**Research Group/PI:** Computational and Structural Biology, **Bruno Contreras Moreira**, <u>https://eead-csic-compbio.github.io</u>; Erosion and Soil and Water Evaluation, **Santiago Beguería Portugués**, <u>https://www.csic.es/en/investigation/research-groups/erosion-and-soil-and-water-evaluation</u>

#### PROJECT SUMMARY

Understanding how crops respond and adapt to climate change is critical to ensuring food security and agricultural sustainability. Despite the existence of climatic data repositories, it is still challenging to calculate agroclimatic variables appropriate to the phenology of each crop, such as days of vernalization of winter cereal crops. This hinders the development of effective adaptation strategies. CLIMACER project addresses these limitations with two objectives. The 1<sup>st</sup> consists on developing open source tools for customized calculation of high-resolution agroclimatic indices based on public data, which will be used in two case studies of genotype-environment association with barley and Sinapis alba populations sequenced in previous projects. The 2nd is to compile a FAIR database that will aggregate cereal trial data from the GENVCE network along with agroclimatic indices for diverse trial locations.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Fluency in Spanish and English.
- Science university degree (computer science, biology, biochemistry, maths, physics, ...).
- Programming ans scripting languages.

#### Merits to be considered:

- R and/or Python programming skills.
- Software development skills (API creation, source code repositories, etc).
- Document digitalization skills (OCR).
- Database management and/or data science skills.
- Bioinformatics and/or geo-information science skills.

#### WHAT IS OFFERED

A training program will be customized for the hired person, with two alternative paths: a) enrolling on a **Master's program**; or, b) attending **courses** on scripting, bioinformatics, computer programming and data science. We also plan for the hired person to c) attend **conferences** on climatology, geoscience and genomics, d) organize a **workshop** in collaboration with CIHEAM Zaragoza to teach how to use the resulting API and d) to take part in **research secondments** for training in diverse national and international labs from 2025 to 2027.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000  $\in$  - 41.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: bcontreras@eead.csic.es / sbegueria@eead.csic.es Phone: +34 976716089











Project: Enhancing Experimental Data Analysis at INMA Through Artificial Intelligence

**Technological and scientific fields:** Artificial Intelligence, Nanotechnology, New Materials, Image Analysis.

**Location:** Zaragoza, Aragón, Instituto de Nanociencia y Materiales de Aragón (INMA), <u>https://inma.unizar-csic.es/en/home</u>

**Research Group/PI:** Theory, Modelling and Simulation (aTMOS) - <u>https://www.qmad.es</u> / Luis Martín-Moreno

#### PROJECT SUMMARY

The project focuses on the application of AI to optimize experimental data analysis, and even the techniques themselves, in the field of nanoscience and advanced materials. This interdisciplinary approach combines the expertise of a theoretical group on AI with several experimental groups from INMA, covering areas such as molecular detection, electron microscopy, and the characterization of nanoparticles in biological samples. By improving the accuracy and efficiency of data analysis, the project will not only benefit the teams involved but also promote the use of AI technologies within the institute, enhancing research and development of new materials with advanced applications in energy, biomedicine, and information technologies.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Bachelor's degree in Physics.
- Proficiency in English.
- Experience in computer programming.

#### Merits to be considered:

- Previous experience in AI, particularly in designing neural networks.
- Dual degree in Physics and Mathematics.
- Recipient of scholarships in the field of AI.
- Proficient in programming languages such as Python, C, C++, Fortran, and others.
- Recipient of academic awards.
- Proficient in multiple languages.

#### WHAT IS OFFERED

- Learning and development of innovative AI techniques.
- Interdisciplinary training (biomedicine, energy, microscopy, etc.).
- Over 70 ECTS of training.
- Training stay at a supercomputing center (Institute for Biocomputation and Physics of Complex Systems, Zaragoza).

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000  $\in$  - 41.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Use of Artificial Intelligence for the Quantification of Impacts of Extreme Weather Events and its Implementation in Climate Services (IMPACT-IA)

Technological and scientific fields: Artificial Intelligence, Massive Data and Information Processing Technologies, Data Analysis and Integration, Climate Services Platform, Digital Tool for Agriculture, Digital Humanities

Location: Zaragoza, Aragón, Instituto Pirenaico de Ecología (IPE) https://www.ipe.csic.es/

Research Group/PI: Environmental Hydrology and Climate-Human Interaction, Fernando https://www.ipe.csic.es/hidrologia-ambiental-e-interacciones-clima-y-Domínguez Castro, actividad-humana/

#### **PROJECT SUMMARY**

We aim to develop, for the first time in Spain, tools based on Artificial Intelligence that automatically select texts containing information about extreme weather events, classify their impacts by sector, and geolocate them. We will apply these tools to large digital newspaper archives to extract information from the past 325 years, creating an unprecedented database of extreme weather event and impacts. This database will be cross-referenced with meteorological station records to determine the impact thresholds of extreme events in various sectors. This knowledge will be used to develop a Climate Service aimed at monitoring the risk of impact from extreme weather events in the agricultural sector.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduate in Computer Engineering, Computer Engineer

#### Merits to be considered:

- Knowledge of programming languages such as Python, JAVA, C++, R.
- Proficiency in Linux systems, Kubernetes (K8), Docker containers, GNU Bash. •
- Experience as a programmer. Experience in handling and processing climate data.

#### WHAT IS OFFERED

Develop first-rate research activity in an interdisciplinary environment. A Training Plan of 250 ECTS will be developed, covering various topics related to Artificial Intelligence, extreme weather events, and the development of climate services. This will involve collaboration with staff from the Pyrenean Institute of Ecology, the Aula Dei Experimental Station, and the University of Zaragoza. The Training Plan includes completing a Master's degree in Artificial Intelligence, as well as 9 months of international stays to strengthen the skills necessary to achieve the project objectives.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: fdominguez@ipe.csic.es Phone: +34 876243764











Project: Automated Discovery of Biocatalysts through Artificial Intelligence for the Production of Compounds of Pharmaceutical Interest

**Technological and scientific fields:** Artificial Intelligence, Biotech, Computational Biology, Data Analysis and Integration, New Drug Design

Location: Zaragoza, Aragón, ISQCH, http://isqch.unizar-csic.es/ISQCHportal

Research Group/PI: The Alegre Group, Juan V. Alegre Requena, <u>https://thealegregroup.com</u>

#### **PROJECT SUMMARY**

This project will advance basic knowledge in digital biocatalysis, as well as promote the use of artificial intelligence protocols to design new biocatalysts and synthesize high-value chemicals such as pharmaceuticals. The ability to design biocatalysts through computational approaches not only increases the efficiency of their discovery, but also opens the door to performing complex chemical transformations that were previously considered unattainable. This advanced methodology promises to offer greener and more economical solutions for the synthesis of chemical products that are attractive to the chemical and pharmaceutical industries.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Licenciate or Graduate and MSc in Chemistry
- Proficiency in English

#### Merits to be considered:

- Knowledge of chemical machine learning and computational chemistry
- Experience with Python
- Proficiency in Gaussian

#### WHAT IS OFFERED

- 160 ECTS including bibliographic work, carrying out the proposed research, writing articles, and conference presentations
- 60 ECTS in research stays at the University of Girona and international institutions
- 120 ECTS in learning to code, familiarizing with computational chemistry programs, conducting data analysis and interpretation, and developing predictive artificial intelligence models, among other digital competencies
- 40 ECTS in scientific dissemination and supervision of junior group members

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000  $\in$  - 41.000  $\in$ ).

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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## Position Offered: UNIVERSITY GRADUATE Project: *Biodiversity trends under global change*

Technological and scientific fields: Biodiversity, habitats, species, databases, remote sensing

Location: Zaragoza, Aragón, Pyrenean Institute of Ecology, https://www.ipe.csic.es

Research Group/PI: Conservation of biodiversity. María Begoña García

#### PROJECT SUMMARY

Mediterranean countries make an extraordinary contribution to biodiversity, and to protect it the EU established the Natura 2000 network. This proposal aims to implement an integrated monitoring system at national level, as early-warning signals of changes in species and habitats of interest. To this end, trends in population abundance will be analysed using field monitoring data (time series of plants and animals) to obtain standardised indicators of biological trends in the Iberian Peninsula, and the extent and functionality of habitats using new generation technologies (changes in land cover, identification of climatic refugia, development of a semi-automatic system for future monitoring of habitats...). Population trends, habitat trends and layers of ecological variables will be integrated and made accessible in a geo-portal.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Graduate / Master / Doctorate in Biology or Geography
- Knowledge of R and/or other programming languages

#### Merits to be considered:

- Research experience (demonstrable through contracts or project-related grants).
- Collaboration with research teams (research stays or co-authorship of scientific articles)
- (co-)authorship of scientific articles with an impact.
- To be fluent in English language
- Courses related to remote sensing, use of databases, and/or Artificial Intelligence.

#### WHAT IS OFFERED

Collaborative work with 25 national teams collecting information on population trends in a wide range of biological groups, located at more than 1000 sites on the Iberian Peninsula. Interaction with teams from Oviedo (CSIC and University) to analyse changes in species at national level, and habitats in the Pyrenean-Cantabrian mountain range. Opportunity to develop pioneering integrative analyses combining large databases and information from remote sensors.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000  $\in$  - 41.000  $\in$ ).

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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# Project: Development of a digital phagogram for the automatized design of therapeutic phage products based on the ONE HEALTH PHAGE COLLECTION

Technological and scientific fields: Artificial intelligence/Data analysis and integration

**Location:** Villaviciosa, Asturias, Instituto de Productos Lácteos de Asturias (IPLA, CSIC), <u>https://www.ipla.csic.es/</u>

Research Group/PI: DairySafe, Lucía Fernández Llamas, https://www.ipla.csic.es/dairysafe/

#### PROJECT SUMMARY

Recently, researchers from IPLA and CINN have begun the creation of a CSIC bacteriophage collection that will make these viruses available to external users for use in phage therapy. This process involves the genomic and functional characterization of bacteriophages, including their antimicrobial efficacy and host range. Once the collection is available, the identification of the suitable phage or phages for each user could be carried out experimentally in the laboratory, determining the in vitro sensitivity of the bacterial strain to the phages available in the collection. The objective of this project is to take advantage of the great advances in the field of data science to optimize this task, so that the analysis can be carried out in silico, using the genomic and host range data collected in the phage library, through the application of machine learning techniques.

#### PROFESSIONAL PROFILE

#### Minimum requirements:

Graduate in Mathematics, Physics, Data Science Biotechnology, Computer Science or similar

#### Merits to be considered:

Advanced English level

Experience in massive data analysis, artificial intelligence and/or supercomputing

#### WHAT IS OFFERED

The candidate will be trained in different skills related to the management of genomic data and database management, and will acquire the following skills and competencies: I) Project design, critical assessment of the possible tools available and selection of optimal strategies in the solving scientific problems. II) Application of computational tools and workflows for the identification of phage/bacteria relationships with clinical interest. III) Collaborative work in multidisciplinary environments. The candidate will spend three months (20 ECTS) at the company Startquake S.L., specialized in the use and application of machine learning tools in the field of health. Additionally, the candidate's participation in other types of academic training stays may be considered, depending on the results obtained. The completion of a specialized master's degree in data science is also contemplated with an estimated workload of 60 ECTS credits.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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## Position Offered: UNIVERSITY GRADUATE Project: Advanced Strategies in Artificial Intelligence and High Performance for Data Analysis and Integration in Food and Health Science

**Technological and scientific fields:** Data Analysis and Integration, Artificial Intelligence and High Performance Computing

Location: Oviedo, Principado de Asturias, Instituto de Productos Lácteos de Asturias

Research Group/PI: María Fernández García, www.ipla.es

#### PROJECT SUMMARY

Research in the food area has undergone significant changes in recent years with the development of omics techniques. This has resulted in a true revolution, generating an abundance of data whose analysis has required the development of new data analysis, bioinformatics, statistical, and computational techniques. However, it is necessary to take a step forward in the analysis capabilities and in the development of digital tools that enable better data integration and analysis, facilitating more efficient and accurate analyses by using or developing bespoke software for the center's research objectives. To achieve this goal, a continuous training plan is proposed, combining resources from IPLA and the Department of Computer Science and Artificial Intelligence at the University of Oviedo. There is also the possibility of training through a specialized master's degree, as well as an international stay at a renowned center in the field of digital technologies

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduated in Computer Science or equivalent

#### Merits to be considered:

Demonstrable professional experience in intelligent data processing. Demonstrable professional experience in quantum simulation. Scientific articles and conference presentations on classical and quantum machine learning. System administration with Linux operating systems and knowledge of SLURM.

#### WHAT IS OFFERED

momentum@csic.es | https://momentum.csic.es/

The project "Advanced Strategies in Artificial Intelligence and High Performance for Data Analysis and Integration in the Food and Health Science " focuses on the application of innovative technologies in artificial intelligence (AI) and high-performance computing (HPC) to address complex challenges in massive data analysis. This project will stand out for its interdisciplinary nature, combining expertise in computer science, mathematics, data science, and specific areas related to the problem at hand, enabling a holistic and efficient approach to the challenges posed. In terms of scientific and technological activity, the project will incorporate cutting-edge developments in AI, such as deep learning and neural networks, along with advanced HPC techniques. The training plan associated with the project is comprehensive, covering a total of 240 ECTS to be completed over the four-year duration of the contract. This plan will include specific training in emerging technologies for efficient data processing, artificial intelligence, high performance, and basic approaches to quantum machine learning. It will also feature training stays in research centers and collaborations with companies and/or technological institutes.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Computational biology for the analysis of island biodiversity BIG DATA

**Technological and scientific fields:** Computational Biology; Artificial Intelligence; High Performance Computing

**Location:** San Cristóbal de La Laguna, Santa Cruz de Tenerife, Instituto de Productos Naturales y Agrobiología, IPNA <u>https://www.ipna.csic.es</u>

Research Group/PI: Island Ecology and Evolution / Prof. Brent C. Emerson

#### PROJECT SUMMARY

The Ecology and Evolution in Islands Group (GEEI) is a pioneer group in the generation and analysis of Island Biodiversity BIG DATA, from the generation of barcode sequences on a massive scale to the sequencing of complete genomes. The group is at a crossroads, requiring complementary skills in computational biology and bioinformatics to make the most of the different geospatial and genomic data that is being generated, within the disciplines of ecology, evolution and conservation of island biodiversity. The chosen candidate will benefit from a training program that will allow them to collaborate in research projects where they are responsible for assembling an arthropod genome at the chromosomal level, assembling genomes through resequencing, and applying Artificial Intelligence to the analysis of metabarcoding data.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

MSc in Bioinformatics Experience in programming with Python, R, BASH and PHP languages Fluent in Spanish and English

#### Merits to be considered:

Experience in bioinformatics applied to genomic data, especially with long-read sequences. Experience in bioinformatics applied to metabarcoding data of arthropod communities. A strong biological background. Experience in the development and implementation of next generation sequencing pipelines.

## WHAT IS OFFERED

The project offers the successful candidate the opportunity to train in bioinformatics skills related to the analysis of genomic data and metabarcoding, and participate in research activities related to the training to be undertaken. The training includes a total of 242.5 ECTS, which is divided into 4 blocks. The project is made up of four work packages (WPs), each having a duration of 1 year, with a final report of 20 ECTs. The four WPs will connect the successful candidate with different research projects within the Ecology and Evolution in Islands Group, within a collaborative framework. For example, WP 1 is focused on the chromosomal-level assembly of a de novo genome through high-fidelity long-read sequencing with PacBio sequencing, with scaffolding informed by Hi-C chromosome contact data and genetic annotation informed by transcriptomes. The successful candidate's work within WP 1 is linked to a project within the GEEI that uses subgenomic data (ddRAD-seq) of the focal species of WP 1. The successful candidate will benefit from two training stays in leading international research centers (40 ECTs) and training in digital skills (95 ECTS) and complementary training (27.5 ECTs).

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

Email: bemerson@ipna.csic.es

Phone: 922474325











# Position Offered: UNIVERSITY GRADUATE Project: Generative Artificial Intelligence applied to the functional enrichmentof complex protein interaction networks and bipartite drug-protein target networks, especially for anti-tumor drugs

Technological and scientific fields: Computational biology; Artificial intelligence; New drug design; Advanced data analytics.

Location: Salamanca, Castilla y León, IBMCC (https://www.cicancer.org/)

**Research Group/PI:** Bioinformatics & Functional Genomics Group (Lab19), Dr. Javier De Las Rivas Sanz, http://bioinfow.dep.usal.es/

## **PROJECT SUMMARY**

This project is based on the preliminary work of our group in developing a database on proteinprotein molecular interactions (PPis) called "APID Interactomes" (apid.dep.usal.es) (ref. PMIDs: 16845013, 27131791, 30715274); as well as a database called "GEDA" (Gene Expression and Drug Activity) of association between drugs (especially FDA-approved anti-cancer drugs) and their potential targets (human genes/proteins) based on the integrated analysis of transcriptomic and drug reactivity data of tumor cell lines (ref. PMIDs: 29459035, 32344870). Based on these bioinformatics resources, our main objective is to implement a "framework for biomedical knowledge graphs" that we intend to connect to sources of generative artificial intelligence ("large language models", LLM, available as "Ollama": ollama.com). For this implementation, we propose to follow a technical and scientific development scheme similar to that of "BioCypher" (biocypher.org) that manages to connect graph networks and knowledge-based relationships ("biomedical knowledge graphs") with LLM language models, using "biochatter" (biochatter.org).

## **PROFESSIONAL PROFILE**

#### Minimum requirements:

- DEGREE in the "bio" field (Biology, Biotechnology, Pharmacy, etc.) or in Computer Sciences and Engineering and MASTER in Bioinformatics or in Computing or Data Science or Software Engineering.
- Mastery of Spanish and knowledge of English (at least intermediate level B1 or B2).

#### Merits to be considered:

The following will be valued: (i) Having scientific publications in the field of Bioinformatics; (ii) Having previous work experience in a Bioinformatics Group in the Biomedical field; (iii) Having a PhD in the field of Bioinformatics.

## WHAT IS OFFERED

To work in Group with extensive experience in the field of Bioinformatics and Computational Genomics applied to studies in cancer and other diseases, using programming languages R and Python, as well as advanced AI technologies such as deep neural networks (DNN) and language models (LLM). All of this integrated with a TRAINING PLAN in DIGITAL COMPETENCES for the person hired with an estimated value of 140 ECTS over 4 years.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: Integration of artificial intelligence-assisted analytical techniques in the study of the pathogenesis of relevant infectious diseases in ovine livestock

**Technological and scientific fields:** Animal Health. Pathogenesis. Histological Image Analysis. Pathology

**Location:** León. Castilla y León. Instituto de Ganadería de Montaña. <u>https://www.igm.ule-csic.es/</u>

**Research Group/PI:** Sanidad y Patología de Rumiantes. University of León. Daniel Gutiérrez Expósito y Julio Benavides Silván

#### **PROJECT SUMMARY**

Research on the pathogenesis of significant diseases in domestic ruminants, focusing on the characterisation of the host's immune response to intracellular pathogens. This is based on advanced studies using massive nucleic acid sequencing techniques and AI-assisted digital analysis of histological images. The project includes training placements at international universities and access to continuous education, both in-person and online.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Veterinary degree C1 level, or equivalent, of English

#### Merits to be considered:

Experience in tissue processing and histology. Experience in immunohistochemical and immunofluorescence staining techniques. Experience in nucleic acid extraction and primary cell line establishment and handling.

Experience in conducting post-mortem studies in small ruminants.

# WHAT IS OFFERED

This project offers a unique opportunity to investigate the pathogenesis of significant diseases in domestic ruminants. It focuses on characterizing the local immune response to intracellular pathogens using advanced digital image analysis of histological and immunofluorescent images, along with high-throughput nucleic acid sequencing. Artificial intelligence will maximize objectivity and information obtained.

The training program includes 290 ECTS in analysis activities, digital skills training, the possibility to undertake a PhD within the project, and training stays at international centers (e.g., Roslin Institute, University of Glasgow) and national ones (University of Santiago de Compostela).

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \notin -41.000 \notin)$ .

Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: *Emerging strategies in vaccinology against haematophagous vectors: integration, analysis, and interpretation of big data in systems biology* 

**Technological and scientific fields:** Big Data and Information Processing Technologies. Computational Biology. Data Analysis and Integration

**Location:** Salamanca. Castilla y León. Instituto de recursos Naturales y Agrobiología de Salamanca. <u>https://www.irnasa.csic.es/</u>

**Research Group/PI:** Livestock Parasitoses and Parasitic Zoonoses. Haematophagous Vectors. Ricardo Pérez Sánchez. <u>https://www.irnasa.csic.es/grupo-de-parasitosis-de-la-ganaderia-y-zoonosis-parasitarias/</u>

#### PROJECT SUMMARY

Ornithodoros erraticus and O. moubata ticks are the primary reservoirs and vectors of Human Relapsing Fever (HRF) and African Swine Fever (ASF) in the Mediterranean-Asia and Africa, respectively. Controlling these diseases requires effective control of these vectors, and the most promising method, as an alternative to chemical acaricides, is anti-tick vaccines. The development of anti-tick vaccines depends on the identification of protective antigens. To this end, this project proposes a multi-omic study of the tick-host interface in O. erraticus and O. moubata, including the sequencing, analysis, and integration of transcriptome, proteome, miRNAome, metagenome, and metatranscriptome data from their salivary glands, gut, and ovary.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualification: Degree in Biochemistry, Molecular Biology, or Biotechnology.
- Additional qualification: Master or Diploma in Bioinformatics, Computational Biology, or similar.
- Proficiency in Spanish and English

#### Merits to be considered:

- Other qualifications: Official Master or Diploma in Molecular and Cellular Biology, Biotechnology, or similar.
- Knowledge/Experience in in silico analysis of proteins, mRNAs, miRNAs, and microbial networks of hematophagous arthropods.
- Experience in handling, culturing, and dissecting ticks, and in obtaining and processing tissue samples.
- Experience in cell culture and recombinant protein production.

# WHAT IS OFFERED

Integration into a research group with extensive experience in the development of tick vaccines. Opportunity to acquire knowledge and skills based on omics data analysis, systems biology, and computational biology, and to apply them in the development of new tools for the immunological control of ticks. Training plan in digital competencies of 260-280 ECTS. Collaboration with international groups.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: Artificial Intelligence in Prediction Policy Problems: New Frontiers in Forecasting, Causal Inference and Ethics

**Technological and scientific fields:** Economic Analysis, Data Science , Statistical Methods Computational Economics

Location: Bellaterra, Catalonia, Institute for Economic Analyisis (IAE), https://www.iae.csic.es/

Research Group/PI: Economic Analysis, Hannes Mueller, https://www.iae.csic.es/

#### PROJECT SUMMARY

The project aims to advance the understanding of prediction policy problems. This research will explore the potential of AI-driven methods for dual systems of forecasting and causal inference while addressing ethical considerations in policy decisions. The candidate will utilize state-of-the-art data science tools and statistical methods to develop innovative dual models that can predict outcomes while considering forecasting problems simultaneously. The research will be conducted in a dynamic and interdisciplinary environment at the Institute for Economic Analysis, fostering collaboration with leading experts in economics and AI. This project promises significant contributions to both theoretical advancements and practical applications in the realm of policy making.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualification: Graduate degree in Economics, Data Science, Statistics, or a related field.
- Proficiency in English

#### Merits to be considered:

- Knowledge of econometrics, economic modeling and statistical analysis.
- Experience with data science tools and programming languages such as R, Python, or similar.
- Previous research experience in prediction policy problems.
- Familiarity with advanced computational methods in economic analysis and data science

#### WHAT IS OFFERED

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- Opportunity to work with a leading research team in economic analysis.
- Use of innovative technologies and methodologies in data science and economics.
- Collaboration with other research groups and entities.
- Interdisciplinary research environment.
  - Comprehensive training plan, including:
    - PhD courses ( de 30 a 120 ECTS)
    - Complementary courses in programming languages, writing, presentation skills, and dissemination (10-30 ECTS)
    - Summer and winter schools in Data Science (60-100 ECTS)
    - Training placements at other institutions (total of 6 months = 30 ECTS)

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

Email: hannes.mueller@iae.csic.es Phone: +34 935 929 780









Project: Integrating emerging technology for automated forecasting and monitoring of migratory insect population dynamics and connectivity

Technological and scientific fields: Remote sensing, Climate Change and Biodiversity, Advanced techniques in Earth Observation, Ecological modelling, Massive Data Processing

Location: Barcelona, Catalonia, Botanical Institute of Barcelona (IBB), https://www.ibb.csic.es

Research Group/PI: Entomology and Insect-Plant Interactions, Insect Migration and Phylodiversity Lab, Gerard Talavera, <u>www.phylomigrationlab.com</u>

#### **PROJECT SUMMARY**

This multidisciplinary project harnesses emerging technologies to automate remote monitoring of insect population dynamics. Insects, highly diverse and abundant, migrate long distances, connecting ecosystems and impacting global processes. They play crucial roles pollination and nutrient transfer, while also pose risks as pests and disease vectors. Recent advances in remote sensing, radar tracking, atmospheric simulations, ecological modeling offer new ways to predict and track insect movements. The project will develop real-time monitoring tools, including automated pipelines for satellite imagery, radar to detect airborne insects, and atmospheric models to predict colonization hotspots. Spatio-temporal models will forecast distribution shifts, invasiveness, and habitat loss. A public web-based platform and a R package will support data integration, outbreak prediction, movement analysis, map visualization, and decision-making.

## **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Master in Remote Sensing applications to Ecology and Geographic Information Systems •
- Degree on Environmental Sciences or Biology

#### Merits to be considered:

- Proficient in coding with R and Python •
- Experienced in working with high-performance computing clusters and LINUX systems •
- Skilled in Species Distribution Modelling and spatial analyses using time-series climate data, land cover maps, vegetation phenological metrics, water indices and wind circulation
- Knowledge of insect biology and biodiversity •

# WHAT IS OFFERED

The project will offer training in both computational and biological aspects. Technical training will include geospatial and data science, high-performance computing, advanced R and Python programming, atmospheric and EBVs modeling, remote sensing, and Bayesian statistics. Biological training will cover insect movement, biology, biogeography, population ecology, pest ecology, and ecological modeling. The contract will complete 260 ECTS, including 55 ECTS for stays abroad in radar movement ecology, high-performance computing, and web-based spatial visualization; 85 ECTS in training courses; and at least 120 ECTS in research and supervised activities.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: *Revolutionizing Protein Drug Development - AI-driven Protein Engineering for Next-Generation Enzyme Therapy.* 

#### Technological and scientific fields: Computational Biology; AI; Design of New Protein Drugs.

Location: Barcelona, Catalunya. Molecular Biology Institute of Barcelona, <u>https://ibmb.csic.es/</u>.

**Research Group/PI:** Synthetic Structural Biology, Ulrich Eckhard, <u>https://bit.ly/UlrichEckhard</u>. Protein Design and Modeling Lab, Enrique Marcos Benteo, <u>https://bit.ly/EnriqueMarcos</u>.

#### PROJECT SUMMARY

Enzymes are invaluable tools for biotechnology and medicine, but their structural complexity poses significant challenges for optimization and practical use. While directed evolution and structural bioinformatics can improve enzyme catalytic efficiency and specificity, these methods fall short for reducing structural complexity, increasing solubility, and enabling large-scale expression in bacteria. We plan to develop an AI-driven computational pipeline for enzyme design and optimization, integrating structural bioinformatics, deep learning-based protein structure prediction and design, high-performance computing, and experimental feedback. Our goal is to transform complex enzyme drugs, typically produced in costly mammalian systems, into robust proteins for high-yield production in bacterial systems, potentially revolutionizing the protein drug industry by providing sustainable biotechnological and medical solutions.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

We are looking for a highly motivated scientist with initiative and strong motivation in combining computational techniques (protein design, docking, molecular dynamics) with experimental testing for protein drug development. The candidate must have studies in Biology, Biochemistry, Biotechnology, or related disciplines. Good English communication skills and basic computational experience is expected.

#### Merits to be considered:

Potential merits to be considered include: familiarity with AI-based methods for protein structure prediction; experience with molecular modelling tools; experience in protein expression, purification, and characterization techniques; strong motivation for combining computational and experimental approaches in enzyme design; documented research experience and publications.

#### WHAT IS OFFERED

We offer state-of-the art training in computational enzyme design, protein engineering, and highthroughput protein characterization. The candidate will be provided with extensive training on physics- and AI-based computational methods for protein modeling and subsequent experimental characterization through research, courses and short-stays abroad. The training encompasses a wide range of methods and programs for structure analysis, prediction, design, ligand docking, and molecular dynamics to assess protein flexibility. The candidate will receive training in programming languages such as Python and Bash, and will learn to utilize (inter)national supercomputing resources.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Artificial Intelligence optimization techniques for astronomical scheduling

tools

# Technological and scientific fields: AI, Optimization, digital tools

Location: Bellaterra, Barcelona, Catalunya, ICE, www.ice.csic.es

Research Group/PI: STARS group / Daniele Viganò

## PROJECT SUMMARY

In the current era of large astronomical surveys, the planning of observations in astronomical facilities has become a complex task. The large number of observations and other tasks to perform, the different constraints and objectives that such observations must fulfill, makes the problem unaffordable for human operators. Thus, optimization tools that can explore the vast parameter space are essential to find the combination of tasks that maximizes the use of the telescopes and the science outcome. At our institute, we are developing automatic scheduling tools based on Artificial Intelligence (AI) optimization techniques for several projects such as the European Space Agency (ESA) mission's PLATO and ARIEL, and the ESFRI-project Cherenkov Telescope Array (CTA). We are responsible for delivering the software tools for scheduling these facilities, and hard requirements exist regarding their functionality and performance. The problem to tackle is how to allocate multiple tasks to one or to multiple telescopes while maximizing the use of the observatory operational time, reducing idling, and/or slewing, and/or night sky background, and maximizing the scientific return. In the case of CTA, in addition of scheduling the multiple scientific aims described in the Key Science Programs, the scheduler has to take into account that there are several sub-arrays, multiple modes of observations, the need to react to astronomical transients with the lesser number of programs disturbed, and in accordance to constraints induced by other operations (e.g. laser handling) that greatly affect operations. A similar complexity appears for organizing, sometimes recurring, observations of stellar hosts of exoplanets for hundreds, or even thousands of candidates. This project aims at investigating the different AI optimization techniques that best suit each observational facility and constraints, testing different algorithmic solutions beyond the ones we have implemented till now, and adapting it to tackle requirements of more complex situations, as for instance subarrays or multi-facility scheduling.

PROFESSIONAL PROFILE

## Minimum requirements:

Software Engineer or related. Minimum technical skills/knowledge: C++, CMake; Linux; git; writing high-quality, standardised code. English at a level sufficient to interact with the international team.

## Merits to be considered:

Desirable technical skills/experience in (not strict requirements): Code optimization, CI/CD tools (Jenkins and SonarQube), virtualization with Docker, DevOps, CORBA standard and/or Distributed Systems; astronomical facilities (especially the ones involved in the project); AI optimization algorithms like Metaheuristic scheduling, Swarm Intelligence, Evolutionary Computation.

#### WHAT IS OFFERED

Participation in internal review processes of the developed software supervised by local coordinators and the international group leaders of the work area, on-site implementation validation. It is encouraged that this work lead to a doctoral thesis.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

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Phone: 937 37 97 88











Project: *Digital twin to support the design and manufacture of functional nanomaterials with applications in biomedicine* (nanoML4Med)

**Technological and scientific fields:** Advanced data analytics, Artificial intelligence, Data analysis and integration, Nanotechnology, New materials, Design of new medicines

Location: Cerdanyola, Barcelona, Cataluña, ICMAB (https://www.icmab.es)

Research Group/PI: NANOMOL-BIO group (<u>https://nanomol-bio.icmab.es</u>) / Dr. Imma Ratera

## PROJECT SUMMARY

In this project, the creation of a digital twin is proposed to assist in the design and manufacture of functional nanomaterials for biomedical applications. The work includes (i) the development of advanced artificial intelligence models (statistics, machine learning and deep learning) that allow the extraction of chemical, physical and biological properties and functions contained in a massive data set of complex molecular structures, (ii) the development of the data infrastructure (numerical, text, images, etc.), and (iii) the development of complementary multi-scale molecular simulation models for physical-chemical interpretability. The work will be carried out in collaboration with the Photonic Engineering Group of the University of Cantabria through research and training stays.

# **PROFESSIONAL PROFILE**

#### Minimum requirements:

- BSc or BEng in Data Science, Physics, Software/Telecommunications, Chemistry or a related field. An MSc or MEng in related fields will be positively valued.
- Excellent communication skills, with the ability to collaborate in a multidisciplinary team

#### Merits to be considered:

The following will be valued: (i) Advanced level of English, (ii) Organized and proactive person, (iii) Ability to work autonomously.

## WHAT IS OFFERED

Work in a group with recognized experience in the design, production and characterization of molecular and polymeric materials with advanced therapeutic and diagnostic functionality, using sustainable and economically efficient production technologies. In collaboration with experts in data processing based on statistical models and artificial intelligence (machine and deep learning). All of this integrated with a TRAINING PLAN in DIGITAL SKILLS for the person hired with an estimated value of 270 ECTS over 4 years.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

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Technological and scientific fields: Artificial Intelligence, Digital Twins, Climate change

Location: Barcelona, Cataluña, IDAEA, www.idaea.csic.es

**Research Group/PI:** PM3 Lab, Groundwater and Hydrogeochemistry, Juan J. Hidalgo & Silvia De Simone, <u>https://pm3lab.csic.es</u>

#### PROJECT SUMMARY

GeotermIA is a project led by IDAEA-CSIC aimed to develop a tool for real time management and optimization of deep geothermal resources using artificial intelligence (AI) that can be used to build digital twins of geothermal facilities. You will work on the development of neural network algorithms applied to geothermal applications. Specifically, you will develop a database of geothermal data to train the AI models and adapt machine learning algorithms to the necessities of geothermal energy production. PM3 Lab (pm3lab.csic.es) belongs to the Groundwater and Hydrogeochemistry group of IDAEA-CSIC. Researchers at PM3 Lab study the hydraulic, chemical, thermal and mechanical processes that take place in porous media from pore to regional scale. The group employs mathematical and numerical approaches as well as laboratory and field scale experiments and sampling methods.

## **PROFESSIONAL PROFILE**

#### Minimum requirements:

• Advanced Degree or master in physics, mathematics, civil engineering, engineering sciences, or a related discipline.

#### Merits to be considered:

- Professional-working proficiency level of English.
- Interest in collaborative multi-disciplinary research.
- Skills in programming and scientific software are a plus.

## WHAT IS OFFERED

GeotermIA offers a strong training program (270 CTS), which includes the opportunity to enrol in the master in Artificial Intelligence of the University of Barcelona and in a PhD program in the Universitat Politècnica de Catalunya after the master completion. You will gain skills in numerical modelling of thermo-hydro-mechanical processes, programming in python, as well as oral and written communication. Research short stays at the Technical University of Madrid and the University of Rennes are planned.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: juanj.hidalgo@idaea.csic.es; silvia.desimone@idaea.csic.es Phone: 934006100











Project: Development of advanced digital skills for the virtualization of archaeological heritage: from documentation to social communication

**Technological and scientific fields:** Digital Humanities, virtual and augmented reality, digital twins, data analysis and integration, computer vision, 3D printing.

Location: Mérida, Extremadura, Instituto de Arqueología, http://www.iam.csic.es/

**Research Group/PI:** Archeology of Architecture and Territory; Victorino Mayoral (PI1) & Elías López-Romero (PI2)

# PROJECT SUMMARY

The objective of the project is the creation of a technical profile specialized in the production and integration of digital data to generate virtual environments that serve as innovative tools in the process of capturing, analyzing and communicating archaeological information, while allowing progress in the design of tools that facilitate the fusion of large volumes of information. The development of data visualization and analysis techniques through mixed and augmented reality is sought for scientific and educational communication purposes.

# **PROFESSIONAL PROFILE**

# Minimum requirements:

- We are looking for a profile that combines a solid training base in archeology with a specialization in virtualization of cultural heritage.
- Required academic qualification: Graduate in Archeology.
- Postgraduate degree in new technologies applied to heritage (master's degree, postgraduate degree, etc.)
- Demonstrable experience in heritage virtualization projects and production of Virtual Reality (VR) applications.
- Demonstrable experience in the use of specialized software (Unity, Blender, Agisoft Metashape).

## Merits to be considered:

- Knowledge of 3D documentation using photogrammetric techniques of archaeological materials and structures.
- Mastery of Unity software game engines; 3D modeling and texturing in Blender software.
- Experience in archaeological excavations and Cataloging of archaeological materials.
- Scientific contributions (publications, conferences, seminars) on issues related to 3D documentation and virtualization of heritage.

# WHAT IS OFFERED

The IAM develops its activity at a regional, national and international level (North Africa, Europe and America). The project is proposed as a transversal approach for the entire Institute, which will have a very positive effect on the professional training and qualification of the person hired by putting them in contact with a great diversity of issues and approaches in the field of archeology and heritage. The Training Plan includes a total of 267.68 ECTS credits (supervised/autonomous work, stays and training courses).

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: *BioGenIA: Generation of Predictive Models integrating Artificial* Intelligence and Mechanistic Knowledge of Bioprocesses and Biosystems of interest in the Food Industry.

**Technological and scientific fields:** Artificial intelligence, High performance computing, Digital Twins, Biotech, Computational Biology

Location: Vigo, Galicia, Instituto de Investigaciones Marinas, <u>www.iim.csic.es</u>

**Research Group/PI:** Bio2Eng Biosystems and Bioprocess Engineering, Eva Balsa-Canto, <u>https://bio2eng.csic.es</u>

## **PROJECT SUMMARY**

In the food industry, bioprocesses and biosystems are essential. While experimental techniques help us analyze them in detail, we still face challenges in transitioning from description to a mechanistic understanding that can facilitate the automation of industrial process design. Computational biology modeling holds enormous potential in this regard, but it also presents challenges due to biological complexity, non-linearity, and limited real-time data availability. The BioGenIA project aims to tackle these challenges by developing and validating methods and software for generating predictive models automatically. Our goals include integrating mechanistic kinetic models with machine learning to enhance predictive capability and developing a streamlined approach to identify models using high-performance architectures and artificial intelligence. Finally, we will test these developments in industrial bioprocesses such as waste and by-product valorization, food fermentation, and integrated multi-trophic aquaculture.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

BSc in Physics or Mathematics; MSc in Industrial Mathematics; Languages: Spanish & English; Programming skills: MATLAB, Latex

#### Merits to be considered:

Experience in dynamic modeling of bioprocesses and biological systems; preferably in the food industry. Experience in numerical optimization methods. Scientific contributions (publications, conferences) and research activities (fellowships, contracts) related to the topic of the project. Additional programming languages.

## WHAT IS OFFERED

This project offers the opportunity to contribute to scientific and technological progress in the field of digital bioprocesses in the food industry and, in parallel, to professional development since it includes both transversal training (writing scientific papers, scientific communication, etc.) and training in the field of modeling of biological systems, artificial intelligence and high performance computing. It also offers two research stays with research groups at the University of A Coruña and another international one (in Slovenia or Italy).

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: ebalsa@iim.csic.es Phone: 986231930











Technological and scientific fields: Data analysis and integration, Digital Humanities

**Location:** Santiago de Compostela, Galicia, Instituto de Ciencias del Patrimonio (INCIPIT) <u>www.incipit.csic.es</u>

Research Group/PI: Interdisciplinary Studies of Cultural Heritage, César Parcero Oubiña

# PROJECT SUMMARY

Archaeological and cultural heritage is a field in which a large amount of digital data and information of a spatial nature characterising the location, shape and geographical context of archaeological and cultural assets is handled. For this reason, Geographic Information Technologies (GIT) are widely used for the creation of digital data whose information is usually managed by means of systems with an architecture composed of a GIS to manage the geospatial information and a DB manager to manage the associated information. In recent years, GIT has been joined by 3D technologies such as scanners and photogrammetry. The management of this type of 3D information is complex, and progress is being made with the development of the BIM (Building Information Medeling) methodology, but it poses major challenges for its management and integration that must be faced.

# **PROFESSIONAL PROFILE**

# Minimum requirements:

Graduate in a field related to cultural heritage (art, history, archaeology...) OR graduate in a field related to geospatial technologies (geomatics, geospatial information technologies, topography...).

Intermediate level of Spanish.

## Merits to be considered:

Training in fields such as geospatial technologies, 3D modelling, geodesy or topography, if these are not their fields of qualification.

Training in fields related to cultural heritage (archaeology, art, history, etc.) if these are not their fields of qualification.

Knowledge of computer programming.

# WHAT IS OFFERED

The person chosen will join the Digital Landscapes Lab (DL-lab), a research infrastructure and service unit of INCIPIT that currently has 3 technicians specialised in geospatial technologies, geographic information systems and 3D technologies. The DL-lab has specialised infrastructure in these fields.

The training programme will include different courses on GIT, 3D modelling and geospatial databases, as well as two training stays: at the Archaeology Data Service, University of York (UK) and at the Geographic Information Systems and Digital Humanities Unit (SIGyHD) of the CCSH-CSIC.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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# Position Offered: UNIVERSITY GRADUATE Project: *DataLAB*

**Technological and scientific fields:** Advanced techniques in land and ocean observation / Sensorization

Location: Esporles, Baleares, IMEDEA, www.imedea.uib-csic.es

**Research Group/PI:** DataLAB, Gotzon Basterretxea, <u>https://imedea.uib-csic.es/servicios/data-lab/</u>

#### PROJECT SUMMARY

The massive acquisition of data along with the increasing complexity of its analysis requires progress in fields such as big-data and artificial intelligence (AI). In the natural sciences (e.g., oceanography, ecology, geosciences), these techniques establish a new paradigm in data management and processing, enabling the combination of multiple data sources and variables from observations, numerical models and alternative sources of information. Among others, they include deep learning models (convolutional neural networks), which are the state of the art in AI, and which allow the detection of complex structures and inferring dynamic backgrounds based on data and associated assimilation schemes. The general objective of this project is to promote the use of advanced data acquisition, management and analysis techniques in the field of life and earth sciences.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Sciences, Mathematics, Computer Engineering, telematics or other degrees for which computational and data processing capabilities are required.

#### Merits to be considered:

Master in Artificial Intelligence, Big Data, Machine Learning, Computer vision or similar. Doctorate. Experience in scientific data management (Data Scientist). English knowledge.

## WHAT IS OFFERED

This project is related to the Digitization and Data Science Service (DataLAB) at IMEDEA. The DataLAB offers support, experience, and training to researchers and projects that require managing and analyzing large data sets, developing computationally efficient models based on data, and integrating mathematical algorithms in their research areas. The person hired will participate in projects on digitalization and data science together with researchers from different fields at IMEDEA. He will take courses and training stays, which will allow him to develop his knowledge and incorporate new analysis techniques. He will also have the opportunity to participate in the center's outreach activities and the training of training and technical personnel.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: *Bioinformatics, data analysis and modeling for the advancement of vitiviniculture* 

**Technological and scientific fields:** Computational biology; Climate change and biodiversity; Digital tools for agriculture; Artificial Intelligence

Location: Logroño, La Rioja, ICVV, www.icvv.es/english

**Research Group/PI:** Structural Bioinformatics, Modeling and Biological Mechanisms (Model3DBio), Juan Fernández Recio, <u>www.icvv.es/english/3dbiowine</u>

# PROJECT SUMMARY

The general goal is to develop and implement digital technologies of interest for the advancement of vitiviniculture towards its sustainability under the important challenges that the sector is facing. The tasks will include the optimization and implementation of computational tools in a bioinformatics, data analysis and modeling platform, and the digitalization and management of winegrowing omic data (genomics, transcriptomics, proteomics), data from plant phenotypes, wines and musts, terroir and climate, as well as from epidemiology of plagues and phytopathogens. The Model3DBio group has developed computational tools and web servers that have been successfully validated in CASP and CAPRI. The collaboration of the Vitigen group from ICVV and the Genomics and Bioinformatics Platform from CIBIR will be essential.

## **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Any of these degrees: Master or grade in Bioinformatics, Mathematis, Physics, Biotechnology or similar. Informatics Engineering.
- High level of English (spoken and written)

#### Merits to be considered:

- Knowledge of several programming languages: bash, R, Python.
- Experience in the development and/or implementation of biocomputing tools.

## WHAT IS OFFERED

The contract will allow the candidate to acquire specialized digital skills, with the goal of improving the interoperability of the biocomputing tools developed in the center, their optimization by the new AI-based technologies, centralization of the applications of interest for the groups of the institute and for other groups from CSIC and external, as well as the building of accessible repositories with relevant data in vitiviniculture. A total of 280 ECTS are expected to complete in the 4 years of the contract, through a robust training plan, which includes a Master in Data Science, postgrade in Cloud Computing, and courses in programming and in the integration and visualization of multi-omic data. The plan includes training stays in research groups at national and international level for learning AI-based methods for the design and optimization of competences in the administration of high-performance computing, and the implementation and optimization of computational tools, servers and databases.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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# Position Offered: UNIVERSITY GRADUATE Project: Artificial Intelligence Integral Tool for AstroChemical Analysis (AI-ITACA)

**Technological and scientific fields:** Artificial Intelligence, Massive data processing technologies, Advanced data analysis, Astrophysics, Astrochemsitry

**Location:** Torrejón de Ardoz, Madrid, Centro de Astrobiología (CAB, CSIC-INTA), <u>https://cab.inta-csic.es/</u>

**Research Group/PI:** Chemical complexity in the interstellar medium and star formation / Víctor M. Rivilla

## PROJECT SUMMARY

The improved sensitivities of the state-of-the-art astronomical facilities, such as the Atacama Large Millimeter/submillimeter Array (ALMA) and the James Webb Space Telescope (JWST), are revolutionizing the discovery of new molecules in space. However, we are still just scraping the tip of the iceberg. We are far from knowing what is the complete catalogue of molecules that astrochemistry can offer, as well as the complexity they can reach. While the instrumental capabilities have been improving exponentially, the tools to analyze and interpret the complex datasets that they provide are still in their infancy. To overcome the current severe limitations that traditional analysis techniques are suffering, the development of new innovative and efficient tools is mandatory. This project, Artificial Intelligence Integral Tool for AstroChemical Analysis (AI-ITACA), proposes to develop multiple cutting-edge machine learning techniques to fully exploit the massive datasets provided by current telescopes. These new analysis tools will allow us to make a crucial leap in the characterization of the level of chemical complexity in the interstellar medium, and in our understanding of the contribution that interstellar chemistry might had in the origin of life.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Bachelor degree in a scientific discipline. High level of oral and written English. Previous experience in the development of Machine Learning tools. Previous experience in programming languages such as Java and Python, Previous experience in advanced data anlaysis and database management.

## Merits to be considered:

Knowledge of SQL for database administration and management will be positively considered. Basic knolewdge in astrophysics will be also considered.

## WHAT IS OFFERED

The candidate will develop several advanced Machine Learning tools to be applied to the stydy of the chemical complexity in the interstellar medium, and its impact on prebiotic chemistry. The work will be done at the Centro de Adtrobiología (CAB) within a multidisciplinary environment in which researchers from different fields (astrophysics, chemistry, geology, biology) interact to address the complex problem of the origin of life. The contract includes an exhaustive Training Plan (240 ECTS credits) based on shorts stays at cutting-edge international research centres (e.q., University of Leiden), courses on advance data analysis, and astrophysics/astrochemistry/astrobiology schools.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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# Project: Massive precise Phenotyping and digitalization to improve crops

#### Technological and scientific fields: plant phenotyping, plant stress, molecular biology

**Location:** Madrid. Pozuelo de Alarcón. Centro de Biotecnología y Genómica de Plantas (CBGP) <u>https://www.cbgp.upm.es/index.php/en/about-us</u>

**Research Group/PI:** Regulation of lateral root development during nutrient deficiencies. https://www.cbgp.upm.es/index.php/es/?option=com\_content&view=article&id=27. IP: Juan Carlos del Pozo

#### **PROJECT SUMMARY**

In the field of plant biotechnology, numerous genomic and molecular analysis techniques are available to study plant responses to environmental changes, both biotic and abiotic. However, phenotypic analysis remains limited in technological terms. In this project, we propose implementing and developing new methodologies for high-precision quantitative analysis using the CBGP phenotyping platform. This state-of-the-art unique platform in Spain allows measurement of growth, photosynthetic capacity, water levels, and stress in the aerial part of plants, as well as root systems using rhizotrons. Its use will enable precise quantification of the effects of different stresses and bioproduct treatments on crops, with the goal of increasing agricultural production and crop tolerance to adverse conditions and infectious diseases.

Reference: CBGP (Centro de Biotecnología y Genómica de Plantas). Phenotyping Platform.

## **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Biology, biotechnology or science Bachelor
- High level of English

#### Merits to be considered:

- Knowledge in statistics, programming, office user level.
- Communication skills and team work

## WHAT IS OFFERED

We offer a great opportunity to work in dynamic research groups, highly recognized at the national e international level, to work in an exclusive plant phenotyping platform in Spain. This will give you the opportunity to interact with diverse research groups and collaborate with agocompanies. We offer a specific training plan taking courses in the biocomputational master of the UPM and also a training from Lemantec company for specific phenotyping programming.

The Total number ETC in the 4 years will be about 260, including a supervise a non-supervise research plant, master courses, seminars, formative stay abroad, etc.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

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Project: Development and implementation of tools for the analysis and integration of multi-omics data, through the use and development of AI functionalities.

**Technological and scientific fields:** Computational Biology; Artificial Intelligence (AI); Data integration and analysis; Massive data and information processing technologies; High performance cloud computing

**Location:** Madrid, Comunidad de Madrid, Centro de Biología Molecular (CBM) Severo Ochoa, <a href="https://www.cbm.uam.es/en/">https://www.cbm.uam.es/en/</a>

Research Group/PI: Biocomputational Analysis Service / Begoña Aguado Orea

#### **PROJECT SUMMARY**

The field of bioscience has been radically transformed not only by the development and application of advanced computational tools for the management and analysis of massive data, but also by the challenge of integrating data from omics technologies: genomics, transcriptomics, metagenomics, metabolomics, proteomics, etc., as well as imaging, to understand biological systems. Given the integration challenges and difficulties in storage, management and analysis of complex data, this project, through AI, focuses on two objectives: 1) Development of cutting-edge analyses on novel protocols of massive technologies, from single cell to bulk sequencing, of long and short reads, and other omics. 2) Development and implementation of multi-omics data integration, storage and management protocols. The project will be carried out in the Biocomputational Analysis Service (SABio) of the CBM, with demonstrated experience, skills and specialized knowledge in these matters.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Degree in life sciences (biochemistry, biomedicine, molecular biology, biotechnology, biology, etc.), chemistry, physics, mathematics, or similar. Experience in bioinformatics, with a focus on NGS data analysis. Effective communication in English. Master's degree in bioinformatics, computational biology, AI, or similar.

#### Merits to be considered:

Pipeline implementation experience. Strong programming skills in Linux, R, Python or Matlab. Advanced knowledge of statistics. Familiarity with machine learning techniques. Problem solving skills and attention to detail. Experience in cloud computing and parallel processing.

#### WHAT IS OFFERED

The hired person will be integrated into SABio of the CBM, where will be supervised by the IP, the Technical Manager and the rest of the members of the Service. Due to the nature of the Service, training in digital skills is essential. Stays will be carried out in national and international research centers, and courses, conferences, conferences, etc. will be attended. Of special interest will be training related to AI, Deep Learning and Data Mining. It will also be trained in: WGS, WES, RNA-seq, ChIP-seq, ATAC-seq, IsoSeq, single cell, and metagenomics data analysis. Statistical analysis. Development and implementation of tools. Data integration. With the training it is expected to reach up to 270 ECTs.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

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# Position Offered: UNIVERSITY GRADUATE Project: Transforming Digital Humanities from CCHS-CSIC: from EXEA to an Open Knowledge Platform

Technological and scientific fields: Digital Humanities, Data Analysis and Integration

Location: Madrid, Community of Madrid, Centro de Ciencias Humanas y Sociales del CSIC, <u>https://cchs.csic.es/es</u>

**Research Group/PI:** Unidad de Sistemas de Información Geográfica y Humanidades Digitales (uSIGyHD) del CCHS, Juan Manuel Vicent García, <u>https://exea.csic.es/en/unidad-SIGyHD</u>

# **PROJECT SUMMARY**

The CSIC's Centre for Human and Social Sciences (CCHS), made up of seven institutes, is the main public research organisation in this field in Spain and is strongly committed to the digitisation process in convergence with the Open Science movement. This commitment has materialised in the launch of EXEA, a scientific data infrastructure for Social Sciences and Digital Humanities, and IMAGO ORBIS, an Spatial Data Infrastructure in Social Sciences and Digital Humanities. The project proposes to provide these infrastructures with the capacity to absorb the impact of the implementation of a national Open Science policy and facilitate their integration into the international ecosystem, through the incorporation of interoperability and semantic technologies, and their incorporation into the European Open Science Cloud (EOSC) and the CLARIAH platform. This purpose is based on five objectives: 1. To promote the interoperability and accessibility of the data, services and digital resources of the CSIC's CCHS. 2. To propose a governance model for the semantic resources of the CCHS. 3. To increase the description, visibility and discoverability of the CCHS digital data and resources. 4. To support the development of applications and methodologies in the field of Social Science and Digital Humanities. 5. To connect with other sources of information and international infrastructures. The purpose of the contract is to reinforce the technological basis for the implementation of these objectives by providing the highly specialised training required for this task.

# **PROFESSIONAL PROFILE**

## Minimum requirements:

Graduates in Computer Engineering, Data Science and Artificial Intelligence, Geospatial Information Technology Engineering, Geomatics Engineering or equivalent.

## Merits to be considered:

Knowledge in databases, (geospatial) web and REST services, programming (PHP, Python), Semantic Web, ontologies, RDF and SPARQL.

# WHAT IS OFFERED

-Integration in the workflow of the uSIGyHD at the CCHS, in contact with the research groups of the different institutes of the Centre that develop projects with the unit.

- Training: Master's degree in Data Science (Higher Technical School of Computer Engineering, Universidad Politécnica de Madrid (60 ECTS); high specialisation and training courses in technologies for the Digital Humanities (20 ECTS); supplementary training in scientific article preparation, conference attendance, and other activities (40 ECTS). Additionally, it comprises stays at the Universidad Politécnica de Madrid and the Laboratory of Landscape Archaeology and Remote Sensing of the Institute of History of the CSIC (40 ECTS).

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: juan.vicent@cchs.csic.es Phone: +34 916022493











# Project: InteliMetal: Artificial Intelligence and machine learning for applications in metallurgy

**Technological and scientific fields:** Artificial Intelligence, Massive Data and Information Processing Technologies, High Performance Computing, 3D Printing and Additive Manufacturing, New Materials

Location: Madrid, Comunidad de Madrid, CENIM-CSIC, https://www.cenim.csic.es/

**Research Group/PI:** Grupo Materalia, Isaac Toda Caraballo, <u>https://www.cenim.csic.es/group-members</u>

# PROJECT SUMMARY

The scientific objective of the project is the development of a computational methodology based on Artificial Intelligence (AI) and Machine Learning (ML) techniques for the calculation of thermal profiles in metal parts manufactured with 3D printing (Additive Manufacturing). This will allow the establishment of a broad knowledge of computational techniques at CENIM, such as ML, massive calculation processes, optimisation techniques, statistical analysis and data mining, in conjunction with thermodynamic simulations, which will serve the Digital Laboratory of Physical Metallurgy. The specific objectives of the project are:

1) To develop computational procedures to build a methodology to optimise geometries and printing parameters, with the aim of improving the microstructure and properties of material produced by additive manufacturing.

2) To establish a broad knowledge of digital tools and ML that will bring these methods to a wide range of researchers in the centre.

3) To train qualified personnel to be assigned to the new Digital Laboratory and the Scientific and Technical Service aimed at promoting digital technologies at the centre.

# **PROFESSIONAL PROFILE**

#### Minimum requirements:

Master Degree in scientific areas (Physics, Mathematics, Chemistry), Materials Engineering, Industrial Engineering or Computer Science.

Good level of English.

Knowledge of calculus, mathematics or computing techniques and programming languages: essential Python.

#### Merits to be considered:

Desirable knowledge of Matlab, standard machine learning library packages and operating systems.

# WHAT IS OFFERED

The contract has a duration of 4 years, and the project will provide professional and personal development in the field of the use of AI and ML techniques applied to physical problems, currently in high demand, such as 3D printing. The competences will be developed during the project, where an important training activity will be carried out, both technical and for the development of the research career, which will be completed with several stays in international research centres. All together, this will correspond to 240 ECTS.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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# Position Offered: UNIVERSITY GRADUATE Project: *Omic technologies and new computational challenges*

**Technological and scientific fields:** 1. High computational throughput. 2. Computational biology. 3. Data analysis and integration 4. Artificial intelligence

Location: Alcalá de Henares, Comunidad de Madrid, Ci2A

**Research Group/PI:** Bioinformatics and omics technologies laboratory/ Jaime Pignatelli Garrigós

## PROJECT SUMMARY

In recent years, omics technologies have become common practice in the field of neuroscience. In brain tissue, multiple cell types coexist and interact, defined not only by their function but also by their anatomical position and their connection with other cells in other brain regions. For this reason, the Ci2A bioinformatics unit was created, as an NGS and bioinformatics analysis service specialized in the study of the brain, both in its anatomy and cellular diversity, as well as in its functionality. This represents a challenge within bioinformatics when developing the necessary algorithms to identify each of the cell types that make up a tissue and develop analysis methods that allow analyzing the processes that occur within them in basal conditions or in pathological states. The aim is to fine-tune the analysis of single-cell experiments and spatial transcriptomics of different regions of the brain to study in depth the different cell types that make up the heterogeneity of brain tissue and the interconnections between them.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

• Biology, Biotechnology, biomedicine or related University graduate

#### Merits to be considered:

- Computational knowledge: R, Phyton, Matlab,...
- English level B2 or superior
- Master degree on bioinformatics

## WHAT IS OFFERED

The hired person will be trained in the use of different NGS technologies and in the use of specialized software for bioinformatics analysis, through training courses by the unit and by specialized companies: Illumina, Curio Bioscience, etc. The person hired will enjoy training stays abroad and will be part of Core Technologies for Life Sciences (CTLS), a global scientific-technological services association. Participation in periodic meetings of the working group and in national and international conferences specialized in the field of NGS and bioinformatics.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

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# Project: *Creation of a Big Data processing and analysis Unit by using Artificial Intelligence and Scientific Computing tools at CIAL (InteligenCIAL)*

#### **Technological and scientific fields:** Big Data and information processing technologies

**Location:** Madrid, Comunidad Autónoma de Madrid, Instituto de Investigación en Ciencias de la Alimentación, CIAL <u>https://www.cial.uam-csic.es/</u>

**Research Group/PI:** Big Data processing and analysis Unit by using Artificial Intelligence and Scientific Computing tools at CIAL (InteligenCIAL). IPs: Alberto Valdés, Victoria Moreno

#### **PROJECT SUMMARY**

The opportunities of Big Data and AI applications in Food Sciences are notable increasingly, but only a minimal amount of the data that is available has been used. The CIAL combines a solid track record in the application of multi-omics technologies and advanced approaches to determine the composition, structure, digestibility, bioavailability, and other parameters of foods and their ingredients. The objective of this project is to exploit these capabilities and the enormous amount of information that is generated by creating a Data Science Unit with the potential to retain the best-trained talent. This unit will provide the CIAL groups with tools for massive data processing, analysis and integration, and AI through horizontal interaction and synergy with all the center's research lines and service platforms.

## **PROFESSIONAL PROFILE**

#### Minimum requirements:

Required academic qualification: Degree in Telecommunications Engineering or Computer Engineering.

#### Merits to be considered:

Experience in deployment and administration of communications equipment and systems; installation and maintenance of equipment with Linux and Windows operating systems; user support in research environments; deployment of data storage and backup systems; virtualization, installation and technical support of scientific equipment; knowledge of programming languages (Python, R, C++, Java) and scripting languages (Bash, PowerShell).

## WHAT IS OFFERED

Incorporation into a reference research center in the field of Food Sciences where massive data analysis and information processing technologies will play a fundamental role in the future. This contract includes a Training Plan of 240 ECTS credits distributed in two master's degrees focused on Data Sciences and Computer Engineering, as well as a 3-month training stay in an advanced computing center. Attendance at courses dedicated to training in digital skills (Deep Learning, Machine Learning, Cloud Computing, Python, R, Shell, AI or Big Data) is also planned.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

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Project: *Machine learning approach to identify correlates of disease severity in viral infections* 

**Technological and scientific fields:** Artificial Intelligence, Data Analysis and Integration, High-Performance Computing through Servers

**Location:** Valdeolmos, Madrid, Centro de Investigación en Sanidad Animal (CISA) <u>https://www.inia.es/unidades/Institutos%20y%20Centros/CISA/Pages/Home.aspx</u>

**Research Group/PI:** New Strategies for Controlling Relevant Diseases in Animal Health (VACUVET)/ Noemí Sevilla Hidalgo

# PROJECT SUMMARY

Most viral diseases exhibit variable clinical outcomes due to differences in the virulence of the viral strain and/or the individual susceptibility of the host. Understanding the biological mechanisms and the complex interactions between the virus and the host that determine the clinical outcome of infections is the cornerstone of viral pathogenesis. Machine learning can be a powerful tool for determining viral pathogenesis, allowing the analysis of large amounts of complex data to identify meaningful patterns and relationships. This project proposes to use machine learning impartially to identify key factors in the pathogenesis of a viral infection. The CISA, with its level 3 biosafety containment (NCB3) facilities and the size of its animal facilities, enables infections of natural hosts with highly pathogenic viruses that are of great importance in Animal Health and Human Health (zoonotic). The objective of this project is to address, through Artificial Intelligence (AI) and the development of machine learning applied to in vivo viral infections, the massive analysis of data generated from infections of natural hosts and the identification of key parameters in the progression of a viral disease. This will allow us to understand and compare the pathogenesis and disease progression and will contribute to the development of more effective control measures.

# **PROFESSIONAL PROFILE**

## Minimum requirements:

- Graduate in Biology or Veterinary Medicine (average grade of 7 minimun)
- High proficiency in English

## Merits to be considered:

Previous work in level 3 biosafety containment facilities; knowledge of molecular biology techniques; experience with high-level programming languages such as Python and R; training in techniques applied to generative AI.

# WHAT IS OFFERED

The project offers training in machine learning models capable of predicting the severity of a viral infection, within the field of Artificial Intelligence. Various types of biological data (clinical, virological, cytometry, histopathological, etc.) will be analyzed using a remote-access computing server, encompassing the areas of Data Analysis and Integration and High-Performance Computing through servers. The training program includes 258 ECTS which encompass a master's degree in Bioinformatics and Biostatistics, two internships in other laboratories, and several courses on AI applications, among other things.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: Computational tools for transcriptional studies in plants: transcription factor target prediction and regulatory SNP cataloguing

**Technological and scientific fields:** Biotech, Climante change and biodiversity; Computational biology; Data analysis; Artifical intelligence

Location: Madrid, Comunidad de Madrid, Centro Nacional de Biotecnología (https://www.cnb.csic.es/)

**Research Group/PI:** Regulation of gene expression in plants. IP: Jose Manuel Franco Zorrilla (https://www.cnb.csic.es/index.php/es/component/k2/item/1908-regulation-of-geneexpression-in-plants

## **PROJECT SUMMARY**

The study of the interactions between transcription factors (TFs) and their target genes (TGs) is essential for understanding the genetic basis of the ability of plants to adapt to their natural environment and resilience. This project will address this study through two approaches: (a) analysis of TF-TG specific recognition, using computational strategies based on machine learning; (b) construction of a plant pan-cistrome atlas for the identification of regulatory SNPs. This project aims to create bioinformatics tools to study transcriptional regulation in plants and to develop a reference portal in the field that integrates all the information generated. The research group (ORCID 0000-0001-6769-7349) has extensive experience in the study of transcriptional regulation in plants following experimental and computational strategies, which will allow to deepen the biological meaning of the results generated in this project.

## **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Graduate in Biotechnology and Master's degree in Computational Biology (or similar).
- Fluency in Spanish and English

#### Merits to be considered:

- Knowledge of Python, R and Linux programming
- Knowledge of machine learning •

# WHAT IS OFFERED

We offer participating in a cutting-edge research project in the field of plant molecular biology in a multidisciplinary and highly collaborative environment with other research groups. You will complete +250 ECTS, which will include an face-to-face master's degree in data science and several online courses in programming and data engineering. Two training stays will be carried out, at least one of which will be international.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

## Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

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Project: Development of digital technologies and processes for the integrated management of archaeological information at CSIC

Technological and scientific fields: Digital Humanities, Data Analysis and Integration, Climate Change and Biodiversity

Location: Madrid, Comunidad de Madrid, Instituto de Historia del CSIC (https://ih.csic.es/es)

Research Group/PI: Conexión de Arqueología - ArchaeologyHub, Ignacio Montero, https://archaeologyhub.csic.es/

# PROJECT SUMMARY

CSIC is one of the main archaeological research organizations in Spain at national and international level. The ArchaeologyHub scientific network gathers 280 people from 47 research groups belonging to 25 Research Institutes across Spain. The Hub has generated a huge volume of archaeological data in recent decades, whose management in accordance with the FAIR principles is essential for maintaining the Open Science principles assumed by CSIC. The CSIC already has a platform with potential for this purpose: the IDEArg Archeology Spatial Data Infrastructure (http://www.idearqueologia.org/). The objective of the project is to develop technological support for the expansion of IDEArq as a transversal platform for the data and research results of all the groups and laboratories that are members of ArchaeologyHub. These objectives require a Full Stack development process of CRUD (Create, Read, Update, Delete) type web applications on databases, which includes both the design of user interfaces (front end) and the implementation and maintenance of the internal architecture of the site (back end). The work will be carried out in the facilities of the Institute of History of the CSIC, with access to the infrastructure of the Center for Human and Social Sciences (CCHS-CSIC), and in close contact with the research groups and laboratories integrated into ArchaeologyHub.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduates in Computer Engineering, Data Science and Artificial Intelligence, Geospatial Information Technology Engineering, Geomatics Engineering or equivalent.

#### Merits to be considered:

Knowledge in: Geographic Information Systems; Webmapping (e.g. OpenLayers); programming languages, both client (JavaScript) and server (Python, PHP); SQL databases (PostgreSQL + PostGIS); UML (Unified Modeling Language).

#### WHAT IS OFFERED

Advanced training in Digital Skills in the field of Humanities and, in particular, in Archaeology, including a master's degree during the first year of the contract (60ECTS), completion of complementary courses on Data management plans, institutional repositories, technical skills (programming, SQL databases, etc.) (20ECTS in total). In the second and third year, training stays of one and a half months each in leading units in the scope of the project (uSIGyHD-CCHS, and Archeology Data Service of the University of York, United Kingdom).

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

#### Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

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Project: The Ethics of AI: Enhancing the Capacities of the Institutional Ethics Committee (ETHICAI)

Technological and scientific fields: Ethical Aspects of Artificial Intelligence

Location: Madrid, Comunidad de Madrid. Cabinet of the CSIC Presidency CSIC

**Research Group/PI:** Cabinet of the CSIC Presidency; Research Ethics Department/Isabel Martínez Sierra

# PROJECT SUMMARY

The project is conceived as a proactive tool so that CSIC Ethics Committee can perform a proper evaluation of the ethical aspects of AI research, and promote the socially responsible and ethically acceptable use of such technology. The main objectives of the project are the following: to optimise the ethical evaluation of CSIC research that includes the development or use of AI systems or tools; to train human capital specialised in AI at the CSIC to provide a competent and effective response to the ethical challenges posed by the use of AI in research; to contribute to raising awareness and ethical reflection on the challenges and opportunities posed by the development and implementation of AI systems; to define indicators for the ethical evaluation of research activities that include AI tools, in order to avoid bias, discrimination, and exclusion; to consider the environmental impact of AI research activities; to identify and promote best practices in AI research; to collaborate with the G-6 in the definition and implementation of ethical guidelines for the development and use of AI in scientific and technical research activities; to place the CSIC Ethics Committee as a reference in the field of ethics and integrity of AI research, in order to contribute to promoting a responsible image of the Institution; to strengthen the cooperation and internationalisation of the CSIC Ethics Committee.

# PROFESSIONAL PROFILE

# Minimum requirements:

- University degree in life sciences.
- English skills.
- Proven knowledge in research ethics and research integrity

## Merits to be considered:

• Experience in managing of the ethical assessment of research projects

# WHAT IS OFFERED

Specialized training in ethics of AI, as well as the participation in training actions concerning research integrity and other transversal skills and subjects.

# Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: isabel.martinez@csic.es Phone: 915680058











# Technological and scientific fields: Artificial Intelligence and Cybersecurity

Location: Madrid, Comunidad de Madrid, ICMAT, https://www.icmat.es

Research Group/PI: DataLab, IP: David Ríos Insua. https://datalab.icmat.es

# **PROJECT SUMMARY**

Besides the benefits brought by artificial intelligence, a series of associated risks have been identified, focusing mainly on attacks against machine learning algorithms due to their potentially very negative impacts. Such threats are exacerbated by the massive adoption of these technologies, particularly since the rise of LLMs. From a regulatory and public policy perspective, the importance of this problem is well reflected in the EU AI Act. From a technical perspective, the growing importance of the field of adversarial machine learning is highlighted, primarily based on game theory methods under unrealistic common knowledge assumptions in the realm of security and cybersecurity.

Within the SECURIA project, this position will develop more rigorous methods and algorithms to strengthen machine learning algorithms against targeted attacks, which will converge into operational pipelines for their implementation in real-world AI-based systems. The methodology and software produced will be made available to the community to promote a more responsible and secure development of AI.

# **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Graduate or Bachelor's degree in Mathematics or Physics.
- Master in Statistics and Data Analysis.
- Knowledge of English and Spanish.

#### Merits to be considered:

- Proficiency in Python programming language.
- Training in Bayesian analysis and machine learning techniques.
- Proven experience with research contracts.

# WHAT IS OFFERED

Cutting-edge training is offered in such current topics as Artificial Intelligence and Cybersecurity, as the central objective of SECURIA is to enable the development of a rigorous framework for risk management in AI that will converge into operational pipelines for their implementation in real-world AI-based systems, as well as strategic methodologies for developing responsible policies for scaling AI systems. From the second year onwards, the candidate will have research support responsibilities while continuing their training, with a total of 185 credits, which includes two stays at prestigious institutions such as George Washington University and the Air Force Institute of Technology, not to mention a whole plan for scientific dissemination and transfer, of which they will be a part along with the DataLab research group

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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momentum@csic.es | https://momentum.csic.es/







# Project: *Development and application of virtual environments in sensory and consumer analysis*

**Technological and scientific fields:** Virtual and Augmented Reality, Biometrics, Sensory and Consumer Science

Location: Madrid, Madrid, ICTAN, https://www.ictan.csic.es

**Research Group/PI:** DIGISEN, Gonzalo Delgado Pando, <u>https://www.ictan.csic.es/grupos-de-investigacion/tecnologias-digitales-analisis-sensorial-carne-y-derivados-digisen</u>

#### **PROJECT SUMMARY**

When consuming or choosing a food product, we follow a multifactorial process of great complexity. This sensory perception is affected not only by the informational context but also by the external environment. Thanks to the recent development and use of digital technologies in sensory science, exploring the connections between participants' subconscious reactions and their hedonic responses in immersive environments is becoming easier. Through this project, virtual environments will be created using extended realities (XR) to recreate contexts closer to consumer reality and/or facilitate controlled sensory evaluation. Biometric devices (such as eye-tracking, galvanic skin response, etc.) will also be used to capture subconscious responses during the analysis. The main objective is to improve the understanding of sensory perception in food choice and consumption.

## **PROFESSIONAL PROFILE**

#### Minimum requirements:

Hold or be in the process of obtaining a Bachelor's degree, Engineering degree, or equivalent, or a degree related to Computer Engineering. Knowledge of XR and related software. B2 level English and Spanish proficiency.

## Merits to be considered:

Experience with extended reality (XR): graphics engine software (e.g.:Unity) and/or 3D modeling (e.g.: Autodesk, 3ds Max, Blender). Programming languages C++/ C# / Python / R. Experience/knowledge in data analysis

# WHAT IS OFFERED

Participation in an innovative project that aids in your training to enhance your technical-scientific career and employability. You will develop virtual environments applied to consumers, analyze biometric data, participate in scientific publications, and attend conferences. Training totaling 240 ECTS is offered: including a Master's in Data Science, a training stay abroad (United Kingdom), and courses on various topics. You will be part of a multidisciplinary, ambitious, and active team located in the vibrant campus of Moncloa close to the centre of Madrid.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000  $\in$  - 41.000  $\in$ ).

## Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: Design of the viscoelastic properties of artificial tears by combining experiments, high-performance computing, and artificial intelligence

**Technological and scientific fields:** Artificial Intelligence, Big Data Processing and Information Technologies, High-Performance Computing, and New Materials

Location: Madrid, Madrid, Instituto de Estructura de la Materia, <u>www.iem.csic.es</u>

Research Group/PI: Biophym, Javier Ramos, <u>www.biophym.iem.csic.es</u>

#### **PROJECT SUMMARY**

This project addresses the study of the viscoelastic properties in biopolymeric solutions with the main objective of advancing the design of artificial tears through a multidimensional approach. The space between the cornea and the eyelid is extremely narrow, and during blinking, a high shear rate is created over the corneal surface. This rapid movement generates large mechanical forces on the tear film. Therefore, the viscoelastic properties of tears play an essential role in responding to these shear forces.

The main objective of this project is to use high-performance computer simulations (HPC) and artificial intelligence (AI) algorithms, primarily machine learning, to identify the factors that are important in the viscoelasticity of tears as a design parameter for eye drops. The data needed to train and test the AI will be obtained by the research groups to which the PIs belong, using advanced experimental techniques in macromolecular characterization, such as rheology, microrheology, and microfluidics. Generally, artificial tears are aqueous solutions with an agent that controls viscosity and with behavior that attempts to emulate natural tears. In this regard, the viscoelastic properties of biopolymeric solutions based on soluble polysaccharides and lipids, possible candidates for the design of artificial tears to treat certain eye diseases such as dry eye disease, will be explored.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Required Qualifications: Bachelor's and Master's Degree in the Area of Sciences Minimum demonstrable English level B2

#### Merits to be considered:

Experience with HPC facilities Professional experience in material modeling Knowledge of Python programming Knowledge of Linux and bash scripting in Linux Knowledge in the use of molecular modeling programs (GROMACS, Gaussian, VMD)

## WHAT IS OFFERED

The project provides an excellent training opportunity in the fields of high-performance computing and artificial intelligence, both of which are of great importance in today's society. There is the possibility to pursue a Master's in Artificial Intelligence as well as the opportunity to collaborate with researchers in the development of AI for the design of new materials.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

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momentum@csic.es | https://momentum.csic.es/









# Position Offered: UNIVERSITY GRADUATE Project: Exploring tumor heterogeneity with morphocynetic analysis: tools for live imaging

Technological and scientific fields: Computational Biology, Image Analysis, Artificial Intelligence

Location: Madrid, Comunidad de Madrid, Instituto de Investigaciones Biomédicas Sols-Morreale CSIC-UAM. https://www.iib.uam.es/en/#gsc.tab=0

Research Group/PI: Machine Learning for Biomedical Imaging Analysis and Multi-Omics Integration, Dra Maria Alieva, <u>www.imAIgene-lab.com</u>

## **PROJECT SUMMARY**

Cancer cells undergo morphological changes during tumor progression, such as increased migration, invasion, and proliferation, indicating aggressiveness. Analyzing these variations helps discover new cell phenotypes and understand underlying mechanisms. Conventional image analysis software struggles with this complexity, necessitating advanced digital methods like artificial intelligence for better segmentation, tracking, and classification of videomicroscopy images, unsupervised learning, dynamic network and modelling for interpratation. This project aims to create automated digital tools for processing and analyzing videomicroscopy data to investigate crucial aspects of cancer, such as cell migration and chromosomal instability. The objective is to understand how these factors contribute to tumor heterogeneity, aggressiveness, and therapy resistance. The project will focus on developing efficient and user-friendly tools accessible to biomedical researchers, featuring intuitive interfaces, cloud computing capabilities, and optimized data management to ensure broad applicability beyond the project's scope.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Master's degree in one of the relevant fields or similar: Biomedicine, Bioinformatics and Computational Biology, Biostatistics, Data Science in Artificial Intelligence, Biomedical Physics, Big Data, Deep Learning, Image Analysis.

#### Merits to be considered:

Knowledge of English; Eexperience in image data analysis or Artificial Intelligence

## WHAT IS OFFERED

This project provides a unique chance to develop skills in microscopy data analysis and software implementation. The hired individual will collaborate in an interdisciplinary environment, bridging computational and biomedical groups to create microscopy analysis tools. Results will be submitted to prestigious open-access journals, and presented at national and international conferences and symposia on cancer research, microscopy, and computational biology. During the project, the hired individual will complete two three-month bioimaging training stays (40 ECTS credits). Over four years, they will earn 90 ECTS credits in digital competencies and 20 ECTS credits in complementary training areas like microscopy, spatial analysis, and data visualization.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

## Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

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# Position Offered: UNIVERSITY GRADUATE Project: Affective markers in the transatlantic letters of women in modern times (CARTER@S)

# Technological and scientific fields: Digital Humanities

Location: Madrid, Comunidad de Madrid, CCHS-ILLA, https://illa.csic.es/es

Research Group/PI: Carter@s, Judith Farré Vidal, https://www.archivocolonial.csic.es/hdlab/

# PROJECT SUMMARY

Affective markers in the transatlantic letters of women in modern times (CARTER@S) is a line of work in which, under the general framework of the I+D "Fastos, simulacros y saberes en la América Virreinal" (PID2020-113841GB-I00). The starting hypothesis of this line of work seeks to recover silenced female voices through correspondence, in which a space of intimacy can be reconstructed and emotions are expressed and subjectivities are interwoven. The corpus of work is made up of letters in which women are involved, either because they write or receive the letters, or because they write to each other. In addition to considering the general theme of female presence/agency, the other two selection criteria concern the spatial and temporal coordinates: transatlantic circulation and during the modern period (16th-18th centuries).

The aim of the project is to make a digital edition of the corpus of letters following standards for the representation of text on the web, so that the corpus is processable, accessible, interoperable and enriched by different processes, both by humans and by Artificial Intelligence tools. The resulting corpus will be stored in a database that will allow for future scalability and refinement. The results will be available as a dataset on digital.csic.

# **PROFESSIONAL PROFILE**

# Minimum requirements:

Master's degree Level of English C1 Aptis qualification (Advanced)

# Merits to be considered:

- Assistant Team Manager
- Work experience in different sectors (at least 10 years)
- Entrepreneur
- Teaching experience in management training
- Expertise in digital marketing, business and technology development
- Skills in international and business relations and communication skills
- Marketing Manager

# WHAT IS OFFERED

The proposal falls within the scope of the Digital Humanities and carries out a transcription and coded edition of the letters to generate the digital file, which includes the tagging of the elements of interest for the project. Currently, the most commonly adopted tagging standard is the so-called TEI (Text Encoding Initiative), an XML-based language for encoding any kind of textual structure, which allows the portability of documents regardless of the software used.

- 3-month stay at the UAB, with the tutoring of Sònia Boadas, Co-IP of the project.
- 3 months stay at the UPM, in the Ontologies group (https://oeg.fi.upm.es/index.html) with the tutoring of Pablo Calleja.
- Master Digital Text Analysis in Antwerp (60 credits)

# Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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# Position Offered: UNIVERSITY GRADUATE Project: Advanced Digitization for Nanoscopy: High-Speed Image Acquisition and Machine Learning Implementation

Technological and scientific fields: Electronic Digitization. Machine Learning, Nanotechnology

Location: Tres Cantos, Madrid, IMN-CSIC, https://imn.csic.es/

**Research Group/PI:** MBE: Nanoestructuras cuánticas para optoelectrónica, M. Mónica Luna, <a href="http://www.imm-cnm.csic.es/mbe/">http://www.imm-cnm.csic.es/mbe/</a>

# PROJECT SUMMARY

The atomic force microscope (AFM) is an exceptional nanotechnology instrument for characterizing the structural, electrical, thermal, and mechanical properties of a wide range of materials at the nanoscale. The fundamental objective of this project is to achieve significant advancements in nanotechnology through the implementation of advanced digital techniques and machine learning (ML). Firstly, a digital control electronics for AFM will be developed based on a proprietary card that will use digital synchronous amplifiers adapted for various applications. Secondly, ML techniques will be implemented, making it one of the first AFMs with incorporated artificial intelligence. Both the project PI and the co-PI (Prof. Julio Gómez, UAM, H-index = 55, over 22,000 citations) have an outstanding track record in instrumental developments as well as in patent generation.

## **PROFESSIONAL PROFILE**

#### Minimum requirements:

Bachelors degree in Electronic, Telecommunications, Computer Engineering or the like

#### Merits to be considered:

Interest in learning and working in a team

# WHAT IS OFFERED

Over the course of 4 years, the hired individual will receive training, guidance, and mentorship from both the host group (120 ECTS) and the co-PI's group, where they will complete 3 training stays of 3 months each (60 ECTS). Additionally, they will receive advice and support from I. Horcas (UAM), an electronic and computer engineer and one of the authors of recent control electronics patents. Furthermore, the hired individual will receive external training in ML, primarily through a paid university master's program (62 ECTS), thus becoming an expert in digital techniques for data acquisition and in the application of ML techniques. Their high level of specialization will make him/her an excellent candidate for competitive job positions that require knowledge in electronic digitization and/or artificial intelligence, both in the research field and in industry. Additionally, he/she will learn to work in a multidisciplinary and international context and will be able to attend international conferences to present the project results. Similarly, the hired person will receive training that will contribute to the improvement and promotion of transversal skills (20 ECTS): he/she will be able to choose from a variety of courses (CSIC Training Plan), such as English, communication skills, etc. During the 4-year contract, all activities (including external learning activities) will be carried out within a 37.5-hour workweek.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

## Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: monica.luna@csic.es Phone: +34-669144582











Project: Innovative digital tools for efficient control of invasive weeds (DigitalWeeds)

**Technological and scientific fields:** Remote Sensing, Aritificial Intelligence, Image analysis and computer vision; Digital tools for agriculture; Software development; Advanced data analytics/edge computing

Location: Madrid, Community of Madrid, INIA-CSIC, https://www.inia.es

**Research Group/PI:** Sustainable Agriculture and Soil Ecology; Ana I. de Castro Megías; <u>https://n9.cl/io1ksc</u>

#### PROJECT SUMMARY

DigitalWeeds aims to develop digital tools based on remote sensing technologies (drone and mobile device images), state-of-the-art Artificial Intelligence (AI) algorithms and mobile applications for the optimal management of the invasive weed Amaranthus palmeri in crops. These tools will allow establishing prevention and eradication measures to control A. palmeri in agricultural scenarios contributing to reduce the use of herbicides, preserve biodiversity and improve farm profitability. DigitalWeeds will enhance scientific-technical knowledge in several research areas, such as AI, Geographic Information Systems (GIS), process automation, software development, Precision Agriculture and Plant Health.

## **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualifications required: Mechatronics, Agricultural, Forestry, Industrial, Geodesy and Cartography, Industrial Electronics and Automation Engineering, or similar ones.
- Advanced level of Spanish and English

#### Merits to be considered:

- Experience in operating drones (e.g.: piloting, sensorization)
- Expertise in image analysis for weed detection
- Knowledge in precision agriculture
- Expertise in artificial intelligence
- Knowledge in mobile application development
- Scientific research experience
- Experience in Geographic Information Systems

## WHAT IS OFFERED

This position will enhance the digital skills of the hired person by contributing to their training in developing tools for the digitization of agriculture. The position has a full training plan of 80 ECTS, consisting of: three Training Stays in national and international centers of recognized prestige in AI, remote sensing, GIS, and application development (University of Cordoba-Spain, Institut Agro Montpellier-France and Center of Applied Artificial Intelligence for Sustainable Agriculture - South Carolina State University-USA); masters and specialization courses in AI, GIS, remote sensing and application design, among others.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

## PRINCIPAL INVESTIGATOR CONTACT

Email: ana.decastro@csic.es Phone: 91 347 6848









Project: *Reproductive bioeconomies: routinisation of genetic research and the use of algorithms in Assisted Reproduction Techniques.* 

**Technological and scientific fields:** Sociology and anthropology of health, reproductive studies, biomedicine and society, political economy of reproductive markets

Location: Madrid, Institute of Public Goods and Policies, <u>www.ipp.csic.es</u>

**Research Group/PI:** MIST: Metrics and Innovation in Science and Technology, IP: Vincenzo Pavone, <u>https://ipp.csic.es/en/org-structure/metrics-innovation-science-technology-mist</u>

#### PROJECT SUMMARY

The number of women and couples resorting to assisted reproduction techniques (ARTs) has increased considerably in recent decades, mainly due to delayed childbearing and environmental factors. Spain ranks first in Europe and third worldwide in the field of assisted reproduction, due to its broad and permissive legislation, which attracts both national and international patients. The main objective of the research project is to understand how recent technologies, such as algorithms and the incorporation of genetic data, operate in the Spanish and global reproductive market. It also aims to analyse the social, political, economic and psychological implications of these technologies for those involved in the treatments, as well as the growing divergence between the public and private sectors in the use of these technologies. The research will use qualitative and quantitative methods, including literature reviews, digital ethnography of clinic websites, analysis of patient and donor forums, semi-structured interviews and surveys representative of the Spanish population. The aim is to gain insight into the implementation and routinisation of these new assisted reproductive technologies, as well as their consequences in social and healthcare policies.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The ideal candidate will possess a BA in political science, public policy or sociology, and will be proficient in both Spanish and English (written and spoken).

#### Merits to be considered:

We will especially appreciate: a) Knowledge of healthcare policies, political economy and reproductive studies, b) experience of qualitative research (interviews, discourse analysis, ethnographic methods) c) proficiency with Nvivo software and d) previous research done on this topic (TFG, TFM, etc...)

#### WHAT IS OFFERED

The Project offers a unique opportunity to become familiar with an ever increasing set of new techniques, which include genetic testing and AI, on a societal challenge that is growing in impact. It will provide an interdisciplinary training in biomedicine, science, and technology studies and policy studies, as well as a link to a growing international community of scholars across Europe. It also provides training in quantitative, qualitative and ethnographic methods, three to four visiting stays in UK, Denmark and Latin America, for a total of 240 training credits through the four years contract.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: Vincenzo.pavone@csic.es Phone: +34686905682











# Project: Using protein design AI-based methods for the development of bioenzymes with therapeutic applications

**Technological and scientific fields:** Structural biology, computational protein design and modelling, artificial intelligence

**Location:** Madrid, Comunidad de Madrid, Institute of Physical Chemistry Blas Cabrera (IQF) <u>https://www.iqf.csic.es/en/</u>

**Research Group/PI:** Crystallography and Structural Biology <u>https://www.xtal.iqfr.csic.es/</u>. PI: Inmaculada Pérez Dorado (<u>https://jiperez3.wixsite.com/perezdorado-group</u>)

## PROJECT SUMMARY

This program aims to train a motivated researcher in cutting-edge digital skills to be applied in bioenzyme design with therapeutic application in infectious diseases and with a high impact on human health. The hired candidate will acquire in-depth experience and competencies in the use of computational approaches, from artificial intelligence (AI) algorithms applied to protein design to molecular docking and molecular dynamics methods, oriented to the computational design of enzymes. This training program is supported by a solid experience of the two host groups in structural and computational biology, as well as by a rigorous training program in computational methods, including AI and programing.

## **PROFESSIONAL PROFILE**

## Minimum requirements:

- Academic qualifications: Graduate in Chemistry, Pharmacy, Biotechnology or related biosciences.
- Good proficiency in English

## Merits to be considered:

- Knowledge in structural biology
- Knowledge in Linux and Python

## WHAT IS OFFERED

We offer a training plan of 289 ECTS, to be completed along the 4 years of contract, and to be conducted by the groups of Dr. I. Pérez-Dorado (CSIC) and Prof. F. Gago (Universidad de Alcalá). This training plan will allow the candidate to acquire in-depth knowledge in computational approaches from a general perspective, as well as focused on R+D in biosciences and structural biology. This program ranges from training in the application and use of AI and other computational techniques applied to the study and design of proteins, to programming languages used in AI, and the creation of advanced software based on AI and machine learning, through the following objectives:

- 1. Training in advanced in silico approaches for structural validation of bioenzymes
- 2. Training in state-of-the-art digital competencies for bioenzyme design
- 3. Training in in silico and in vitro approaches to validate the activity of synthetic bioenzymes

The training program includes a 3-months stay in the group of Prof. Gago's and a master in AI, as well as additional training in the form of courses and workshops in computational structural biology, AI and programing.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: jiperez@iqf.csic.es Phone: +34 915619400 (ext. 442055)











**Technological and scientific fields:** Medical Imaging, Digital Twins, Medical Devices, Additive Manufacturing

Location: Madrid, Madrid, ICTP Facilities at CENIM, <a href="http://www.ictp.csic.es/ICTP2/">http://www.ictp.csic.es/ICTP2/</a>

**Research Group/PI:** Polymer Functionalization Group, Helmut Reinecke, <a href="http://www.ictp.csic.es/qm/fupol/">http://www.ictp.csic.es/qm/fupol/</a>

# PROJECT SUMMARY

Digital tools and additive manufacturing have revolutionized the health field, allowing for the first time to make personalized medicine possible through development in the field of medical devices. Personalized devices are medical devices, training models, digital or physical twins created specifically for a single patient, based on medical images (for example, CT or MRI) of each individual. However, in addition to the materials used or the recent 3D printing technologies incorporated into the sector, digitalization is key in this area:

- First of all, digitalization plays a crucial role by providing the tools for obtaining medical images of the patient, scanning, analyzing these medical images, 3D design of devices or automatic image processing using artificial intelligence or algorithms. of artificial vision.
- Secondly, digital manufacturing technologies (Industry 4.0) such as 3D printing make it possible for the first time to make it feasible to manufacture personalized health products (for example, surgical planning biomodels, surgical guides or implants) for each patient. These devices are made in specialized companies, in healthcare centers (POC manufacturing model, Point-Of-Care) or even within research centers.

# **PROFESSIONAL PROFILE**

# Minimum requirements:

• Degree in Industrial Engineering

# Merits to be considered:

- Experience working with hospital centers
- Knowledge of the biomedical field
- Knowledge and/or experience at an industrial level of 3D printing at a national level.
- Training in regulation of biomedical devices (ISO 13485, ISO 9001,...)
- Training in products manufactured in the hospital environment: in house.
- Experience in teaching and training in different fields including Biomedical Engineering, Health Products and 3D Printing (among others) will be positively valued.

# WHAT IS OFFERED

This project addresses the treatment of medical images as well as the manufacturing of devices and commissioning. Work will also be done on the validation and development of the processes, including regulatory and quality analysis. Finally, work will be done on the development of custom medical devices, surgical simulation models and augmented reality applications. Training stays in different hospitals are proposed, as well as training in digital skills such as Artificial Intelligence, Augmented Reality and Artificial Vision.

## Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: hreinecke@ictp.csic.es Phone: (+34) 915622900








Project: *Quantum Communication with Integrated Photonics and Superconducting Devices* 

#### Technological and scientific fields: Quantum Technologies and Cybersecurity

**Location:** Madrid, Instituto de Tecnologías Físicas y de la Información "Leonardo Torres Quevedo" (ITEFI) <u>https://www.itefi.csic.es/es</u>

**Research Group/PI:** Cryptography and Information Security, Verónica Fernández Mármol

#### PROJECT SUMMARY

Quantum communication is a strategic field addressing security challenges posed by quantum computers' ability to break modern cryptographic techniques. This project aims to advance quantum communication by exploring the miniaturization of Quantum Key Distribution (QKD) devices using Photonic Integrated Circuits (PICs), that offer advantages such as low power consumption and compatibility with electronics, paving the way for cost-effective mass production of QKD devices. The main objective of the project is to design, fabricate, and characterize PICs for QKD implementation. The tasks involved in this contract include exploring QKD protocols for integrated implementation, designing PICs to function as QKD transmitters and receivers, characterizing them, and implementing QKD in laboratory settings and real-world applications such as mobile or airborne scenarios.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualification required: graduate in Physics
- Proficiency in Spanish and English
- Proven knowledge about the main fields of the project: quantum communications and integrated photonics

#### Merits to be considered:

- Posgraduate academic degrees: PhD and masters in relevant and related fields
- Other academic degrees
- Research experience: publications and congress contributions related to the field of the project
- Experience in mannaging and participating in research projects
- Proven ability to work in a team and collaborate with other research groups
- Experience in teaching or supervising undergraduate and graduate students

#### WHAT IS OFFERED

The hired individual will have the opportunity to join a pioneering quantum communications research group in Spain and collaborate with various CSIC groups (IMB and IFF) to achieve the project's objectives. During their training at the center, they are expected to complete a total of 230-290 ECTS of activities, including research and experimentation, project collaboration and management, teaching, training courses, and conference participation between others. Additionally, the hiree will undertake training stays at national and international centers.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: veronica.fernandez@csic.es Phone: +34 653 462 991













### Position Offered: UNIVERSITY GRADUATE Project: Application of supervised machine learning in the exploration and resolution of evolutionary scenarios

Technological and scientific fields: Principal: Artificial Intelligence. Others: Massive data and information processing technologies. Computacional Biology.

Location: Madrid, Comunidad Autónoma de Madrid, Real Jardín Botánico (RJB), CSIC, https://rjb.csic.es

**Research Group/PI:** Evolutionary plant biology: patterns, processes and mechanisms (PEBG) / Isabel Sanmartín / https://rjb.csic.es/personal-cientifico/isabel-sanmartin-bastida

#### **PROJECT SUMMARY**

Supervised" machine learning (ML) is a subfield of AI in which algorithms trained with "labeled" data from simulations learn to solve complex problems, which escape classical statistical inference methods. The objective of the contract is to train the candidate in a growing field such as the application of ML in evolutionary biology. The project will analyze the mathematical basis of statistical models for their translation to a new ML-based framework. The use of different algorithms such as decision trees and different neural network architectures will be explored, as well as representation languages for evolutionary data and biological traits. Existing simulators will be compared in order to develop a generative neural network-based simulator that captures the complexity of statistically complex models.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduate in Data Science and Artificial Intelligence or Graduate in Software Engineering or Graduate in Biology or Biological Sciences or Computer Engineering or Graduate in Technologies for the Information Society. Medium-high level in English language. Experience in programming and data processing. Knowledge of Python and R programming languages.

#### Merits to be considered:

Experience in the field of artificial intelligence. Experience with machine learning libraries: as Tensorflow/Keras/Sklearn/PyTorch. Knowledge of Bayesian Inference tools.

#### WHAT IS OFFERED

The project will have an impact on digital competencies in the field of machine learning. The increase in the amount of available data has introduced new challenges in evolutionary biology that require the development of more sophisticated data modeling methods. Current methods are based on statistical inference techniques, but suffer from problems of computational intractability. The project will introduce the candidate to an expanding field, with projections in epidemiology, demography, and community ecology. The training plan includes statistical modeling of evolutionary scenarios; development of simulation algorithms and coding languages; exploration of AI architectures in classification and parameter estimation (90 ECTS). Attendance to accredited specialization courses at national/international universities (77 ECTS), and training stays with prestigious researchers in AI and statistical inference (60 ECTS). Dual supervision at RJB-CSIC and Universidad Politécnica de Madrid.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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### Position Offered: UNIVERSITY GRADUATE Project: Service operation model in the SGAI-CSIC distributed storage infrastructure for massive scientific data analysis at CSIC

Technological and scientific fields: Computing, Information and Communication Technologies

**Location:** Madrid, Madrid. SGAI-CSIC. Área de Informática Científica (AIC). Home - Home - Área de Informática Científica de la Secretaría General Adjunta de Informática del CSIC. <u>https://aic.csic.es</u>

Research Group/PI: Sonia Martínez Hedo. VICYT

#### **PROJECT SUMMARY**

To develop a management model for an infrastructure dedicated to the storage, processing, and preservation of scientific data. The aim is to provide CSIC researchers with an effective tool for projects involving cloud computing, big data analysis (BD), artificial intelligence (AI), machine learning (ML), deep learning (DL), and complex computational techniques that require specific technological architectures due to data volume, data type or analysis and visualization needs.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree in Computer Systems Engineering, corresponding to level 2 (Degree) or higher of the Spanish Qualifications Framework for Higher Education (MECES) and level 6 or higher of the European Qualifications Framework (EQF)
- Advanced Linux
- Experience in HPC Systems

#### Merits to be considered:

- Accredited knowledge in: HPC systems administration; Ethernet and high-performance networks; server virtualization management; high-performance distributed storage systems; deployment and configuration of monitoring systems; and software compilation and installation.
- Teaching experience
- Experience in scientific research environments

#### WHAT IS OFFERED

A learning and professional development environment within a centralised scientific computing infrastructure. The Scientific Computing Area (AIC) team of the Deputy General Secretary for Informatics offers the opportunity to participate in the development of a service model for research personnel across all scientific fields. Constant interaction with researchers and technicians will be maintained, with a dynamic learning process overseen by the Principal Investigator (PI), the Head of the AIC unit, and the Head of Services of the AIC unit. Intensive training will be provided during the first two years of the contract, after which the individual will engage in service tasks and project management for the subsequent two years. Training stays will be conducted at Spanish supercomputing centres with similar projects.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: sonia.martinez@csic.es Phone: +34 915681470 / +34 915680224











Project: Implementation of Artificial Intelligence for the definition of CSIC's Institutional Strategy and data management of the Unidad de Inteligencia Institucional y Evaluación (UNIN)

#### Technological and scientific fields: Artificial Intelligence

Location: Madrid, Comunidad de Madrid, Sede Central CSIC, <u>www.csic.es/en</u>

**Research Group/PI:** Unidad de Inteligencia Institucional y Evaluación (UNIN), Elena Corera Álvarez

#### **PROJECT SUMMARY**

The UNIN is a unit under the CSIC Presidency, whose function is based on collecting, analyzing and distributing relevant information for decision making, as well as foreseeing and planning contingencies and other actions that the CSIC needs or intends to implement. The project focuses on the implementation of AI in the UNIN, with the aim of maximizing the use of resources, facilitating decision making and managing data and information. To this end, it will be necessary to identify and evaluate the opportunities for implementation within the Unit, which will subsequently allow the most appropriate AI systems to be developed and implemented.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Degree in Data Science and Artificial Intelligence; Degree in Computer Engineering; Degree in Mathematics; Degree in Telecommunication Technologies Engineering; Degree in Physics or equivalent.

Fluency in Spanish and medium-high level of English.

#### Merits to be considered:

Knowledge of statistical packages and programming languages such as Stata, R and Python will be an asset. It will also be an asset to have a master's or postgraduate degree in Human and Social Sciences Research, Data Science, Big Data or similar. It will also be valued to have official certification of English level C1. Likewise, knowledge of business intelligence (BI) tools and data visualization techniques and applications will be taken into account.

#### WHAT IS OFFERED

The contracted person associated with this project will participate in the creation of a working system for the implementation of AI in the UNIN, which will serve as a pilot project for the future implementation of AI in other units and vice-presidencies of the CSIC Central Organization. During the duration of the contract, the contracted person will enjoy national and international training stays and training courses that, among other aspects, will allow him/her to broaden his/her knowledge in AI and to learn how to apply it in public administrations.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: elena.corera@csic.es Phone: +34 91 568 14 53













### Project: New digital competencies for new open science requirements in DIGITAL.CSIC

**Technological and scientific fields:** Open access repositories, Open source software, Data and information processing technologies, Data analysis and integration, Open science.

Location: Madrid, Community of Madrid, URICI, https://bibliotecas.csic.es/

Research Group/PI: VORI/URICI, Carlos Closa Montero

#### PROJECT SUMMARY

The project proposes to delve into several lines of work of DIGITAL.CSIC to optimize some open science services that have experienced a significant increase in demand from the community of repository users. It also aims to achieve a perfect alignment with the recommendations of the National Open Science Strategy (ENCA), and best practices and standards by reputed repository communities such as COAR and RDA. Likewise, this project will reinforce the technological pillar of DIGITAL.CSIC at a time of deep transformations in the DSpace software architecture (the most widely used open source software for open repositories globally) and will position DIGITAL.CSIC as a real asset in the European Open Science Cloud (EOSC). Such specialization will prepare DIGITAL.CSIC for its consolidation and technological expansion phase and will provide the person hired with advanced digital skills that are highly sought after.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Bachelor's Degree, Engineering, or Degree in Computer Science or similar.
- Knowledge in Java technologies, Hibernate, Spring, and knowledge of SOAP and REST APIs and Python.
- It is essential to be able to speak and write English at a professional level.
- Strong communication skills and experience in teamwork.

#### Merits to be considered:

- Experience in Java technologies, Hibernate, Spring, SOAP and REST APIs and Python.
- Experience in SOLR application development. Knowledge of Angular is a plus.
- Interest and experience with open source applications, ideally in a research context.
- Knowledge of OAI-PMH protocol, relational database management, and linked open data.

#### WHAT IS OFFERED

momentum@csic.es | https://momentum.csic.es/

The person hired will carry out his/her work plan under the area "Open Science Services and DIGITAL.CSIC" in URICI. A gradual methodology will be implemented. In this 1st phase (first year), the learning plan will include training sessions given by the DIGITAL.CSIC team and other training activities organized for CSIC staff throughout the year. The intermediate phase (second and third year) will combine specialized training activities and the execution of specific tasks related to their specialization in this URICI service, in such a way that the gradual acquisition of new digital skills does not remain at a merely theoretical level but is applied in the repository infrastructure and in the relevant support services offered by the team to the CSIC scientific and technical community. This phase will include training stays in other CSIC centers/institutes and/or in the repository teams of other relevant research institutions, as well as participation in training events given by companies of recognized prestige in the field and/or relevant research institutions/universities. The final phase (fourth year) will focus on the design, testing, implementation and dissemination of a specialized project in which the person hired will put into practice all the digital skills acquired during the previous 3 years.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: Isabel.bernal@bib.csic.es, agnes@bib.csic.es/Phone: 91-5681674











Project: DATA4VRI: Procesamiento y análisis masivo de datos de internacionalización en el CSIC

**Technological and scientific fields:** Massive Data and Information Processing Technologies/Data Analysis and Integration/Artificial Intelligence.

Location: Madrid, Madrid, Vicepresidency for International Affairs, www.csic.es

**Research Group/PI:** Vicepresidencia de Relaciones Internacionales, Francisco Javier Moreno Fuentes

#### PROJECT SUMMARY

With this project, the Vice-Presidency for International Affairs (VRI) aims to strengthen the management and use of data related to the internationalization of the CSIC, while facing the challenge of incorporating Artificial Intelligence in the processes of data management and analysis. The project objectives are essentially two:

1) Improve the techniques of management (automation), analysis and visualization of the data of the international activity of the institution, (1.1) establish a unit of the data in the VRI, 1.2) Systematize the methods of analysis, statistics and performance of the databases of the VRI, (1.3) Improve the presentation (visualization) of results.

2) Introduce Artificial Intelligence for data analysis, (2.1) standardization and updating of available data, (2.2) Evaluation of processes and selection of proposals, (2.3) Analysis of results of the CSIC and counterpart organizations in the international context.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree or engineering in ICT.
- Other higher education degrees, provided that additional experience or training in programming, data analysis and integration or AI is demonstrated.

#### Merits to be considered:

Training and experience in:

- Document digitization processes.
- Data and information processing.
- Data analysis and integration.
- Development of AI-based applications.

#### WHAT IS OFFERED

It offers the incorporation to a dynamic and proactive work team. The contract includes a training program for the four years of the contract, with a total of 100 ECTs for additional training in digital skills (possibility of enrolment in a master's program), and 60 ECTs in national and international internship programs.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: vri@csic.es Phone: +34 91 568 15 28











Project: Development and implementation of computational tools for analysis, massive processing and integration of multi-omics data for functional engineering of microbial communities of biotechnological interest.

Technological and scientific fields: Data analysis and integration, Massive data and information processing technologies, Biotech, Artificial intelligence, Advanced data analytics / edge computing, Computational biology

Location: Mutilva, Navarra, IDAB-CSIC, https://www.idab.csic.es

Research Group/PI: Biotechnology, Edurne Baroja

#### **PROJECT SUMMARY**

Understanding the mechanisms that determine the dynamics and functioning of microbial communities in their respective natural environments (i.e., soil, etc.) and hosts (intestinal, respiratory microbiome, etc.) is essential for their biotechnological exploitation. The General Objective of this project is to equip IDAB with the capacity and autonomy in the analysis and integration of multi-omic data related to the composition, activity, function, interaction, and modulation of microbial communities, both in natural and synthetic habitats, through the use of massive data processing technologies. To achieve this, we propose (i) to develop and implement multi-data processing and integration tools, as well as (ii) to advance towards the contemporary design of biotechnological tools for engineering microbial communities, with applications in agriculture, health, and climate.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduate/Degree in at least one of the following fields: Biology, Biochemistry, Biotechnology, Computer Science, Mathematics, or Data Science. Proficiency in programming languages for managing biological data, preferably Python or R. Ability to write and read in English.

#### Merits to be considered:

Knowledge of other programming languages (Unix, Java...). Experience in analyzing large biological data sets from microbial communities. Ability to convey complex analysis results to personnel not familiar with computing environments. Experience in managing bioinformatics units. Experience using computing clusters (High Performing Clustering).

#### WHAT IS OFFERED

During the execution of this project, we will establish the necessary bioinformatics methods and pipelines for: 1) Acquisition of multi-omic data from biological communities regardless of their origin; 2) Processing of these data at the taxonomic and functional levels within each origin domain, exploring the use of machine learning (ML); 3) Global integration of all microbial communities to describe their dynamics, as well as modeling important communication or interaction nodes. The candidate will work in collaboration with six groups from the center, with interests ranging from plant biology to human health, in an interdisciplinary environment with microbial communities and their interactions as a common interest. This contract has a strong training component (total of 240 ETCS), to provide the contracted person with high-level skills in digital competencies for multi-omic data analysis, massive processing, and modeling, using the most advanced bioinformatics analysis tools. This includes a Master's Degree in Artificial Intelligence, attendance at the FISABIO Summer School, HarvardX courses and two three-month stays each at EMBL-EBI in the United Kingdom and BSC-CNS in Barcelona, both world-leading centers in supercomputing applied to bioinformatics.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: e.baroja@csic.es /Phone: 948168009











### Project: Quantum computing of complex nanophotonic systems for optical control of quantum emitters

Technological and scientific fields: Photonics; Functional and multifunctional materials (photonic, magnetic, hybrid, thin films and coatings); Information and Communication Technologies

Location: San Sebastián, Basque Country, Centro de Física de Materiales, https://cfm.ehu.es/

Group/PI: Research Theory of Nanophotonics, Rubén Esteban, https://cfm.ehu.es/nanophotonics/

#### **PROJECT SUMMARY**

The objective of this project is to investigate the possibilities offered by quantum computing to analyze complex configurations of interest in nanophotonics based on the interaction of plasmonic resonators with quantum emitters such as molecules or quantum dots. The circuits designed will be executed in IBM quantum computers. The work will be carried out together with two PIs with strong experience in the study of quantum effects in plasmonics.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Master (or equivalent title) in physics or related field •
- Proficiency in English •
- Strong background on physics and particularly on quantum physics •
- Practical experience in Quantum Computing •

#### Merits to be considered:

- Knowledge of Nanophotonics •
- Practical experience on using quantum computing to calculate time dynamics of physical • systems and/or chemical modelling
- Knowledge of Qiskit and other programming languages .
- Knowledge of open quantum systems •
- Strong recommendation letter •

#### WHAT IS OFFERED

Opportunity to develop expertise on the treatment of physical (nanophotonic) systems with quantum computers, as well as to gain a broad background on quantum effects in nanophotonics Collaboration with different experimental and theoretical international groups including with members of IBM Quantum.

Training stays in internationally renown groups, likely in IBM Dublín or IBM Zurich (3 month or more in total).

At least 60 ECTS in training in digital competences, with emphasis on quantum technologies.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

#### Start of contract: before 31 December 2024

### PRINCIPAL INVESTIGATOR CONTACT

Email: ruben.esteban@ehu.eus Phone: 0034943015763











Project: Meta-learning for the automated analysis of high-resolution cryo-electron tomography images

Technological and scientific fields: Computational Biology, Image Analysis and Computer Vision, Artificial Intelligence

Location: Leioa, País Vasco, Instituto Biofisika, www.biofisika.org

**Research Group/PI:** Numerical methods of cryo-electron tomography. PI: Daniel Castaño. https://www.biofisika.org/en/research/numerical-methods-cryo-electron-tomography

#### **PROJECT SUMMARY**

Cryo-electron tomography is an imaging method in molecular and cellular biology that allows the direct visualization of functional macromolecules in their physiological context. This project proposes the development and use of modern artificial intelligence tools to address two fundamental aspects of this imaging technique: the automated segmentation of large amounts of cellular images and the alignment of individual images of molecules in their cellular environment. Both problems are notable for the enormous amount of noise inherent in the experimental data collection, challenging classical resolution methods. The recent emergence of publicly accessible data banks now makes it possible to use Deep Learning models, which we will develop under the paradigms of transfer learning and meta-learning.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Master's, or Engineering degree in a technical discipline. •
- Fluent communication skills in English and Spanish.

#### Merits to be considered:

Experience in the use of artificial intelligence. Experience in developing numerical methods for image processing. Advanced knowledge of Matlab, C++, and/or CUDA. Experience in research projects focused on structural and/or molecular biology.

#### WHAT IS OFFERED

The project will coordinate various groups with expertise in the field of electron microscopy, molecular biology, and artificial intelligence.

The chosen candidate will follow a four-year training project of 240 ECTS, including stays in national and international institutions and in-person and remote training courses in cutting-edge artificial intelligence techniques. A PhD by compendium of publications is expected during the project.

The host group has extensive experience in developing software for cryotomography, focused on the Dynamo project (www.dynamo-em.org), in which the project's results will be integrated. The candidate will collaborate in the development of this software and its dissemination at international conferences and workshops.

The Biofisika Institute has a solid infrastructure for high-performance computing, with several multi-GPU servers dedicated exclusively to the group.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: daniel.castano@csic.es Phone: 0034 946 01 26 25 - ext: 8049











#### Technological and scientific fields: Physics; design engineering

**Location:** Valencia, Comunidad Valenciana, Institute for Instrumentation in Molecular Imaging (i3M), <u>https://i3m.csic.upv.es</u>

**Research Group/PI:** Medical Imaging and Therapy Systems, IP José María Benlloch Baviera, <u>https://i3m.csic.upv.es/research/stim</u>

#### PROJECT SUMMARY

Digital techniques enable increasingly versatile and effective medical applications. This project is oriented towards proton therapy and research into radiobiological effects. In recent years, clinical evidence has been found that the same dose of radiation can have different effects on the patient if it is concentrated in a time of less than 1 second compared to standard treatment. The research group works on several related aspects. On the one hand, the development of radiation detectors capable of measuring the total dose in such short times, and on the other hand, the in-vitro study of the effects of radiation on cell cultures. These works require experimental setups and laboratory models adapted to each environment. CAD design and instant 3D printing of designed components allows for a very efficient workflow. This project will promote the incorporation of new modules and techniques such as artificial intelligence and advanced industrial modeling and manufacturing in SolidWorks.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

University degree required: Degree in Industrial Design Engineering and Product Development

#### Merits to be considered:

The following aspects will be positively valued:

- Experience using SolidWorks software
- English certificate (minimum level B1)
- Experience in the design of laboratory models for research in physics, medicine or biology

#### WHAT IS OFFERED

The project combines activities related to the group's lines of research with four main training activities, each culminating in the writing of a work and which can lead to scientific publications and contributions at conferences, including the design and construction of an ion beam monitor based on scintillating fibers for use in hadrontherapy or the design of an underground laboratory for the new i3M building. The person hired will carry out several stays in national (CLPU Salamanca, CNA Sevilla, IGFAE Santiago de Compostela) and international research centers (DKFZ Heidelberg). In addition, he/she will take a series of online courses on advanced industrial design techniques.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: benlloch@i3m.upv.es Phone: +34 963879907











Project: *Quantum computing of complex nanophotonic systems for optical control of quantum emitters* 

**Technological and scientific fields:** Photonics; Functional and multifunctional materials (photonic, magnetic, hybrid, thin films and coatings); Information and Communication Technologies

Location: San Sebastián, Basque Country, Centro de Física de Materiales, <u>https://cfm.ehu.es/</u>

ResearchGroup/PI:TheoryofNanophotonics,RubénEsteban,https://cfm.ehu.es/nanophotonics/

#### PROJECT SUMMARY

The objective of this project is to investigate the possibilities offered by quantum computing to analyze complex configurations of interest in nanophotonics based on the interaction of plasmonic resonators with quantum emitters such as molecules or quantum dots. The circuits designed will be executed in IBM quantum computers. The work will be carried out together with two PIs with strong experience in the study of quantum effects in plasmonics.

#### PROFESSIONAL PROFILE

#### Minimum requirements:

- Master (or equivalent title) in physics or related field
- Proficiency in English
- Strong background on physics and particularly on quantum physics
- Practical experience in Quantum Computing

#### Merits to be considered:

- Knowledge of Nanophotonics
- Practical experience on using quantum computing to calculate time dynamics of physical systems and/or chemical modelling
- Knowledge of Qiskit and other programming languages
- Knowledge of open quantum systems
- Strong recommendation letter

#### WHAT IS OFFERED

Opportunity to develop expertise on the treatment of physical (nanophotonic) systems with quantum computers, as well as to gain a broad background on quantum effects in nanophotonics.

Collaboration with different experimental and theoretical international groups including with members of IBM Quantum.

Training stays in internationally renown groups, likely in IBM Dublín or IBM Zurich (3 month or more in total).

At least 60 ECTS in training in digital competences, with emphasis on quantum technologies.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

### PRINCIPAL INVESTIGATOR CONTACT

Email: ruben.esteban@ehu.eus Phone: 0034943015763











Project: Machine Learning Applied to the Search for the Distribution Pattern of a Unique Plant Cell Type: The Laticiferous Cell Network in Euphorbia lathyris

Technological and scientific fields: Biotechnology, Computational Biology, Artificial Intelligence, Image Analysis and computer vision

Location: Valencia. Comunidad Valenciana. Instituto de Biología Molecular y Celular de Plantas (IBMCP) https://ibmcp.upv.es

**Research Group/PI:** Plant Adaptation to Environmental Stress and Biotechnology of Energy Crops/ Pablo Vera

#### PROJECT SUMMARY

The main objective of the project is to generate, using computational learning tools, a model for recognizing laticiferous cells, their parameterization and unraveling their distribution pattern in plant organs and also in the entire plant. In plant organisms, very little is known about the tubular system based on cells called laticifers, which constitute the longest, if not the longest, type of plant cell of all cell typologies identified in nature. The laticifers form a tissue network close to the surface of the leaf, and when this tissue is slightly damaged, a viscous suspension of particles known as latex oozes out, which fulfills a defensive function against insect attack. Latex has in its composition metabolites of great economic importance depending on the plant species (e.g. rubber, morphine, triterpenes, etc.). Despite the particularity and economic and ecological importance of this cell type, there is a great lack of knowledge about the differentiation mechanisms of laticiferous cells and how the system of laticiferous cells is organized within the plant body and in its different organs (leaves, stems, fruits, roots). AI, through its machine learning disciplines, would improve the possibility of analyzing and predicting the distribution pattern of this system of laticiferous cells, both under conditions of normal development and in situations of stress and climate change conditions

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Agronomic Engineer or graduate in Biotechnology or biology

#### Merits to be considered:

Experience in the management of the E. lathyris plant and in the understanding of the laticiferous cell system will be positively valued, also in the plant-pathogen interaction processes and especially in the computational transcriptomic analysis and the study and analysis of plant secondary metabolites.

#### WHAT IS OFFERED

We offer the candidate a training plan of at least 240 ECTS to be developed over 4 years and the development of a project related to digitalization of cellular images of laticiferous cells together with their processing and application of AI tools for the determination of patterns of growth and distribution of said cells.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (37.000 € - 41.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: vera@ibmcp.upv.es Phone: +34 677 300 377



momentum@csic.es | https://momentum.csic.es/









# Position Offered: UNIVERSITY GRADUATE Project: *Self-activating phototherapies for the treatment of glioblastoma multiforme*

**Technological and scientific fields:** Design of new drugs, computational biology, high performance computing

**Location:** Valencia, Comunidad Valenciana, Instituto de Tecnología Química (ITQ), <u>https://itq.upv-csic.es/</u>, and Instituto de Ciencia Molecular (ICMOL), <u>https://www.icmol.es/</u>

**Research Group/PI:** Organic and Biological Photochemistry Group, PI: Virginie Lhiaubet (ITQ), and The Excited State Quantum Chemistry Group, co-PI: Daniel Roca Sanjuán (ICMOL)

#### PROJECT SUMMARY

We propose the development of an innovative technology based on intracellular photon generation for the treatment of brain tumors such as glioblastoma multiforme. The system will take advantage of the chemiluminescence induced by electron transfer to selectively excite a phototherapeutic agent in situ and induce cell death. An interdisciplinary and multidisciplinary approach, utilizing tools from theoretical and experimental chemistry, is planned. The hired researcher will perform tasks at the interface between chemistry, biology, biomedicine, and physics. The investigation will be carried out at two internationally renowned institutes: the Institute of Chemical Technology (experimental part, supervised by V. Lhiaubet) and the Institute of Molecular Science (computational chemistry, supervised by D. Roca Sanjuán).

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Required academic qualification: Degree in Chemistry, Pharmacy, or equivalent.
- Proficiency in Spanish and English.

#### Merits to be considered:

- Training or experience in computational chemistry and/or organic synthesis
- Motivation to develop a multidisciplinary topic
- Research experience (articles, oral presentations, posters...)

#### WHAT IS OFFERED

The project has a strong multidisciplinary character, involving the acquisition of knowledge in organic synthesis, spectroscopy, in vitro cellular studies, microscopy, quantum chemistry applied to the characterization of excited electronic states, and hybrid methodologies of quantum chemistry and molecular mechanics in computational photobiology. Depending on the academic profile of the hired researcher, the following will be offered: (i) advanced master's level training in computational chemistry by completing the Master's Degree in Theoretical Chemistry and Computational Modeling of 120 ECTS/2 years (https://shorturl.at/rIWTZ) or (ii) an equivalent qualification that complements their initial training in accordance with the Project's theme. Additionally, he/she will attend specialized courses, summer schools, and relevant conferences. The training will be complemented by two stays (one national and one international) in groups specialized in microscopy and in modeling processes of chemiexcitation and bioluminescence.

#### Contract conditions:

Indefinite contract for a University Graduate associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(37.000 \in -41.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: lvirgini@itq.upv.es Phone: +34 963877807













# **POSTDOCTORAL POSITIONS**



# 73 Contracts

# **12 CCAA**

7 PTI / HUBS

# **67 CENTRES**

## **30 CITIES**

Andalucía Aragón Asturias Cantabria Castilla La Mancha Castilla y León Cataluña Galicia **Islas Baleares** Madrid Murcia **Comunidad Valenciana** 



















## Position Offered: POSTDOCTORAL RESEARCHER Project: Application and Development of Imaging Tools for the 4D analysis of biological processes -from nanoscopy to mesoscopy

**Technological and scientific fields:** Artificial Intelligence; Image Analysis and Computer Vision; Developmental Biology; Quantitative biology; Live Imaging; Topological Data Analysis; Single-cell omics; In situ detection of gene expression.

**Location:** Seville (Andalusia), CABD (Andalusian Centre for Developmental Biology): <a href="https://www.cabd.es/en/">https://www.cabd.es/en/</a>

**Research Group/PI:** Developmental Control group; PI: Fernando Casares: <u>https://www.cabd.es/en/research\_groups/developmental-control/summary-24.html</u>

#### PROJECT SUMMARY

The successful candidate will develop AI tools for the analysis of developmental trajectories (normal and perturbed) and combine them with the spatial embedding of cell states (described by single-cell omics) to not only predict normal and aberrant developmental trajectories, but also to explain the causes of embryonic developmental variability as a combination of cellular interactions in space and time. The successful candidate will be expected to make a significant contribution to the design of the project.

In addition, the successful candidate will be involved in the activities of ALMIA, the Advanced Light Microscopy and Image Analysis Platform of CABD, to provide technical and scientific advice to CABD researchers.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The candidate is expected to have a Ph.D. with expertise in image analysis, preferably biological, using artificial intelligence, and an excellent track record. Fluency in English is required.

#### Merits to be considered:

Experience in live imaging, quantitative and computational biology, or single cell omics is a plus.

#### WHAT IS OFFERED

A four-year postdoctoral contract starting before 31.12.2024 at the CABD, Seville. The salary will be between 41.000  $\in$  - 52.000  $\in$  per year (gross) depending on the qualifications of the candidate.

The CABD is perhaps the only research institution in Spain dedicated to developmental biology sensu lato. With a structure based on strong shared technological platforms, the CABD stands out for three aspects: advanced imaging, functional genomics (including a large fish facility) and the diversity of model systems that the CABD hosts. Within the institute, the postdoc will have the opportunity to interact with a wide range of colleagues to define his/her research project, including the model system - although zebrafish may be the starting model.

Mentoring will be provided by Prof. Fernando Casares, senior CABD PI and scientific director of ALMIA, and Prof. María José Jiménez, from the Department of Applied Mathematics (I) of the University of Seville and an expert in topological data analysis.

The contract includes an additional allowance for training and meeting expenses.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: fcasfer@upo.es (preferred mean of contact; Mention in subject "Momentum Postdoctoral" Phone: +34 954348947











Project: Identification of genetic and epigenetic determinants involved in resistance to epigenetic stress in cancer

**Technological and scientific fields:** Computational biology, Data analysis and Data integration, Genomics, Cancer Biology

**Location:** Sevilla, Andalucía, Centro Andaluz de Biología Molecular y Medicina Regenerativa (CABIMER). <u>https://www.cabimer.es/</u>

**Research Group/PI:** Epigenetics and Gene expression Group / Jose C. Reyes. <u>https://www.cabimer.es/en/research-groups/epigenetics-and-gene-expression/</u>

#### PROJECT SUMMARY

Cancer cells adapt and survive by acquiring and selecting molecular modifications in a process known as **tumor evolution**. One of the consequences of tumor evolution is the emergence of clones with different characteristics, vulnerabilities and drug resistance capabilities, making **tumors heterogeneous** and difficult to eradicate. Studying in detail how tumor evolution occurs is therefore a priority in modern molecular oncology, and the use of new tools for **big data analysis and artificial intelligence** is essential to this task. Tumor cells are not only genetically but also epigenetically heterogeneous, and current theories suggest that tumor evolution is the consequence of the interplay between genetic and epigenetic mechanisms. Here, we propose to use **computational analysis of genomic and epigenomic data** to investigate the interaction between epigenetics and genetics in cancer cells evolution.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Doctorate in Biology, Biomedicine, Bioinformatics, or other doctorates related to live sciences, Medicine, Statistics, Mathematics or Informatics
- Knowledge of R software environment

#### Merits to be considered:

- Knowledge of Programming languages.
- Experience in bioinformatics and computational biology.
- Experience in ChIP-seq, RNA-seq, ATAC-seq and WGS analysis, network analysis, computational evolution and/or other genomic analysis.
- Experience in cáncer biology.

#### WHAT IS OFFERED

Interdisciplinary project aimed at understanding the evolution of cancer cell genomes. Use of innovative genomic and epigenomic analysis technologies. Collaborations and short-term stays with international reference groups. Training plan that includes 60 ECTS to perform a master related to bioinformatics, deep learning and artificial intelligence applied to genomics.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: jose.reyes@cabimer.es Phone: 34 954467842











Project: Developing a scalable individual-based ecosystem model to understand human impacts in complex natural systems

Technological and scientific fields: climate change & biodiversity, digital twins, data analysis & integration, high-performance computing, computational biology, complex systems

Location: Sevilla, Andalucía, Doñana Biological Station, https://www.ebd.csic.es/

Research Group/PI: DEMOCAST, Maria Paniw, https://globalchangeeco.com/

#### **PROJECT SUMMARY**

We will use decades of ecological data from Doñana Natural Area, coupled with advanced methods in computational biology, to develop a digital twin. We have three main objectives:

(i) To create a dynamic database structure to obtain abiotic and biotic information from Doñana Natural Area by digitizing and continuously updating, via cloud-based workflows, primary data

(ii) To develop new methods in data integration based on high-output latent state computing which allow to join disparate data types and scales into one modelling framework

(iii) To develop a digital twin that scales up, from individuals to ecosystems, the effects of interacting global-change on terrestrial ecosystems in Doñana Natural Area

The main tasks of the project therefore consist in coordinating cloud-based iterative forecasting; integration of high-quality species counts, camera trap, bio-acoustic and remote-sensing data; and demographic modelling. The postdoc will be integrated in an international, dynamic, and interdisciplinary team at EBD.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Biological or Natural Sciences or similar
- Fluent in at least one scientific programming language (R, Python, C++, Pascal) •
- Experience in individual demographic modelling and ecological forecasting
- A track record of publishing high-quality research (commensurate to career stage) •
- Excellent communication skills (both written and oral) in English •
- Ability to work independently and capacity to collaborate in an international environment •

#### Merits to be considered:

- Experience in working with non-academic (policy) stakeholders •
- Experience in parallel computing, collaborative coding, and version control (e.g., Git) •
- Previous experience with modelling some components of terrestrial systems in Doñana •
- Processing and integrating different data types into ecological predictions

#### WHAT IS OFFERED

Skill development: cloud-based automated data workflows; bio-data processing with machnice learning and AI; latent-state Bayesian modelling; predictive modelling. Collaborations & research stays: Ecological Forecating Initiative (USA, Germany, Finland), Uni Potsdam, BIOCOM-SC (co-PI); Training: 146 ECTS total, including Barcelona Supercomputing Center, bioinformatics courses at Transmitting Science/Coursera: Gordon Conferences on Agent Based Modelling

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: maria.paniw@ebd.csic.es Phone: +34 671 246 338











Project: Integration of -omics and data mining for the study of multiple interactions in Mediterranean agricultural systems in the face of climate change

**Technological and scientific fields:** Data analysis and integration. Image analysis and computer vision. Artificial intelligence. Climate change and biodiversity.

Location: Granada, Andalucía, Estación Experimental del Zaidín (EEZ), www.eez.csic.es/

Research Group/PI: BReMAP, Dr. Juan de Dios Alché Ramírez

#### **PROJECT SUMMARY**

The project will implement an institutional structure of computational biology at the EEZ-CSIC that enhances existing lines of research in areas such as plant biology, soil, stress, environment and food, amplifying its capacity to address high-impact global problems, such as climate change. Strategies will be designed that integrate a vast amount of data generated (-omics, biochemical, molecular, imaging and positioning studies), from a holistic perspective and using advanced technologies of Artificial Intelligence (AI), machine learning and deep data analysis (deep data). A technical support infrastructure will be created to store, organize, manage and analyze large volumes of data from diverse experimental sources, adhering to the EU FAIR principles. On the other hand, databases and platforms that integrate machine learning (ML) and predictive analysis tools will be developed. These will facilitate advanced functions to organize, expand, compare and predict interactions from ongoing projects, using intuitive interfaces and visualizations that simplify the interpretation of complex datasets. Finally, tools based on ML and AI will be implemented for the holistic analysis of the datasets, allowing advanced comparisons.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The candidate must have a doctorate in Biology, Biochemistry and Molecular Biology, Biotechnology, Mathematics, Statistics, Bioinformatics, Engineering or related subjects, with competencies in English and Spanish.

#### Merits to be considered:

Multidisciplinary training will be valued. For bio training, prior knowledge in data analysis, programming, completed projects or additional training will be valued. In engineering or mathematics profiles, training in the biological field, participation in similar projects, etc. will be valued. In both cases, work experience and related publications will be valued.

#### WHAT IS OFFERED

The project will allow the candidate to integrate into a newly created unit, in which its marked multidisciplinary aspect will stand out, since it will interact with various groups of the institute that will provide data of both the -omic type (transcriptomic, (meta)genomic, proteomic, metabolomic...), as well as biochemical, molecular data, image banks, positioning...) for analysis and integration. The training plan includes a total of 264 ECTS, with numerous activities such as participation in highly prestigious courses on programming languages, specific analysis, etc. It will also include 3 stays (3 months each) in prestigious international laboratories for specific learning, participation in conferences, direction of works in various associated master's degrees and others.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: juandedios.alche@eez.csic.es Phone: 958526520, 615380299













Technological and scientific fields: Artificial intelligence - Image analysis and computer vision - Edge Computing

Location: Granada, Andalucía, IAA-CSIC, https://www.iaa.csic.es/

Research Group/PI: VHEGA, Rubén López Coto, https://vhega.iaa.es/

#### **PROJECT SUMMARY**

The project aims to apply advanced deep learning (DL) techniques to data from Imaging Atmospheric Cherenkov Telescopes (IACTs), particularly focusing on the Large-Sized Telescopes (LSTs) in La Palma. Using Convolutional Neural Networks (CNNs), Graph Neural Networks (GNNs), and Transformers, the project seeks to enhance data analysis, optimizing event separation and achieving precise energy and direction reconstruction. A key innovation is combining DL with edge computing, processing data at the source to reduce latency, conserve bandwidth, and improve real-time analysis. This approach is especially beneficial for applications like autonomous vehicles and smart cities, as well as for the efficient operation of LSTs. The project targets very high-energy (VHE) gamma-ray astronomy, exploring high-energy radiation from cosmic events like black holes and stellar explosions. The LSTs detect Cherenkov light from these energetic particles, and improved data analysis via DL will significantly enhance their performance. Initially focusing on LST-1, a prototype for the Cherenkov Telescope Array Observatory (CTAO), the project aims to scale DL analysis for multiple telescopes, establishing it as a standard method. A comprehensive CNN-based pipeline will be optimized with real data, aiding in the detection and analysis of phenomena like pulsars, which could answer key questions about particle acceleration and cosmic rays. The project also emphasizes enhancing digital skills by training researchers and students in advanced machine learning and data analysis techniques, boosting their employability. In summary, the project promises technological advancements in astrophysical data analysis and improvement in digital skills, positioning CSIC as a leader in DL and edge computing applications in VHE gamma-ray astronomy.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualification(s) required: PhD in Informatics or similar
- Proficiency in Spanish and English. •
- Knowledge of very high-energy gamma-ray analysis using Cherenkov telescopes and • especially the analysis using the CTLearn library for CNN analysis of Cherenkov telescopes.

#### Merits to be considered:

- Knowledge of Python
  - Experience with libraries such as PyTorch and TensorFlow

#### WHAT IS OFFERED

Implement the latest CNN techniques for the analysis of Cherenkov telescope data. Short training stays at leading centers for very high energy gamma rays. Attendance at machine learning courses, software schools, and in-person meetings.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000 € - 52.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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momentum@csic.es | https://momentum.csic.es/









### Project: Geodynamic integration of Volatiles and Redox exchanges

Technological and scientific fields: Advanced Techniques in Earth Science Observation; Data Analysis, Artificial Intelligence and Machine Learning

Location: Granada (Andalusia), Andalusian Earth Sciences Institute (IACT) CSIC https://www.iact.csic.es/en/

**Research Group/PI:** Petrology, Geochemistry and Geochronology (PGG), José Alberto Padrón-Navarta

https://www.iact.csic.es/en/research/units/petrology-and-geochemistry/group/petrologygeochemistry-and-geochronology/

#### **PROJECT SUMMARY**

Develop advanced numerical modelling tools to enhance our understanding of volatile exchanges and redox reactions at high pressure and temperature in the Earth's deep interior. The methodology would be based on "Two-phase multi-component reactive transport" models. The true technical challenge, and the main goal of this project, is the efficient coupling of Gibbs free energy minimization (GFEM) with these reactive transport models.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualification required: PhD in Earth Sciences or Geophysics •
- Proficiency in English

#### Merits to be considered:

- Proficiency in programming languages such as Python, Julia, Matlab, and similar.
- Experience with scientific computing and working with large datasets.
- Knowledge of geodynamics, petrology, and thermodynamic modeling. •

#### WHAT IS OFFERED

The postdoctoral researcher will integrate the PGG group, a research group of the Spanish Research Council (CSIC). The team carry out multidisciplinary research in Mantle and Crustal processes and includes experts in geochemistry, experimental petrology and thermodynamic modeling under extreme conditions, making the integration of this knowledge into geodynamic models a key opportunity. This project aims to strengthen the PGG research lines, providing essential tools for international consolidation. The project includes a training plan that entails conducting annual research projects on numerical methods and specialized courses in thermodynamic modelling (90 ECTS), stays at international centers (20 ECTS), and training in digital skills, particularly in available Geodynamic codes and Gibbs free energy minimization (GFEM) (90 ECTS).

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000 € - 52.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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### Project: Identification of new treatments for sarcoma extracted from the combination of multiomic data and gene association rules by artificial intelligence.

#### Technological and scientific fields: Bioinformatics, artificial inteligence, Cancer

Location: Sevilla, Andalucía, Instituto de biomedicina de Sevilla, https://www.ibis-sevilla.es/es/

Research Group/PI: Molecular Biology of Cancer, IP Amancio Carnero, https://www.ibissevilla.es/es/investigacion/oncohematologia-y-genetica/biologia-molecular-del-cancer/

#### **PROJECT SUMMARY**

To incorporate complex data from different multiomic analysis on tumors, including NGS, mRNA expression (coding and non-coding), proteome, methylome, and chromatin accessibility data (ATAC-seq) with transcription factors binding prediction to obtain the transcription factors network with in-depth bioinformatics analysis, the use of association rules, and reported genedrug associations. We will establish a new flow chart for tumor analysis, identifying several potential new treatments for sarcoma patients.

Incorporate and analyze all these massive data with artificial intelligence to run the algorithm timely for possible use in patients.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduate in biomedical sciences, Software Engineering, computer science, biomedical engineering or bioinformatics, or equivalent. PhD in biomedical sciences, Software Engineering, computer science, biomedical engineering or bioinformatics, or equivalent. Advanced English knowledge

#### Merits to be considered:

Extensive knowledge in statistics, programming knowledge in R (or RStudio) and/or Python and/or Bash. Extensive knowledge/experience in techniques used in Artificial Intelligence (machine learning, neural networks, clustering algorithms, principal component analysis or knowledge of evolutionary algorithms, among others). Extensive knowledge of basic cancer processes, Experimentation Laboratory Experience. Experience in software program design

#### WHAT IS OFFERED

Training. Course: "TREE-BASED MACHINE LEARNING TECHNIQUES FOR SCIENTIFIC RESEARCH" https://www.mncn.csic.es/es/sociedad-de-amigos-del-museo/tecnicas-avanzadas-de-machinelearning-para-investigacion-cientifica-i, https://www.mncn.csic.es/es/sociedad-de-amigos-delmuseo/tecnicas-avanzadas-de-machine-learning-para-investigacion-cientifica;

Course: "Introduction to Data Science: Statistical Programming with R"; Training in secondary analysis of omics databases. Training in SPSS analysis; Neural networks and Deep Learning course (https://www.coursera.org/learn/neural-networks-deep-learning). Training in project and publication writing.

Assistance Master's Degree in Omic Data Analysis and Systems Biology

Attendance IBIS Seminars and seminars Program: 20/year. Taught by external speakers and IBIS groups. Active participation in Lab meetings and national and international collaborations of the group. Active participation in national and international networks.

High publication capacity in international journals. High diffusion and dissemination

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Development of emerging DIGItalisation and data processing technologies for the study of coastal environmental phenomena with on-board sensors on DRONs (DIGIDRON)

Technological and scientific fields: Remote Sensing, Advanced Techniques in Earth and Ocean Observation, Climate Change and Biodiversity, Artificial Intelligence, Data Analysis and Integration

Location: Puerto Real, (Cádiz), Andalusia, ICMAN-CSIC, https://www.icman.csic.es/

Research Group/PI: Ecosystem Oceanography, G. Navarro, http://eo.csic.es/, Service C-T OPECAM - SEDRON (https://opecam.csic.es/)

#### **PROJECT SUMMARY**

UAVs or drones are revolutionizing the monitoring of marine systems with their ability to perform repeated observations on demand and at exceptional spatial resolutions. ICMAN-CSIC is a pioneer in using this technology for research and monitoring a wide range of coastal environmental phenomena by developing algorithms for UAV data processing, creating open databases for the scientific community, and exploring new calibration techniques for satellite sensors. The main objective of DIGIDRON is to integrate data obtained using drones with the development of new algorithms, processing tools, and advanced machine learning and artificial intelligence techniques for the study of coastal ecosystems.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic Qualifications: PhD in Marine Sciences and Technologies, Master's in •
- Oceanography, and Bachelor's in Marine Sciences. •
- Official EASA Remote Pilot Certification (drones): A1/A3, A2, and STS (STS-01 and 02). •
- Advanced English Certification: Minimum required level C1.

#### Merits to be considered:

- Experience in the application of GIS software and programming skills in Python. •
- Proven experience in conducting UAV flights and data processing in extreme •
- environments (polar regions, natural disasters, among others). •
- Verified experience with scientific publications on satellite and drone remote sensing. •
- Demonstrated experience in using photogrammetric software and algorithms for .
- georeferencing and mosaicking UAV flights over aquatic surfaces.

#### WHAT IS OFFERED

DIGIDRON will advance the candidate's professional career through high-quality research supervised by experts in marine studies at ICMAN-CSIC and UCA. Additionally, the candidate will have access to the scientific and technical services of ICMAN-CSIC, which includes a fleet of drones, sensors, and resources for UAV and satellite data processing. The candidate's training plan includes 250 ECTS: 80 ECTS for writing a scientific/technical report; 60 ECTS for training internship; 90 ECTS for digital skills training through advanced courses; and 20 ECTS for supplementary training.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *Authenticity, microbial quality and safety evaluation of table olives through machine learning and metataxonomic analysis* 

Technological and scientific fields: Digital tools for agriculture, livestock and aquaculture.

Location: Seville, Andalusia. Instituto de la Grasa. Webpage: <u>www.ig.csic.es</u>

**Research Group/PI:** Microbial quality and safety of fermented foods. PI: Dr. Francisco Noé Arroyo López. <u>www.ig.csic.es/interacciones-bacterias-lacticas-levaduras-en-alimentos/</u>

#### PROJECT SUMMARY

Table olives are the most important fermented vegetable in Spain, especially in regions such as Andalusia and Extremadura. Its fermentation is a complex process where a large number of microbial species (lactic bacteria, yeasts, etc.) are involved depending on the type of process, variety of olive, country of origin, environmental conditions, etc. During this process, both beneficial and spoilage/pathogenic microorganisms can growth. The main objective of this research project is to develop a digital tool based on machine-learning and supervised automatic learning to improve the authenticity, microbial quality and safety of table olives based on metataxonomic profiles. For this purpose, the creation of a database that compiles all the available information on metataxonomic studies of table olives that is dispersed in repositories such as the NCBI and ENA will be carried out, as well as the inclusion and sequencing of new samples. Then, a methodology and scripts based in R will be developed to predict the origin, type of processing, and olive variety of new sequenced samples.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

• PhD. in Biology, Biochemestry, Pharmacy or Food Science and Technology.

#### Merits to be considered:

- Previous knowledge in metataxonomic analysis.
- Previous knowledge of vegetable fermentations.
- Master in Food or Bioinformatics.
- Scientific Publications.

#### WHAT IS OFFERED

Use of Machine Learning techniques and Oxford Nanopore sequencer. Enrollment and training in Master of Bioinformatics Analysis. Stays in national and international centers of recognized prestige in the field.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: Dr. Francisco Noé Arroyo López (fnoe@ig.csic.es) Phone: +34 954 611 550 ext 431059.











Project: *Digital twins for large earthquakes – integration of physics-based simulators and geological data for large scale earthquake forecasts* 

**Technological and scientific fields:** Digital twins, data analysis and integration, advanced techniques in Earth and oceans observation

Location: Tres Cantos, Comunidad de Madrid, IGME, https://www.igme.es

Research Group/PI: GI-OBTIER, Julián García Mayordomo, https://shorturl.at/iaKbz

#### PROJECT SUMMARY

Physics-based computational tools for simulating earthquakes from geological data of active faults currently lead the research on seismic hazard. The extensive body of information produced by the simulators enables the development of advanced statistical analyses to forecast the occurrence of future earthquakes and their characteristics. The objectives of the project are: 1) To derive global-scale seismic rupture forecasts, 2) To determine the parameters that control the occurrence of seismic ruptures, 3) To integrate them into surface rupture hazard and seismic hazard assessments, and 4) To transfer the results for application in earthquake-resistant standards.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Earth Sciences, specialization in Geo-Hazards.
- Research experience in probabilistic seismic hazard assessment (PSHA) based on faultsource models.
- Excellent knowledge of geological data on active faults, their uncertainties, and their incorporation into seismic occurrence/forecast models.
- Experience in programming and developing geoscientific code, especially applied to active faults and seismic hazard.
- Proficiency in Spanish and English, with strong oral and written communication skills.

#### Merits to be considered:

- Experience in physics-based earthquake simulation models (multi-cycle).
- Experience with geological fault data (e.g., paleoseismic), including its collection and systematization in databases, and skills for its statistical and probabilistic analysis.
- Knowledge of seismic hazard assessment softwares.
- University teaching, supervision of Master's theses, and scientific dissemination.

#### WHAT IS OFFERED

Integration into a leading research line in earthquake geology applied to seismic hazard assessment. The candidate will pursue a university master's degree in Data Science (60 ECTS), as well as specialized postgraduate courses. They will undertake 2 research and training stays of 3-6 months each at the University of Barcelona and the Istituto Nazionale di Geofisica e Vulcanologia in Italy. They will collaborate in the co-supervision of master's theses, attend international conferences, and participate in scientific outreach and dissemination activities.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *Bioinformatics training for genomics and breeding data analysis, data integration and software development.* 

**Technological and scientific fields:** Digital tools for agriculture, Computational biology, Data analysis and integration, Artificial Intelligence

Location: Málaga, Adalucía. IHSM. https://www.ihsm.uma-csic.es/

**Research Group/PI:** Breeding and developmental biology of subtropical fruit. Noé Fernández Pozo. https://www.ihsm.uma-csic.es/grupos/13

#### **PROJECT SUMMARY**

Recent advancements in omics technologies and the availability for the exploitation of thousands of genotypes hold unique opportunities to accelerate precision crop breeding. However, a major bottleneck lies in integrating those data using the appropriate software tools, artificial intelligence, systems modelling, and bioinformatics. IHSM research lines are focused in subtropical and Mediterranean plant species such as tomato, strawberry, mango, avocado, and cherimoya. Using the unique germplasm collections available at the IHSM, the institute is generating a large amount of omics data. The bioinformatic team of the institute has contributed several genomic portals of different crop species that are becoming reference tools at the international level. The aim of this proposal is to enhance the value of the data available to the center by generating a team of experts in integrative biology, incorporating Artificial intelligence as the foundations for new research lines in our institute. We propose a program to train a team of experts in Plant and Computer science, capable to (1) analyze omics data of the species studied in our institute and integrate them in our platforms; (2) implement and develop new bioinformatics tools in our platforms to manage pangenomics and multi-omics data; (3) apply computational biology algorithms and AI to study the genetic variations of thousands of accessions and their association with traits agricultural interest, and (4) apply AI to study emerging knowledge in multi-omics data.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Grade and PhD related to life science. Proficiency in Spanish and English. Basic bioinformatics skills. Knowledge about biology and genomics.

#### Merits to be considered:

Experience with AI, programming languages, and data analysis. Knowledge about plant science. Publications, funding and scientific dessemination

#### WHAT IS OFFERED

We offer a four years contract with intensive training in bioinformatics and artificial intelligence aiming to create a new ressearch line about artificial intelligence applied to plant science at the IHSM. It will include international stays and collaborations with researchers worldwide in countries such as USA or Australia. The candidate will learn to develop bioinformatics tools and will work with subtropical and Mediterranean species, for wich we maintain an unique germplam collection of subtropical species in Europe.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *Micromachining, Additive Manufacturing and Advanced Encapsulation Techniques for Neuromorphic Sensing and Massive High-Performance Computing Ultra-Low Power Edge Systems with CMOS Nanotechnologies* 

**Technological and scientific fields:** AI, massive data processing technologies, edge computing, additive manufacturing, nanotechnology, sensors.

Location: Sevilla, Andalucía, IMSE-CNM, <u>www.imse-cnm.csic.es</u>

**Research Group/PI:** Neuromorphic group, Bernabé Linares-Barranco, <u>www.imse-</u> <u>cnm.csic.es/neuromorphs</u>

#### **PROJECT SUMMARY**

The Project is enclosed in the research line of Neuromorphic Systems at IMSE (www.imsecnm.csic.es/neuromorphs). With over 30 years of activity, over 15 EU projects portfolio, two successful spin-offs (www.prophesee.ai, www.graimatterlabs.ai), it develops microchips and edge-computing hardware for bio-inspired event-driven vision sensing, computing, and learning systems. The focus is in vision sensing chips exploiting neuromorphic principles on nanometerscale CMOS, and low-power computing chips, including emerging nanotechnology memristive synaptic devices. The research line is highly interdisciplinary, covering from vision sensing, nanoscale memristor based computing and learning hardware, computational neuromorphic algorithms, and applications to high-speed and low-power environments.

On the other hand, IMSE is receiving 9 million € funds to start setting up a new cleanroom facility for advanced encapsulation, micro-printing, and additive manufacturing. The project is intended to combine the neuromorphic microchip design experience with the new cleanroom facilities to enhance and exploit new technological and research capabilites at IMSE, applied to artificial intelligence, sensing, high-efficient edge computing and massive data processing of neuromorphic systems. The specific objectives include: (1) training on 3D additive manufacturing (microlense, light/infarerred/microwave sensors, learning devices connected to an underneath CMOS chip); (2) training on CMOS nanoscale circuit design technologies; (3) training on nanotechnology synaptic computing devices (HfOx, perovskite, or nanopore liquid-ionic-based memristors); (4) training on neuromorphic computational architectures; (5) training on vision sensor chip design.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

(1) BSc, MSc, and PhD in Electronics related subjects, (2) experience in analog or mixed-signal circuit design, (3) proficiency in English

#### Merits to be considered:

Experience in digital circuit design, additive manufacturing, advanced encapsulation, clean room

#### WHAT IS OFFERED

Training on the subjects described above in "PROJECT SUMMARY", usage of lab facilities at IMSE (see www.imse-cnm.csic.es) including the new cleanroom for advanced packaging and additive manufacturing currently being set up, and participation in EU projects with collaboration of top-level European research labs. Also, a number of research stays are considered, in labs experienced in additive manufacturing, memristor fabrication, and circuit design.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Position Offered: POSTDOCTORAL RESEARCHER Project: Development of tools and algorithms for the processing and integration of large-scale spatial and single-cell transcriptomics data, utilizing highperformance computing and artificial intelligence

**Technological and scientific fields:** Massive data and information processing technologies, high-performance computing, medical imaging, data analysis and integration, artificial intelligence, computational biology, image analysis and computer vision, edge computing **Location:** Granada, Andalusia, Institute of Parasitology and Biomedicine "López-Neyra". https://www.ipb.csic.es

**Research Group/PI:** Genetic Basis of Autoimmune Diseases. Javier Martín, <u>https://www.ipb.csic.es/departamentos/javiermartin.html</u>

#### **PROJECT SUMMARY**

Bioinformatics plays a fundamental role by closely aligning with the most recent technological advances, with analyses and results relying on advanced tools and algorithms. Bioinformatics not only facilitates the management of these data but also drives innovation in personalized medicine and fosters interdisciplinary collaboration, a key piece in the advancement of science. This project aims to develop new methods and algorithms capable of analyzing and integrating a vast volume of biomedical data related to single-cell transcriptomic analysis and the latest spatial transcriptomics. The project encompasses numerous themes, such as: mass data processing technology, FAIR principles (Findable, Accessible, Interoperable, and Reusable), high-performance computing, analysis of medical images using artificial intelligence, and integration of multidimensional data.

#### PROFESSIONAL PROFILE

#### Minimum requirements:

The following essential requirements must be met: PhD degree from an official doctoral program in: Biochemistry or Molecular Biology or Biomedicine, or Biotechnology or Fundamental and Systems Biology or Information and Communication Technologies.

#### Merits to be considered:

- Demonstrable experience of 5 or more years in the field of bioinformatics and programming (R, Python, etc.).
- Demonstrable experience of 5 or more years in statistics (correlation, linear models, survival analysis, statistical tests).
- Knowledge in machine learning techniques and big data in bioinformatics. Use of Nextflow for scientific computing in containers.
- Proficiency in the analysis of single-cell transcriptomics samples (scRNASeq), metatranscriptomics, or spatial transcriptomics.
- Participation as Principal Investigator (PI), Co-PI, or research member in a research project.
- Scientific publications in the field of bioinformatics and omics data analysis.

#### WHAT IS OFFERED

This project will facilitate the analysis of large volumes of data from an innovative platform for biomedical research, allowing for the addressing of complex biological questions and the development of new therapeutic approaches. Additionally, it will promote the training of researchers in advanced bioinformatics and data analysis techniques, ensuring that the CSIC remains at the forefront of research. **It includes a training plan of 240 ECTS credits** (over the 4 years of the contract), encompassing the completion of a master's degree, various courses, and two research stays.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(41.000 \in -52.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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momentum@csic.es | https://momentum.csic.es/









Project: *Evaluating the impact of climate change on microbial biodiversity and ecosystem functioning in soils of urban green areas throughout the Iberian Peninsula using bioinformatics techniques of massive DNA sequencing processing.* 

#### Technological and scientific fields: Environmental resources / Microbiology

Location: Sevilla, Andalucía, IRNAS-CSIC, https://www.irnas.csic.es/

**Research Group/PI:** Laboratorio de Biodiversidad y Funcionamiento Ecosistemico (BioFunLab) / Manuel Delgado Baquerizo

#### PROJECT SUMMARY

This project will contribute to investigate the influence of climate change on the soil microbiome of urban greenspaces. The main tasks of the postdoctoral researcher will be the processing of DNA sequencing data of the soil microbiome using computational biology (bioinformatics) techniques: creation and maintenance of pipelines for bioinformatics analysis, management of servers for bioinformatics analysis in the BioFunLab, metagenomics, taxonomic and functional annotation, amplicon sequencing. The technologies to be used will be diverse including bioinformatics: metabarcoding, metagenomics (shot-gun metagenomics on Illumina platforms with short-reads and NanoPore with long-reads), functional gene annotation, creation of "metagenome assembled genomes" (MAGs); statistics, database creation and a web page.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Natural Sciences, specifically with theses carried out in the area of Microbial Ecology.
- Scientific writing skills in microbial ecology and soil ecology, with metabarcoding techniques.
- Proficiency in English and Spanish, spoken and written, at C1 Advanced level.

#### Merits to be considered:

- Experience in field experiments investigating the impact of climate change.
- Experience in research projects related to urban soils.
- Experience with the R programming language and bioinformatics analysis

#### WHAT IS OFFERED

A four-year PostDoc contract is offered with a very high percentage of training time (240 ECTS) in bioinformatics, statistics, web pages, and for data integration within the area of soil biodiversity and climate change effects in a scarcely studied environment: urban green areas. This contract offers the possibility to collaborate with an interdisciplinary network of collaborators from all over Spain and Portugal from different CSIC centers or universities.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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### Position Offered: POSTDOCTORAL RESEARCHER Project: Integrating remote sensing and epidemiological modelling for operational surveillance and risk assessment of emerging plant diseases in the context of climate change

Technological and scientific fields: Remote sensing, Epidemiological modelling, Climate change, Machine Learning, Radiative Transfer Modelling

Location: Córdoba, Andalusia, Institute for Sustainable Agriculture, https://www.ias.csic.es/

Research Group/PI: Phytopathology of Sustainable Agricultural Systems, Juan A. Navas Cortés, https://tinyurl.com/2pdpu4pt

#### **PROJECT SUMMARY**

The project entails linking satellite remote sensing and epidemiological modelling to advance operational surveillance and risk assessment of emerging plant diseases. The objectives are: 1) To assess the use of hyperspectral and multispectral satellite imagery to detect and monitor plant diseases in agricultural settings; 2) To integrate satellite remote sensing data into epidemiological models to improve their parameterization and optimise surveillance and disease control; 3) To enhance the risk assessment of plant diseases in a changing climate by combining satellite remote sensing data, epidemiological models, and species distribution models.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Agricultural Engineering, Biology, or a equivalent field, with specific expertise in remote sensing applications for plant disease monitoring and/or epidemiological modelling.
- Skilled in hyperspectral and multispectral imaging analyses, and plant trait quantification • using radiative transfer models.
- Experience with epidemiological modelling in agricultural settings, including stochastic and • spatially explicit compartmental models and species distribution models.
- Publications and/or a strong track record in relevant fields to the project. English proficiency.

#### Merits to be considered:

- Proficiency in programming languages such as R and Python for data analysis and modelling.
- Knowledge of advanced statistical methods and machine learning techniques for biological • data.
- Experience with integrating remote sensing data into epidemiological models.
- Familiarity with climate model simulations (CMIP6) for risk assessments under climate change.

#### WHAT IS OFFERED

This postdoctoral position offers an unique opportunity to collaborate within an interdisciplinary team of scientists, including plant pathologists, remote sensing experts, mathematicians, and epidemiological modellers. This position involves working closely with co-PI Dr. Vincent Cervera at the Valencian Institute of Agricultural Research in Valencia for 1 year. The successful candidate will conduct a 240-ECTS training plan, which includes pursuing a 2-year M.Sc. in Biostatistics, specialized courses in digital competencies, relevant to the project, and a secondment at a foreign institution to gain expertise in advanced radiative transfer modelling.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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## Position Offered: POSTDOCTORAL RESEARCHER Project: Artificial Intelligence approaches for a Sustainable Ocean (AIDOS)

**Technological and scientific fields:** Data analysis and integration; artificial intelligence; big data and information processing technologies; climate change and biodiversity.

**Location:** Puerto Real (Cádiz), Andalucía, Instituto de Ciencias Marinas de Andalucía (<u>www.icman.csic.es</u>)

**Research Group/PI:** Ecosystems Oceanography (https://pti-oceans.csic.es/)/ I. Emma Huertas

#### PROJECT SUMMARY

Advances in marine technology are enabling the collection of Big Data (BD) from the ocean. Recent developments in Artificial Intelligence (AI), particularly in Machine Learning (ML) algorithms and modeling, allow efficient treatment of BD. This project aims at generating new approaches to process marine BD through advanced technologies and assimilation into ML techniques to assess the dual role of the ocean in the climate system, as a mitigator through the absortion of heat and CO2 and as receptor (warming, acidification). The main goal of AIDOS is to provide management tools to assist the decision-making process in support of European directives, within the framework of activities carried out by the PTI OCEANS+.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualifications: PhD in Science, Master's in Oceanography and Bachelor's in Marine Sciences
- Diving certification 3 stars level.
- Advanced Python knowledge certification.
- Advanced English language knowledge certification.

#### Merits to be considered:

- Experience in generation, analysis and processing of time series of biogeochemical variables.
- Demonstrated experience in oceanographic instrumentation for acquisition of biogeochemical data involved in the marine carbon cycle (pH, carbon dioxide, dissolved oxygen).
- Experience in models and machine learning techniques and Python programming skills.
- Participation in oceanographic campaigns carried out in different marine environments.
- Authorship in peer-review publications on marine biogeochemistry.
- Proven skills on leadership, management and coordination of scientific projects.

#### WHAT IS OFFERED

The AIDOS project will advance the candidate's professional career through interaction with researches from the PTI OCEANS+ who are experts on assessing the role of the ocean in climate change mitigation and the subsequent impact on marine ecosystems (warming, acidification, etc.). In addition, the candidate will have access to facilities and infrastructures of two CSIC marine centers, ICMAN and ICM. The candidate's training plan includes 299 ECTS: 122 ECTS in activities to be included in a scientific report; 54 ECTS for training stays; 95 ECTS for training in digital skills; and 28 ECTS for complementary training.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: Emma.huertas@csic.es / Phone: +34856031254











Project: Development of sustainable aviation biofuels with machine learning and artificial intelligence

**Technological and scientific fields:** Massive data and information processing technologies; Artificial intelligence; Machine learning; Nanotechnology; New Materials

Location: Zaragoza, Aragon, Instituto de Carboquimica (ICB), www.icb.csic.es

Research Group/PI: Fuels Conversion Group/Isabel Suelves Laiglesia

#### **PROJECT SUMMARY**

The general objective of the project is the training of a postdoctoral researcher in the development and application of digitalization strategies that transform the way of developing new processes or products, such as sustainable aviation biofuels produced through different processes (hydrotreatment of oils and fats, hydrocracking/hydrosiomerization of Fischer-Tropsch products). As an innovative part of the project, the objective is to develop machine learning and artificial intelligence (AI) models in combination with first principles models that allow us to understand the materials and processes investigated. This is expected to improve data analysis and interpretation of results that direct and accelerate the experimentation and development of new materials, molecules or processes. The project will answer questions such as: How can the synthesis of a catalyst be optimized through data analysis and machine learning and AI models? Is it possible to predict the properties of new materials and molecules to define if they are good candidates to be used as fuels? Can AI help recognize reaction patterns and detect reaction pathways or networks that explain catalyst performance and product distribution?

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Doctor in Chemical Engineering
- Proficiency in Spanish and English

#### Merits to be considered:

- Management of experimental facilities to obtain biofuels
- Basic knowledge of digital tools

#### WHAT IS OFFERED

The project aims to promote a new paradigm by applying a data approach, digitization of experimental procedures and results, as well as the application of machine learning, artificial intelligence and hybrid models as a new research and development tool applied to the production of biofuels from waste and/or biomass. The training plan includes supervised and unsupervised activities that will be included in the Annual Report, training activities in digital skills (Courses/Master), training stays in other national and international research centers as well as other complementary activities (dissemination, TFG/TFM direction ,...)

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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## Position Offered: POSTDOCTORAL RESEARCHER Project: *Towards hybrid quantum machine learning with Rydberg atoms experiments*

**Technological and scientific fields:** Quantum Simulation, Quantum Technologies, Artificial Intelligence, Machine Learning, Cold Atoms.

**Location:** El Entrego, Principado de Asturias, Nanomaterials and Nanotechnology Research Center, <u>https://cinn.es/en/nanomaterials-and-nanotechnology-research-center/</u>

Research Group/PI: Quantum simulations / Daniel Barredo - Miguel A. Pruneda

#### **PROJECT SUMMARY**

Quantum simulation and computation stand today as highly dynamic domains, potentially offering the only practical avenues for addressing significant quantum many-body problems found in physics and chemistry. Due to these advantages, numerous platforms are being explored. Among them, arrays of neutral atoms trapped in optical tweezers and excited to Rydberg states are becoming a leading technology (<u>https://doi.org/10.1051/epn/2022406</u>). At CINN, we are building a new quantum simulator based on this technology for these tasks. The main objective of this project is to explore and exploit the possibilities of Machine Learning (ML) for quantum simulation. We plan to use ML to control hardware operations in the new machine and to optimize the simulation parameters. Moreover, we will explore the application of quantum simulations to encode optimization algorithms, or to solve classical machine learning problems. This objective will also be used as a testbed scenario to establish a transversal platform to provide ML techniques to a broad spectrum of research lines at CINN.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Physics, Mathematics, Computer Science or related fields.
- Proficiency in English.

#### Merits to be considered:

- Experience with technologies used in AMO experiments.
- Programming skills (Python, Julia, C++,...).
- Proficiency in data analysis.
- Knowledge of ML techniques

#### WHAT IS OFFERED

The candidate will have the opportunity to join a dynamic team, composed of both experimentalists and theorists, to work on quantum simulation and computation with cold atoms, with a particular emphasis on integrating machine learning techniques. The position offers opportunities for professional growth through participation in international workshops, conferences and collaborations with other research groups in a multidisciplinary environment. Furthermore, a full training plan including specialized courses and seminars developed over four years will be provided. This training will be combined with several research stays in top-notch international laboratories.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: daniel.barredo@csic.es (Daniel Barredo), or mpruneda@csic.es (Miguel A. Pruneda) Phone: +34 985 733 644











Project: *Electrochemically exfoliated 2D material inks for the printing of electronic, sensor and energy storage microdevices* 

#### Technological and scientific fields: Nanotechnology, New materials, Sensorization

**Location:** Oviedo, Principality of Asturias, Carbon Science and Technology Institute (INCAR), <a href="https://www.incar.csic.es/">https://www.incar.csic.es/</a>

**Research Group/PI:** Carbon Materials Group / Juan Ignacio Paredes, <u>https://www.incar.csic.es/en/carbon-materials/</u>

#### PROJECT SUMMARY

Microdevices based on printed 2-dimensional (2D) material networks will be developed for their use in transistors, batteries, supercapacitors or sensors in flexible and wearable technologies. 2D materials will be prepared via electrochemical exfoliation and processed to obtain printable inks for the fabrication of networks. This project involves training in scientific computing and machine learning tools, which will be used in several steps of the work to optimise exfoliation conditions, identify 2D materials with optimal properties for specific applications or reconstruct the 3D morphology of printed networks. The achievement of the scientific objectives is supported by the complementary specialization areas of the involved researchers: (i) development of 2D materials via electrochemical exfoliation from the PI (CSIC), (ii) scientific computing applied to chemistry, materials and nanotechnology problems from the co-PI (University of Oviedo), y (iii) printed networks for microdevices from the external collaborator (Trinity College Dublin, Ireland), pioneer in the field of 2D materials, in whose group there will be training stays.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Bachelor's Degree in Chemistry, Physics or Materials Science
- PhD in Materials Science, Nanoscience or Nanotechnology, focused on the synthesis and processing of nanostructured materials
- Broad English knowledge, basic Spanish knowledge

#### Merits to be considered:

- Experience in the synthesis of 2D materials, especially via electrochemical exfoliation
- Experience in the use of characterization techniques: AFM, SEM/TEM, XPS, Raman, EPR, DLS
- Knowledge in material printing techniques via inks

#### WHAT IS OFFERED

Integration in a research group specialized in the synthesis, processing and diverse applications of 2D materials, with the objective of developing printed microdevices supported by machine learning techniques. Collaborations and stays with first-class 2D materials research groups. 240 ECTS credits of training, co-supervised by an expert in scientific computing.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *Development of computational tools for the diagnosis of diseases* caused by structural variants

**Technological and scientific fields:** Medical devices, computational biology, data analysis and integration

**Location:** Santander, Cantabria, Institute of Biomedicine and Biotechnology of Cantabria (IBBTEC), <u>https://web.unican.es/ibbtec/en-us/</u>

**Research Group/PI:** Alvaro Rada Iglesias, Transcriptional regulation in development and congenital disease, <u>https://web.unican.es/ibbtec/en-us/about-ibbtec/team/members/member-detail?d=AlvaroRadaLAB</u>

#### PROJECT SUMMARY

Structural variants (SVs) can cause disease through long-range mechanisms that affect the transcriptional regulation of genes. However, the prediction of long-range mechanisms is complicated and the etiological relevance of many SVs remains unknown. We recently developed POSTRE (Prediction Of STRuctural variant Effects), a computational tool that can predict the "long-range" pathomechanisms by which SVs cause certain types of congenital disorders. In this project we propose to analyze and integrate public single-cell genomic data (scRNA-seq and scATAC-seq) from human fetal tissues to generate regulatory maps in hundreds of human cell types. Once incorporated into POSTRE, these regulatory maps will allow us to (i) analyze the SVs involved in the majority of congenital defects and (ii) improve the sensitivity of POSTRE. Furthermore, this integration strategy will be also applied to single-cell genomic data obtained in adult tissues to extend the diagnostic use of POSTRE to common diseases (e.g. cancer).

#### PROFESSIONAL PROFILE

#### Minimum requirements:

momentum@csic.es | https://momentum.csic.es/

- Doctorate in Molecular Biology, Biomedicine or similar.
- Programming knowledge (R, Python or similar).

#### Merits to be considered:

- Experience in the analysis and integration of differenty types of genomic data (e.g. RNA-seq, ChIP-seq, ATAC-seq, Hi-C, etc.).
- Experience in prioritizing genetic variants involved in disease.

#### WHAT IS OFFERED

We offer a postdoctoral contract in an internationally recognized group (e.g. ERC Consolidator Grant) and with a multidisciplinary and international composition. The project includes an extensive training program (240 ECTS) with diverse activities, including training internships in prestigious international laboratories (e.g. Prof. Malte Spielmann (University Medical Center Schleswig-Holstein, Germany).

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

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#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: alvaro.rada@unican.es Phone: 0034 665618617 / 0034 942203932





# Position Offered: POSTDOCTORAL RESEARCHER Project: Leveraging digital talent to boost IFCA synergies

Technological and scientific fields: Astrophysics and space sciences; advanced scientific instrumentation; Micro/nano technology

Location: Santander, (IFCA) Cantabria, Institute of Physics of Cantabria https://ifca.unican.es/en-us

Research Group/PI: Observational Cosmology and Instrumentation, Enrique Martínez https://ifca.unican.es/es-es/investigacion/cosmologia-observacional-e-González, instrumentacion

#### **PROJECT SUMMARY**

As a complement to the specific research activity of the different IFCA groups, the centre has defined two research synergies that are transversal to the Institute's groups: artificial intelligence and machine learning, and the study of dark matter. In addition, the IFCA also promotes instrumental development, which is inherent to all the Institute's Departments. The main R&D objective of this project is to strengthen the synergistic research line in the study of dark matter.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The essential requirements are:

- PhD degree in Physical Sciences
- Fluency in Spanish and English

#### Merits to be considered:

The following knowledge and experience would be an asset:

- Knowledge of space astrofisycs
- Experience in magnetic field shielding studies •
- Experience in analysing sky scanning strategies for calibration of experiments with point • source references

#### WHAT IS OFFERED

The person recruited will be part of the cross-cutting research synergy in the study of dark matter. The scientific-technological activities to be carried out will be related to instrumental development in astrophysics and particle physics and associated digital aspects. In particular, he/she will participate with the cosmology and particle physics groups in the assembly, maintenance and operation of the dilution refrigerator recently acquired by the IFCA, which will be used to characterise superconducting sensors for different experiments. He/she will also collaborate in the development of the Temperature Monitoring and Control System for the JAXA LiteBIRD telescopes, in the development of a calibration satellite for microwave experiments, and in the development of an active temperature control system for the IR sensors of the ESA ARRAKIHS mission led by IFCA. The person hired will benefit from a solid training provided through specialised courses and stays in research centres and companies with which we collaborate.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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### Position Offered: POSTDOCTORAL RESEARCHER Project: Adaptive wildlife management in the digital age: advances in data collection, processing and dissemination

Technological and scientific fields: artificial intelligence, cloud computing, advanced data analytics, data analysis and integration, image analysis and computer vision, digital tools

Location: Ciudad Real, Castilla-La Mancha, IREC, ww.irec.es

Research Group/PI: Health and Biotechnology, Pelayo Acevedo Lavandera, https://www.irec.es/investigacion/grupos-de-investigacion/sanidad-y-biotecnologia-sabio/

#### PROJECT SUMMARY

In this era of rapid technological advances, the application of digitisation to wildlife management is crucial for sustainable development and the preservation of biodiversity. Using digital tools and new analytical approaches, ecosystems and wildlife populations can be monitored, and resource use can be optimised. This project aims to integrate digital tools and analytical techniques for the collection, processing and dissemination of data useful for adaptive wildlife management. Specifically, it aims to: i) inventory, assess and improve the availability of wildlife data sources; ii) optimise the performance of devices for monitoring; and iii) parameterize models on wildlife population dynamics. The integration of all the objectives towards the search for robust solutions will enhance the scope of the project's results and its capacity to interfere in wildlife management programmes.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

A postdoctoral researcher with experience in ecology and management of wildlife, in general, and ungulates and lagomorphs, in particular, is required. Requirements: i) PhD in Biological Sciences or related; Spanish and English [B2 or higher]; leadership skills: supervision of researchers and PI of projects; participation in international consortia on wildlife management; and active participation in projects on digital tools for wildlife management.

#### Merits to be considered:

Merits to be considered: experience in projects on wildlife management in Europe; scientific publications on wildlife management; experience in transfer, training and dissemination; capacity to undertake new lines of research; experience in advanced statistical analysis; capacity to develop and implement technological tools for wildlife monitoring; active participation in consortiums and networks on wildlife management.

#### WHAT IS OFFERED

The project offers a unique opportunity to consolidate as a researcher in wildlife management. The digital skills that the person hired will acquire, guaranteed by the research team and the training programme, will define a researcher's profile that is still scarce in Europe, but highly demanded given the existing management needs. The research team offers personal means and resources to achieve the objectives of the project. The network of collaborators of the research team represents a further strength for a project like this, facilitating access to information and the carrying out of research stays.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000 € - 52.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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# Project: Creation of the Bioinformatics and Data Science Unit at the IBFG

**Technological and scientific fields:** 1) Massive data and information processing technologies. 2) Computational Biology. 3) Data analysis and integration

**Location:** Salamanca. Castilla y León. Instituto de Biología Funcional y Genómica (IBFG). <u>https://ibfg.usal-csic.es/index-en.php</u>

**Research Group/PI:** Cell Cycle and Genome Stability Group. Andrés Clemente Blanco. <u>https://ibfg.usal-csic.es/andres-clemente-en.html</u>

#### **PROJECT SUMMARY**

The Project involves the creation of a Bioinformatics and Data Science Unit (UBCD) at the IBFG. Its main objective will be to advise and support the researchers at the center in aspects of data science, bioinformatics, and computational biology. Additionally, the UBCD will be responsible for providing training in digital skills to the IBFG staff and developing new methodologies for the integration of multi-omics data. This unit will provide comprehensive support to the Genomics, Microscopy and Genetic Screening facilities at the IBFG, facilitating cross-disciplinary research among the different research lines in the IBFG.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Doctoral degree.
- Experience in computing, programming, statistics, sequencing techniques, and multiomics data analysis.
- English speaking and writing.

#### Merits to be considered:

- Knowledge in computing: Unix-based OS, HPC, AWS.
- Experience in programming: Python, R, bash.
- Proficiency in multi-omics data analysis: WGS, WES, RNA-seq, ChIP-seq, Shotgun.
- Knowledge in bioinformatics: Mass data analysis of genomic and proteomic data, AI.

#### WHAT IS OFFERED

- Lead the technical team of the UBCD.
- Collaborate with other researchers through participation in scientific projects.
- Participate in the co-authorship of projects and research articles.
- Capacity to design and develop new bioinformatics tools.
- Participate in teaching activities at the IBFG.
- Training activities in digital skills (140 ECTS), including training stays (20 ECTS).

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: IBGM bioinformatics and genomics unit for multiomic analysis and the development of predictive algorithms and computational biology in cancer, prevalent diseases and aging

#### Technological and scientific fields: Biomedicine, Genomics, Computational Biology

**Location:** Valladolid, Castilla y León, Instituto de Biomedicina y Genética Molecular (IBGM) <u>http://www.ibgm.med.uva.es/</u>

Research Group/PI: Pathophysiology of Intracellular Calcium @IBGM / PI Carlos Villalobos

### **PROJECT SUMMARY**

The project consists of the implementation of a bioinformatics and genomics unit or service at the Institute of Biomedicine and Molecular Genetics of Valladolid (IBGM), a joint center of the University of Valladolid and the CSIC. The postdoctoral researcher will lead this service will codirect the doctoral thesis of the predoctoral researcher who will join under this same project. Finally, through the provision of service and/or scientific collaboration, it will contribute to the development of bioinformatics solutions to IBGM research groups that require it in topics of genomic and transcriptomic analysis, computational biology and massive analysis of biomedical data.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Biomedical Research or similar
- Master in Bioinformatics and Biostatistics or similar
- Grade in Chemistry or similar
- Scientific publications in the area of transcriptomics

#### Merits to be considered:

- Master in Biomedical Research
- Master in Present Techniques in Applied Statistics
- PhD topic in the area of transcriptomics

# WHAT IS OFFERED

The postdoctoral researcher will join the research groups in Pathophysiology of Intracellular Calcium and Molecular Genetics of Hereditary Cancer of the IBGM and develop with them a Bioinformatics and Genomics unit to provide biostatistical and bioinformatics solutions to the demands of the different groups of the center. The postdoctoral researcher will lead this service or unit and will carry out training stays at the Artificial Intelligence Center of the University of Valladolid, the Bioinformatics unit of the CNIC in Madrid, the Bioinformatics Unit of the CIEMAT in Madrid and the Medical Xenomics Unit in Santiago de Compostela. The postdoctoral researcher will have the opportunity to co-direct a doctoral thesis work and develop scientific collaborations with other IBGM research groups involved in Genomics, Computational Biology and massive analysis of biomedical data.

# Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: Biological invasions accross time and space: delimiting the invasion stages at different aquatic ecosystems

**Technological and scientific fields:** Climate change and biodiversity, Computational biology, High performance computing

Location: Blanes (Girona), Catalonia, Center for Advanced Studies of Blanes (<u>www.ceab.csic.es</u>)

**Research Group / PI:** Integrative Freshwater Ecology Group, IP: Marc Ventura (<u>https://www.ceab.csic.es/en/personal/marc-ventura-oller/</u>); Molecular Ecology of Benthos Group, IP: Marc Rius (<u>https://www.ceab.csic.es/en/personal/rius-viladomiu-marc/</u>)

#### PROJECT SUMMARY

Non-native species (NNS) are currently being accidentally/intentionally introduced as a result of human activities at an unprecedented rate. Despite a sharp increase in invasion science research in recent years, most knowledge generated to date comes from a limited number of well-studied NNS. This project will analyse DNA metabarcoding data from water and sediment samples to study a large number of NNS from different aquatic ecosystems (from high mountain lakes to coastal marine ecosystems). This approach will provide an unprecedented opportunity to analyse large amounts of comparable information on historical bioinvasion patterns (e.g. detection of recent introductions of NNS, 'boom and burst' population dynamics, lag period, etc.) and bioinvasion stages (i.e. introduction, establishment, naturalisation and invasion).

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Doctorate in biology, ecology or genetics
- Proficiency in English
- Experience in bioinformatics and programming (e.g. R, Phyton)

#### Merits to be considered:

- Proficiency in metabarcoding and bioinformatic analyses and / or invasive species from aquatic ecosystems
- Experience in laboratory genetic analyses
- Multidisciplinary experience (e.g. marine ecology, genetics, limnology and biogeography)
- Basic knowledge of Catalan or Spanish

#### WHAT IS OFFERED

The post-doc will spend an important part of her / his time analysing already generated metabarcoding data and writing scientific papers. In addition, there will be opportunities to visit field sites and collect environmental samples. We have a training plan (150 ECTs) that will include attendance of high throughput sequencing courses, participating in specialized bioinformatics training, and presenting international conferences and research stays at different research-intensive institutions.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: *Development and improvement of computational tools and platforms for understanding the function, structure and evolution of genomes* 

**Technological and scientific fields:** Data Analysis and Integration; Big data and information processing technologies, Computational Biology; High Performance Computing Cloud Computing; Artificial Intelligence, Climate change and biodiversity; Digital tools for agriculture, livestock and aquaculture

Location: Barcelona, Catalonia, Instituto Botánico de Barcelona, <u>www.ibb.csic.es</u>

**Research Group/PI:** Evolutionary and Functional Genomics, Josefa González, <u>www.gonzalezlab.eu</u>

#### **PROJECT SUMMARY**

The project focuses on the development of new algorithms and enhancement of available computational tools for integrative data analysis with the aim of gaining a deeper understanding of genome function, structure and evolution. The project also includes the development of a scalable, reproducible, user- friendly platform capable of integrating, analysing and storing genomic, epigenomic, structural and functional data from model and non-model species.

#### PROFESSIONAL PROFILE

#### Minimum requirements:

- Doctorate in Biology, in Cell Biology, in Genetics, in Biotechnology, in Bioinformatics, in Computer Sciences, or similar disciplines
- Proficiency in English

#### Merits to be considered:

- Ability to work in a command line environment, including UNIX/Linux-based systems as well as Windows command prompt. Knowledge of programming in scripting languages, including R, Python and Perl. Knowledge of machine learning and other AI approaches.
- Experience with generating and analyzing NGS data: From filtering, mapping, sorting, etc; to more complex downstream analysis. Knowledge of NCBI tools and databases: Experience downloading, uploading and finding raw and processed data.
- Knowledge of Graphic design, including Adobe Illustrator and Photoshop for figures creation and image edition. Knowledge in data visualisation and graphical user interface.

#### WHAT IS OFFERED

The candidate will develop research in close collaboration with Conexion GENOMA research groups, including short research stays in their laboratories across Spain. A research stay at a local private company is also planned. Besides the training stays, the training program will include several activities including courses in digital competences and soft skills for a total of 240 ECTS.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary  $(41.000 \in -52.000 \in)$ .

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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momentum@csic.es | https://momentum.csic.es/









Project: *Climate-smart agriculture: harnessing molecular solutions from microalgae and plants* 

Technological and scientific fields: Biotech; Climate change and biodiversity

Location: Bellaterra, Calatuña, CRAG, https://www.cragenomica.es/

Research Group/PI: Plant transformation and Genome Editing platform/ E. Monte/ L. M. Lois

### PROJECT SUMMARY

In the current climate change scenario, preserving food sovereignty needs to tackle key challenges: (1) Design of crops with improved stress and global warming performance, which requires breaking crop transformation barriers, increasing genetic diversity studies, and a more efficient use of synthetic biology tools and CRISPR technology; (2) Crop production with reduced used of fertilizers. This transition needs the implementation of AI-tools for advancing in crop-design and biostimulant development. In biomedicine, AI models have been in used for designing guide RNAs (gRNAs) for CRISPR-Cas systems. These approaches consider multiple factors, including genomic context, Cas protein type, desired mutation type, specificity, and the potential impacts of genome editing on gene function and cell phenotype. This project aims to develop state-of-the-art technology for designing climate change resilient crops and sustainable crop management.

# **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Hold a PhD in Biotechnology, Biochemistry or equivalent.
- Proficiency in English and Spanish

#### Merits to be considered:

- Willingness to learn new experimental/computational techniques. Motivation and commitment.
- Ability to design, execute and write up experimental work independently and to troubleshoot failed experiments.
- Ability to deal with quantitative aspects of plant growth and development.
- Ability to work effectively as part of a team or independently as required.
- Good time management skills, ability to prioritize and meet deadlines.
- Able to communicate effectively with supervisors and collaborators.
- An understanding of the issues of confidentiality and acting accordingly.

#### WHAT IS OFFERED

In this project, AI and machine learning solutions will be applied to accelerate the development of plant varieties better adapted to complex environmental conditions and to identify new microalgae strains with beneficial agricultural properties. Computational algorithms will be generated to assist from gene editing design, to sustainable agrochemical development, and plant performance assessment based in phenomics. For this purpose the candidate will receive 160 ECTS training including genome editing and computational skills, secondments in leading research institutes and transversal skills (leadership, science communication, technology transfer, ethics, career development, among others).

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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momentum@csic.es | https://momentum.csic.es/









# Position Offered: POSTDOCTORAL RESEARCHER Project: Integration of Artificial Intelligence in Numerical Models Applied to Geosciences

**Technological and scientific fields:** High-Performance Computing, Artificial Intelligence, Mass Data and Information Processing Technologies, Data Analysis and Integration, Advanced Techniques in Earth and Ocean Observation, Digital Twins

Location: Barcelona, Cataluña, Geociencias Barcelona, https://www.geo3bcn.csic.es/

Research Group/PI: GEO3BCN, Geodynamics / Ivone Jiménez Munt

#### PROJECT SUMMARY

Geosciences are characterized by the use and processing of large amounts of information, both to identify the Earth's internal structure and their processes. The recent rise of artificial intelligence (AI) presents a unique opportunity to be applied in the field of geosciences. The processes that occur inside the Earth involve interactions between different physical phenomena, such as the dynamics of solids and fluids. The coupling between these processes is vital to understanding their global behavior. The different temporal and spatial scales at which these processes occur increase the difficulty of their solution. AI can help us overcome the limitation of large data sets in multiscale modeling, allowing us to create predictive models. This project aims to train an expert in multiphysics and multiscale modeling with AI. This integration requires multidisciplinary collaboration between geoscientists, modelers, and AI experts. The main objective of this project is to attract talent, train it, and open a new line of research in geosciences that combines high-performance numerical modeling with AI. The employed will develop its activity within the Geodynamic Modeling Laboratory of GEO3BCN, co-directed with the Numerical Calculation group of the Universitat Politécnica de Catalunya (UPC).

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

PhD. High proficiency in English. Knowledge of numerical techniques. Participation in research projects.

#### Merits to be considered:

Experience in numerical modeling, preferably applied in geosciences. Knowledge of fluid mechanics. Experience in HPC and AI techniques. Stays abroad.

#### WHAT IS OFFERED

GEO3BCN includes the Laboratory of Geodynamical Modeling with experience on develope and on the numerical modeling techniques. Currently it works through three associated units with universities and research centers, where the postdoc will be able to develop the tasks: 1) With the UPC, it will facilitate the candidate's access to infrastructures and organized activities, participating in courses and stays during the contract. 2) With the BSC (Barcelona Supercomputer Center), they will benefit from access to the MareNostrum 5 supercomputer, as well as technical support. 3) With the Department of Petrology of the University of Barcelona (UB), with the incorporation of data from natural samples. During this contract, several longterm stays are planned: 1) at the UPC, with the co-PI, experts in numerical techniques; 2) at the University of Durham, a leading group in geodynamic modeling; 3) at the BSC, experts in AI techniques. The interaction between the four groups guarantees to the candidate the necessary scientific and technical support to carry out the proposed project.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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# Position Offered: POSTDOCTORAL RESEARCHER Project: *Genetic Programming for Population Genomics*

**Technological and scientific fields:** Artificial Intelligence, High Performance Computing, Computational Biology

Location: Barcelona, Catalunya, Institut de Biologia Evolutiva, https://www.ibe.upf-csic.es

**Research Group/PI:** Algorithms for population genomics, Oscar Lao, <u>https://www.ibe.upf-csic.es/lao</u>, Evolutionary Population Genomics; Elena Bosch, <u>https://www.ibe.upf-csic.es/bosch</u>

### PROJECT SUMMARY

This project presents an exciting opportunity to be at the forefront of applying artificial intelligence to understand the evolutionary history of species. Key objectives: i) Developing interpretable statistics using Genetic Programming (GP) to resolve complex population genomics questions; ii) Researching and applying advanced AI techniques to evolutionary biology; iii) Exploring Deep Learning (DL) methods and addressing their interpretability challenges; iv) Leveraging GP inspired by biological evolution to produce human-readable solutions.

# **PROFESSIONAL PROFILE**

### Minimum requirements:

- A Ph.D. in Computer Science, Bioinformatics, Evolutionary Biology, or a related field.
- Proficiency in JAVA programming language and others such as Python, R, or C++.
- Experience with machine learning (ML) and DL frameworks (e.g., TensorFlow, PyTorch).
- Familiarity with GP and other evolutionary algorithms.

#### Merits to be considered:

- Proven track record of research in AI, ML, or computational biology.
- Publications in peer-reviewed journals or conferences showcasing relevant work.
- Familiarity with detecting adaptive selection and analyzing demographic scenarios.
- Experience in developing and maintaining software packages or tools for scientific research. Knowledge of best practices in software development, including version control (e.g., Git) and documentation.

# WHAT IS OFFERED

We offer cutting-edge scientific and technological research opportunities while providing a holistic training program designed to enhance both scientific expertise and personal growth. The candidate will engage in pioneering research using DL and GP to address complex population genomics challenges. The candidate will have access to state-of-the-art computational resources and collaborate with leading experts in AI and genomics. The project offers a comprehensive Training Plan (240 ECTS in four years), where the candidate is expected to do a minimum of one stay at the Integrative Genomics Lab led by Dr U Martinez Marigorta, regularly report his/her progress, attend to specializes courses on evolutionary population genomics and digital competence as well as the Interval courses (<u>https://intervals.prbb.org/</u>) to enhance skills in critical thinking, time management, teamwork, and communication. The candidate will also participate in international meetings such as those of the SMBE, the ESSHE, and the ASHG.

# Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: oscar.lao@ibe.upf-csic.es Phone: 0034933160840











Project: Spatial Habitat Identification and Forecasting Tool (SHIFT)

**Technological and scientific fields:** Artificial Intelligence, Massive Data and Information Processing Technologies, High-Performance Computing, Advanced Data Analytics/Edge Computing, Climate Change and Biodiversity, Digital Twins, Computational Biology, Data Analysis and Integration

Location: Barcelona, Cataluña, Institut de Ciències del Mar (https://www.icm.csic.es/)

Research Group/PI: iMARES, Francisco José Ramírez Benítez

#### PROJECT SUMMARY

SHIFT aims to develop digital tools to evaluate marine biodiversity redistribution in response global environemtal change. These tools include the acquisition and standardization of geospatial data and their integration into species distribution models and ecosystem models. SHIFT will provide hired personnel with valuable training in various digital competencies directly relevant to the project's development, ultimately enhancing their professional growth.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The candidate should hold a PhD degree in Biodiversity or related fields. Solid background and quantitative skills in the handling and analysis of movement and geospatial datasets from multiple sources is required. Proficiency in the data acquisition (fieldwork and online repositories), management and data standardization and their integration in modelling approaches.

Strong programming skills in R programming language and experience in statistical analysis and modelling, data visualization capabilities.

Good communication and writing skills in English and Spanish.

#### Merits to be considered:

Experience in handling and analysis of big datasets.

Experience in the Open Science, FAIR data, use of GitHub repository.

Experience in relational databases (SQL).

Experience in machine learning and Species Distribution Models is beneficial.

#### WHAT IS OFFERED

SHIFT will be developed within a multi-institutional and interdisciplinary framework that will ensure the successful achievement of its research objectives, as well as the training of the hired individual in a variety of digital competencies directly relevant to the project's development. The Training Plan includes a minimum of 240 ECTS, encompassing formal education and stays at other national and international research centers.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: ramirez@icm.csic.es Phone: 932 30 95 00 (office B75) / 627379355











# Project: Myeloid cells as a therapeutic target in arteriosclerosis and stroke

#### Technological and scientific fields: Biomedicine

**Location:** Barcelona, Catalonia, Instituto de Investigaciones Biomédicas de Barcelona, <u>https://www.iibb.csic.es/en</u>

Research Group/PI: Cerebrovascular research group, Anna M. Planas

#### PROJECT SUMMARY

We are seeking a highly motivated post-doctoral researcher to join our project focused on understanding the phenotypic and spatial diversity of myeloid cells and their interaction with vasculature in ischemic stroke models, with or without atherosclerosis. The study involves advanced transcriptomic analysis at the single-cell level, requiring strong computational skills to handle and interpret complex data. Key objectives include discovering new immune mechanisms mediated by macrophages and microglia, and training the researcher in transcriptomic data analysis within biomedical research. The role will involve both scientific and technological goals, such as elucidating the phenotypic diversity of myeloid cells, understanding the impact of atherosclerosis, and implementing digital technologies for data analysis.

### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Biomedicine
- Bachelor's degree in Biochemistry, Biotechnology, Biology, or Pharmacy
- Master's degree in Biomedicine, Pharmacology, or a related field
- Certification in animal experimentation that is recognized in Spain
- Research experience in neuroscience and participation in scientific publications
- English (minimum B2 level)

#### Merits to be considered:

- Experience in RNA data analysis
- Experience in confocal microscopy
- Experience in Image J

# WHAT IS OFFERED

We offer a 4-year post-doctoral contract that includes participation in the scientific project and comprehensive training in biomedicine and data science. The project provides opportunities to merge biomedical research with data science, acquiring skills in using cutting-edge technologies, including single-cell technology and spatial transcriptomics, advanced transcriptomic data analysis, and data representation. The candidate will collaborate with other teams and benefit from a six-month stay at CNAG (Dr. Anna Pascual, co-PI of this project), with additional stays, at ICFO and abroad. Training in digital competencies will be provided, including a Master's degree in Bioinformatics and Biostatistics, as well as courses in RNA analysis and its functional interpretation, among others. Overall, the training will encompass a total of 140 ECTS.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: anna.planas@iibb.csic.es Phone: +34-93 363 83 27











# Position Offered: POSTDOCTORAL RESEARCHER Project: Learning ethics to guide AI decisions

Technological and scientific fields: Artificial Intelligence, Artificial Intelligence & Ethics

Location: Bellaterra, Catalonia, Artificial Intelligence Institute Research (http://www.iiia.csic.es).

Research Group/PI: AI & Ethics, Juan Antonio Rodríguez Aguilar and Maite López Sánchez, (https://www.iiia.csic.es/en-us/research/themes/ethics-ai)

### **PROJECT SUMMARY**

This project aims to develop a model to capture individual and collective value systems, which can serve as criteria for AI value alignment and other applications like supporting decision and policy making. In the state of the art, few attempts have addressed some parts of the process of capturing value systems for AI value alignment. This project takes a novel global approach to capturing value systems, studying and providing each of the necessary steps in the process. Furthermore, we place an emphasis on setting theoretical foundations for each step to ensure the soundness of the resulting value system, something not addressed before. This model will be composed of processes to capture individual interpretations of moral values and individual preferences and finally aggregate individual value systems into a collective one.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Artificial Intelligence, Engineering, Computer Sciences or equivalent •
- Strong background in Mathematics
- Strong background in Artificial Intelligence •
- Experience in publishing research articles on AI
- Proficiency in Spanish and English

#### Merits to be considered:

- Experience in research projects on AI & Ethics
- Experience in publishing research articles on AI & Ethics ٠
- Research awards •

#### WHAT IS OFFERED

This project aims to contribute to the application of theoretical work on value alignment. With that aim, the selected candidate will become part of the IIIA world-renowned research team working on AI & Ethics. Furthermore, the selected candidate will take part in international collaborations with leading groups in AI & Ethics at the University of Oxford and in Social Choice at CNRS. Finally, the selected candidate will enrol in a Master's degree related to the project (worth 60 ECTS) and participate in training activities offered by ICMAT, CESGA, and the Machine Learning and Advanced Statistics Summer School (worth 10-17 ECTS).

#### **Contract conditions:**

Indefinite contract for a Postdoctoral Researcher associated with the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000 € - 52.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: jar@iiia.csic.es Phone: +34 935809570













### Technological and scientific fields: Nanofabrication, Quantum technologies

**Location:** Cerdanyola del Vallès, Catalonia, Instituto de Microelectrónica de Barcelona, IMB-CNM (CSIC); <u>https://www.imb-cnm.csic.es</u>

**Research Group/PI:** NanoNEMS (IMB-CNM), Marta Fernández Regúlez, <u>http://nanonems.imb-cnm.csic.es/;</u> PEND (ICN2), Juan Sierra, <u>https://nanodevices.icn2.cat/</u>

### **PROJECT SUMMARY**

The objective of the Project is to develop hybrid organic-inorganic resists, specifically organic resists modified by vapor phase infiltration (VPI) with metal oxides for nanolithography. In VPI, metal oxides are sequentially introduced into a polymer matrix using processes similar to atomic layer deposition (ALD). This approach allows for adjusting the properties of Electron Beam Lithography (EBL) resists according to the application. A slight infiltration can improve contrast and roughness, facilitating the definition of the nanostructures. On the other hand, greater infiltration could enable these resists to be used directly as masks to define high aspect ratio structures. Three application areas are considered: (I) Fabrication of spin devices with two-dimensional (2D) materials; (ii) Reducing line roughness in the fabrication of silicon quantum devices (iii) Investigating the properties of infiltrated polymers as functional elements in devices

# **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in physics, chemistry, engineering, material science or related areas
- Previous experience in micro/nanofabrication technologies in clean room environments
- Knowledge in quantum technologies and/or 2D materials
- Good communication and writing skills in English

### Merits to be considered:

- Previous experience with EBL and ALD techniques
- Familliarity with hybrid material processing
- Experience in characterization techniques: SEM, AFM, Raman, EDX, FTIR etc.
- Basic competencies in scientific programming
- Relevant previous publications in the field of the offer

# WHAT IS OFFERED

The hired person will receive support from the research team composed of several members of the IMB-CNM (NanoNEMS) and ICN2 (PEND) research groups. During the 4 years of the project, he/she will receive a comprehensive training plan equivalent to 240 ECTS credits, including specialized courses and seminars in advance nanofabrication, EBL, quantum technologies, and scientific programing, among others. She/He will also benefit from international stays at prestigious Eurpoean centers and training in digital and complementary skills such as entrepreneurship, data management, intellectual property and leadership. The experimental work will be carried out in the clean rooms of IMB-CNM and ICN2. At least two stays in two European centers are planned to strengthen knowledge in EBL (3 months) and VPI (1.5 months)

# Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: marta.fernandez@imb-cnm.csic.es; juan.sierra@icn2.cat Phone: +34 93 580 7700 (ext. 435411)











# Position Offered: POSTDOCTORAL RESEARCHER Project: *bluePALEOeconomy: analysis of coastal socio-ecological systems in the long-term through data science*

**Technological and scientific fields:** Artificial Intelligence, Advanced Data Analysis, Climate change and biodiversity, Digital Humanities

**Location:** Barcelona, Catalunya, Institución Milà i Fontanals for Research in the Humanities, <a href="https://www.imf.csic.es/">https://www.imf.csic.es/</a>

**Research Group/PI:** HUMANE - Archaeology and Human Ecology, IP Débora Zurro, <u>https://www.imf.csic.es/areas-de-investigacion/arqueologia/arqueologia-y-ecologia-humana/</u>

#### PROJECT SUMMARY

The highly transdisciplinary project uses Data Science to analyze the historical relationship of human societies, coasts and marine ecosystems. It focuses on the study of these blue economies by addressing aspects such as the anthropological impact on marine resources. The contract will develop an agent-based model (ABM) to formalize and evaluate the relationship between environmental and social dimensions in case studies on the coast of the Atacama Desert (Chile) and the Mediterranean coast. It will open the field of study to the anthropization of marine ecosystems, incorporating a long history perspective. The working group has expertise in social simulation and data science, marine ecology, analysis of trophic networks in pelagic contexts, gender, and in archaeology and ethnography of coastal hunting-gathering societies.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Natural Sciences, Applied Ecology, Data Science, Engineering, Physics, Telecommunications or Humanities
- Knowledge of programming languages (e.g. R, Python) and data analysis techniques
- Proficiency in English, including publications in international journals

#### Merits to be considered:

- Training in data analysis methodologies and techniques, as well as knowledge of analytical tools and packages in different programming languages
- Experience in ABM, especially in the area of socio-ecological systems
- Experience in dissemination and in the organization of international scientific events
- Knowledge of Spanish

#### WHAT IS OFFERED

*bluePALEOeconomy* is an innovative project that will assess the anthropogenic impact on oceans and coasts, one of the major challenges of Global Change. The selected person will have the opportunity to follow a specialized training itinerary (with formal and regulated content) of 240 ECTS, to make stays at the Escuela Politécnica Superior of the Universidad de Burgos, headquarters of the Co-IP, JM Galán Órdax, as well as in UK laboratories where Data Science is applied to paleo contexts. In order to position the postdoctoral researcher favorably for a future permanent position in the Academy, the research team will make sure that *bluePALEOeconomy* 

offers a special opportunity to develop new skills and publish the results in an optimal manner.

-Training in modeling applied to Social Sciences and socioecological systems, advanced statistics

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: *Machine Learning and Artificial Intelligence for the Optimisation of Nanomedicines (MELINA)* 

**Technological and scientific fields:** Artificial Intelligence, Nanotechnology, Design of New Drugs

Location: Barcelona, Catalonia, Institut de Química Avançada de Catalunya - iqac.csic.es

Research Group/PI: Nanomedicine for Therapeutic Applications (NM4T) / Ibane Abasolo

### PROJECT SUMMARY

Artificial intelligence (AI) tools, and more specifically machine learning (ML), have accelerated the discovery of new chemicals and materials with unprecedented efficiency, resilience and precision. In recent years, these strategies have begun to be implemented timidly in the field of nanotechnology where multiple factors, from the synthetic process to the size or functionalization of the nanoparticle, have a relevant impact on the effectiveness of the final product. In the MELINA project, we seek to develop -and exploit- the full potential of ML tools towards the experimental design of new nanomedicines.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Degree in Chemistry.
- Master related to computational modeling and/or machine learning, applied to chemistry.
- Proficiency in Spanish and English.
- Experience in Python programing.
- Scientific Publications related to the application of Machine Learning tools.

#### Merits to be considered:

- Experience in the construction of Neural Networks, as well as in the development of tools/descriptors related to Machine Learning.
- Knowledge in the creation and design of online interactive platforms that host scientific data or tools.

#### WHAT IS OFFERED

We offer the participation in a multidisciplinary scientific project combining state-of-the-art technologies in the fields of artificial intelligence and nanomedicine, under the direct supervision of Dr. Sergi Vela (Theoretical and Computational Chemistry, IQAC). The project is associated with a comprehensive training plan (321 ECTS) in experimental methodologies and computational tools, which also includes short stays in renowned institutions abroad.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: ibane.abasolo@iqac.csic.es Phone: 934006165











Project: Virtual prototyping for robotic manipulation of garments: enhancing the capabilities of the CLOTHILDE cloth simulator

Technological and scientific fields: Computer Graphics, Robotics, Geometry

**Location:** Barcelona, Cataluña, Instituto de Robótica e Informática Industrial, CSIC-UPC, <u>https://www.iri.upc.edu</u>

Research Group/PI: Robot Perception and Manipulation at IRI (RobIRI), Carme Torras Genís

### **PROJECT SUMMARY**

While there are numerous cloth simulators available, most of them lack the necessary physical realism to excel in challenging application areas, such as robotics. In our group, we developed a physically accurate cloth model, CLOTHILDE, and validated its realism empirically using recordings of various textiles. We aim to make this cutting-edge cloth simulator accessible to a wider audience and enhance its capabilities to enable robotic systems to manipulate garments more effectively based on the simulations it generates. The main goals of the project are: 1. Develop a user-friendly VR interface for the cloth simulator, emphasizing real-time feedback, ease of use, interactivity, and customization. 2. Expand the cloth model to include garments with complex designs, considering seams and mixed materials. 3. Optimize the cloth model for handling collisions, especially on surfaces like folding tables. 4. Integrate virtual robotic environments to model robot-cloth interactions with different grasping modes.

# **PROFESSIONAL PROFILE**

#### Minimum requirements:

PhD in Applied Mathematics, Computer Science, Robotics, Mechanical Engineering or related fields. Proficiency in English.

#### Merits to be considered:

Proficiency in mathematical modelling, optimization and data science techniques. Knowledge of programming languages such as Python, MATLAB or C++. Experience with cloth simulators or virtual reality environments.

#### WHAT IS OFFERED

Joining a leading research group in robotic cloth manipulation, which has a laboratory equipped with four mobile robots, three of them with one arm, and three pairs of robots (WAM, KINOVA and UR5) for bimanual manipulation, as well as robot hands, high-precision and RGB-D cameras, motion capture and other sensors, virtual reality devices, and software maintained by laboratory support staff. 240 ECTS of training are also offered, which includes a stay in the ELAN team (modELisation de l'Apparence de phénomènes Non-linéaires, https://team.inria.fr/elan/) of the INRIA Grenoble Rhône-Alpes (France).

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: *Coordination and support actions of technical and human resources in data science and technology in an open science environment* 

**Technological and scientific fields:** Massive data and information processing technologies; High performance computing; Cloud Computing; Data analysis and integration; Others: Open science, Data science, Digitalization

Location: Cerdanyola del Vallès, Cataluña, IMB-CNM, https://www.imb-cnm.csic.es

Research Group/PI: PTI Ciencia Digital, Cecilia Jiménez, https://pti-cienciadigital.csic.es/

### PROJECT SUMMARY

It is a CSA (Coordination and Support Actions) type project for the management of R&D in the field of digital science. This is a transversal project that covers all research areas related to Data Science and Open Science, within the scope of the European Open Science Cloud (EOSC).

It aims to provide support and bring researchers closer to modern digital tools for complex topics in an open science environment, with the aim of making the CSIC more competitive in national, European and international calls, in the field of digital skills, as well as meet national and European strategic objectives.

### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The minimum requirements required are:

- Doctor in science or engineering
- Fluency in Spanish and English
- Minimum three years of experience in similar positions

#### Merits to be considered:

- Management training (MBA or equivalent)
- Experience in scientific project management
- Knowledge of programming languages (Python, C++, etc.)
- Proficiency in other official languages of the state
- Experience in organizing scientific activities
- Coordination and leadership skills

# WHAT IS OFFERED

Scientific-technological activity: Support for the coordination of the PTI Digital Science; support for the coordination of the EOSC-CSIC strategy; actions to improve the CSIC's computing resources; Dissemination, dissemination and training.

Training plan of 240 ECTS that includes: Master in Data Science; training stay in centers of the Spanish Supercomputing Network (RES); training stay at the Institute of Physics of Cantabria (IFCA); complementary training activities: preparation of annual reports, preparation of reports and articles, courses in transversal skills.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: *History and emotions: Characterization and evaluation of computational linguistics and language models in emotion mining from historical sources.* 

**Technological and scientific fields:** Digital Humanities, Massive data and information processing technologies, Computational linguistics, Emotion mining

**Location:** Santiago de Compostela, Galicia, Spain. Padre Sarmiento Institute of Galician Studies <a href="https://iegps.csic.es/en/iegps/">https://iegps.csic.es/en/iegps/</a>

**Research Group/PI:** Social history of power since the Middle Ages. Research group PI: Dra. Amparo Rubio Martínez.

#### **PROJECT SUMMARY**

The main goal is to characterize and evaluate existing computational linguistics techniques in emotion mining from historical sources. What can we extract from our historical corpus that allows us to support historical hypotheses and carry out a more human-centered investigation based on them? What do the texts produced reflect about the authors? Therefore, tasks will be carried out to study the state of the art in computational linguistics and emotion mining (extraction of emotions from text), selection of historical documentary corpora, annotation and evaluation of the techniques on the selected corpora, as well as empirical evaluation with historians of the results obtained. In addition, the project contemplates the development of use guides in emotion mining in historical contexts.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Academic qualification in philology, linguistics, history or computer engineering. In the computation case, it is necessary to demonstrate previous experience in Humanities and management of documental sources.

PhD related to Digital Humanities. Fluency in Spanish and English.

Demonstrable experience in computer programming, management and training of large language models (LLMs) in the Humanities.

#### Merits to be considered:

- Experience in developing and knowledge of programming languages such as Python, R, node.js or similar for LLMs

- Experience in creation, annotation and management of linguistic and/or historical corpora in digital contexts. Previous scientific record related to the topic.

#### WHAT IS OFFERED

The project is framed in a interdisciplinary research environment within the digital humanities, with a large existing network of researchers, centers and universities working on projects along the research line. The postdoctoral researcher will access an ambitious training program of 240 ECTS over 4 years that combines work methodologies and skills in both historical research and management of documental sources and in computational linguistics (programming, analysis, etc.), and that includes up to 3 short stays in national and/or European reference centers.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: p.m.rodilla@iegps.csic.es

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Project: Enhancing the computational biology of microorganisms and plants with new methods of artificial intelligence and supercomputing (SuperBioComp)

**Technological and scientific fields:** computational biology, high-performance computing, artificial intelligence, biotech, digital tools in agriculture

Location: PONTEVEDRA, GALICIA, MBG-CSIC, <a href="https://mbg.csic.es/">https://mbg.csic.es/</a>

**Research Group/PI:** COMPUTATIONAL BIOLOGY LAB, JULIO RODRIGUEZ BANGA, <u>https://www.bangalab.org</u>

#### **PROJECT SUMMARY**

Computational systems biology uses mathematical models and advanced scientific computing methods (simulation and optimization) to elucidate and understand complex biological processes. A key challenge is to model and study these processes as large dynamical systems. To this end, in this project, we propose the combined use of new methods based on two strategies: (1) High-Performance Computing (HPC), to provide the necessary computational power to calibrate, simulate, and analyze these systems; (2) new Artificial Intelligence (AI) techniques for the automatic discovery of kinetic models from large data sets.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Candidates must have:

- a PhD in the areas of Computer Science, Applied Mathematics, Physics, or Engineering (Chemical or Biomedical)
- proficiency in Spanish and English (minimum level B1)

#### Merits to be considered:

We will value previous experience in:

- computational biology: simulation and optimization of biological systems
- supercomputing: basic knowledge of parallel scientific computing
- basic artificial intelligence techniques (and in particular, metaheuristics)

#### WHAT IS OFFERED

The training plan will have an estimated effort of 240 ECTS over 48 months, including annual research projects, training stays in top-level groups in Germany and France, and advanced training courses in the topics of (i) High-Performance Computing (HPC), on classical supercomputers and quantum computers, and (ii) Scientific Artificial Intelligence (particularly regarding machine learning methods relevant to model discovery from data). Applications in computational biology of microorganisms and plants will be carried out. This training plan, to be developed over 4 years, will be facilitated by the intense collaboration between Julio R. Banga's group and the Supercomputing Center of Galicia (CESGA), within the framework of their Associated Unit 'COMPUTATIONAL OPTIMIZATION IN SYSTEMS BIOLOGY'.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: j.r.banga@csic.es Phone: +34 986 85 48 00 ext 430185











# Position Offered: POSTDOCTORAL RESEARCHER Project: High-throughput phenotyping from unmanned aerial vehicles in forestry research

**Technological and scientific fields:** Massive data and information processing technologies; Advanced techniques in earth and ocean observation; Remote sensing

Location: Pontevedra, Galicia, MBG-CSIC, www.mbg.csic.es

Research	Group/PI:	Genétio	ca y	Ecología	Forestal	/	Rafae	l Zas
(www.genecol	pines.weebly.c	<u>com</u> ).	Plataform	PTI	Horizonte	verd	le, y	www.pti-
horizonteverde	<u>e.csic.es</u> .							

#### PROJECT SUMMARY

The main objective of this project is the specialised training of a PhD in the post-processing of RGB, multispectral, hyperspectral and thermal imagery and LiDAR data to infer phenotypic characteristics of interest in trees and forest stands. In particular, the aim is to apply innovative techniques to systematise efficient and flexible post-processing tools to facilitate the assessment of genetic variation, plasticity and variation in plasticity related to the adaptive capacity of genetic material. This project proposes a transversal line of work with potential impact on a large number of CSIC research groups and centres and their national and international collaborators.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Doctorate in forestry, environmental science or similar •
- Bachelor's and Master's degrees in forestry, environmental sciences or biology •
- Good knowledge of English and Spanish •
- Experience in aerial image processing •
- Scientific publications in the proposed research area •
- Knowledge of QGIS

#### Merits to be considered:

- Knowledge of forest remote sensing
- Experience in field work, preferably forest genetic experiments •
- Drone pilot licence A1/A3 •
- Good communication skills •
- Knowledge of R or other statistical analysis software •

#### WHAT IS OFFERED

The proposal falls directly into the areas of Massive Data and Information Processing Technologies and Advanced Remote Sensing Techniques, although it is also related to the areas of High Performance Computing, Advanced Data Analytics / Edge Computing, Climate Change and Biodiversity, Image Analysis and Computer Vision. The project foresees a close collaboration with other research centres (iCIFOR-CSIC-INIA, IRNAS-CSIC, UdL, CETEMAS). The proposal foresees the implementation of an intensive and continuous training activity in digital competences for a total of 240 ETCS. In addition, four research stays are contemplated, 3 in the national territory and at least one in international research centres.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000 € - 52.000 €).

### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Seagrass meadows: Risk assessment with drones and AI

**Technological and scientific fields:** Remote sensing, Image analysis and computer vision, Artificial intelligence, Computational biology and High performance computing, Climate change and biodiversity, Advanced techniques in Earth and ocean observation.

**Location:** Palma de Mallorca, Baleares, Institute for Cross-Disciplinary Physics and Complex Systems, IFISC (CSIC-UIB), <u>https://ifisc.uib-csic.es</u>

**Research Group/PI:** Life and Environment, Damià Gomila, <u>https://ifisc.uib-csic.es/en/research/life-and-environment/</u>

### PROJECT SUMMARY

Recent advances in geospatial remote sensing and artificial intelligence techniques allow for the automatic detection and monitoring of at-risk seagrass ecosystems in a cost-effective and large-scale manner. Currently, the automatic identification of at-risk seagrass meadows is limited by the low resolution of satellite images and the lack of drone image coverage. The main objective of the project is to map the spatial organisation of seagrass meadows along the coast of Mallorca using unmanned aerial vehicles (UAVs or drones). By means of massive image analysis and the application of pre-existing mathematical models, which serve as a basis for the training of artificial intelligence (AI) algorithms, advanced coastal monitoring methods will be developed to detect at-risk seagrass meadows.

### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Doctorate in Physics, Proficiency in Spanish and English

#### Merits to be considered:

Knowledge of mathematical models of growth of clonal plants such as Posidonia. Knowledge of techniques for image analysis. Experience in developing and using numerical codes for the integration of partial differential equations. Drone pilot qualification. Experience in using drones to capture images.

# WHAT IS OFFERED

Opportunity to work in an area of ecological relevance, contributing to the protection and monitoring of seagrass meadows. Collaboration with experts in marine biology, mathematical modelling and development of artificial intelligence. Training in: Design and planning of flights according to specific regulations; Application of image processing techniques for the analysis of cartographic data; Management of advanced software and tools for processing high-resolution images; Numerical simulation of vegetation distributions using mathematical growth models; Development and training of machine learning and deep learning algorithms; Generation and use of synthetic images using 3D modelling techniques; Training and validation of artificial intelligence models for the quantification of vegetation density; Use of real and synthetic data to improve the accuracy and robustness of AI models.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: Digitization of innovative agricultural techniques: Integration of precision agriculture robotics into software for crop management

**Technological and scientific fields:** Artificial Intelligence, Cloud Computing, Robotics, Advanced Data Analytics/Edge Computing, Digital Tools for Agriculture, etc.

Location: Arganda del Rey, Madrid: Centre for Automation and Robotics, <u>https://www.car.upm-csic.es</u>

**Research Group/PI:** Field and Service Robotics Group, Pablo González de Santos, <u>https://www.car.upm-csic.es/groups/field-and-service-robotics</u>

#### **PROJECT SUMMARY**

Digitalization in agriculture leverages new technologies to improve sustainability at all levels of the food chain. These include sensorization, 5G communication, cloud computing, AI, image analysis, and decision-making support software.

One of the challenges in agricultural digitalization is the use of autonomous robots to carry out precise tasks (planting, harvesting, and weed management), especially due to the lack of adaptability between machinery, software, and data management devices.

Therefore, this project focuses on (i) the standardization of data models and interoperability design, (ii) the development of autonomous data collection systems, both inside and outside the field, (iii) the development of interfaces for user and decision-making support tools with easy access to farmers, (iv) the execution of field trials and validation studies and (v) the creation of synergies and exchange of knowledge.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- A degree in electronic or industrial engineering with a MSc and PhD in Computer Science.

- More than two years of experience in postdoctoral research in prestigious foreign centers in control, navigation, and decision-making in robotic systems for agriculture.

- Experience in applying AI techniques in mobile robotics.
- Experience in web applications and communication with the cloud in robotics for agriculture

#### Merits to be considered:

- A PhD in mobile robotics, especially in robotics for agriculture.
- Experience in perception systems (RGB, ToF, and hyperspectral cameras).
- Experience in sensor integration and robot navigation strategies in agriculture
- Experience with ROS, FIWARE and C++, LabView-RT, and Python programming languages.

# WHAT IS OFFERED

To join (4 years) a research group with a solid background in mobile robotics. Specialization in the development of digitalization techniques for agriculture.

The associated training will be based on at least 240 ECTS credits (1 ECTS = 25 hours). It will include some stays (2 to 3 months each) in national and international research centers and training in digital skills including geographic information systems (GIS and ARCGIS).

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: Implementation of advanced digital tools in the processing and analysis of data from biological samples using massive proteomic techniques.

**Technological and scientific fields:** Data analysis and integration/ Mass data processing technologies

Location: Madrid, Centro de Investigaciones Biológicas Margarita Salas, https://www.cib.csic.es

**Research Group/PI:** Proteomics and Genomics Facility at CIB Margarita Sala. PI; Eduardo A Espeso. <u>https://www.cib.csic.es/facilities/scientific-facilities/proteomics-and-genomics</u>

#### **PROJECT SUMMARY**

The Proteomics and Genomics Unit (UPG) of the Margarita Salas Biological Research Centre (CIB) provides scientific and technological support to researchers from the Centre itself, other CSIC ICUs and national and international institutions. The objective of this contract is to integrate personnel specialised in digital techniques, capable of implementing advanced digital skills and visualising and interpreting the data obtained in the proteomics projects developed by the different users of the UPG at the CIB.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The person to be recruited to carry out the tasks described in the report must have a Ph.D., preferably in microbiology and parasitology, and experience in bioinformatics (master's degree and training courses in this area), as evidenced by their scientific career (publications, research projects and/or contracts). Personal interviews will be held with the director and staff of the UPG.

#### Merits to be considered:

Master's degree in bioinformatics and specific courses in this field

Experienced in transcriptomic and proteomic techniques

Publications related to these topics

Experienced in teaching or mentoring undergraduates, dissemination and popularisation Proficiency in English

# WHAT IS OFFERED

The person to be recruited will be integrated in the UPG providing scientific and analytical support to the users of this service of the CIB Margarita Salas. The project focuses on three main objectives: 1) Adaptation of massive data processing technologies to the UPG, 2) Extension of Data Analysis and Integration and 3) Implementation of tools and methods framed in Computational Biology. The contracted staff will carry out a total of 240 ECTS of training over the 4 years, taking national and foreign courses, stays in other services and companies, as well as the management of technical reports to users and the maintenance of databases and other bioinformatics tools.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: SecondBody: Neuroscience-inspired AI for personalized control of wearable robots

Technological and scientific fields: Artificial intelligence, wearable robots, digital twins, sensorization, reinforcement learning

Location: Alcalá de Henares, Madrid, Cajal International Neuroscience Center (CINC), https://www.cinc.csic.es/

**Research Group/PI:** Neuro AI and Robotics (NAIR) (<u>neuro-ai-robotics.github.io</u>) / Pablo Lanillos

#### PROJECT SUMMARY

Mobility problems are the common denominator of many diseases, neurological causes, and musculoskeletal conditions that affect hundreds of thousands of citizens each year. Being able to assist the mobility of these people is central to society and the healthcare system. The main goal of this project is the development of a new generation of intelligent and customizable Wearable Robots (WRs) to assist users with mobility problems in their day-to-day lives. To achieve this, a neuro-inspired Artificial Intelligence (AI) will be developed for the perception and control of WRs, based on deep reinforcement learning. It will be trained on different mobility pathologies and users modeled with musculoskeletal digital twins. These algorithms will be implemented in sensorized exoskeletons, adapted for safe use in real environments. The selected candidate will join a young, highly active, interdisciplinary research group in the fields of AI, robotics, and neuroscience.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Required academic qualifications:

PhD in Engineering Sciences, Computer Science, or a related field • Language proficiency: Professional English and Spanish Postdoctoral experience of at least 2 years in wearable robotics

#### Merits to be considered:

Experience in musculoskeletal model development and biomechanical gait analysis Experience with advanced sensors for robotic exoskeletons Knowledge of reinforcement learning Knowledge of programming in Python and deep learning libraries

Experience supervising undergraduate and master's students

# WHAT IS OFFERED

Use of advanced robotic technologies for mobility assistance Training in digital AI skills for robotics (e.g., reinforcement learning) International training stays in academia and business Collaboration with other national and international research centers Continuous training for the advancement of the scientific career

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000 € - 52.000 €).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: Development and Implementation of AI for animal behavior and neuronal activity analysis and integration

**Technological and scientific fields:** Artificial Intelligence, Massive data and information processing technologies and Image analysis, and computer vision

Location: Av. Del Dr Arce 37, Madrid, Madrid. Instituto Cajal (IC) https://cajal.csic.es/

**Research Group/PI:** Jercog Team/ IP: Pablo E. Jercog (co-PI: Liset M. de la Prida)

#### **PROJECT SUMMARY**

This project aims to develop sophisticated tools for analyzing animal behavior coupled to brain activity in neuroscience labs. This project also aims training junior researchers to create and implement cutting-edge AI technologies for animal behavior and its integration with neuronal activity, seeking to provide deeper insights into the neural mechanisms in health and disease. The applicability of these techniques span a large range of research areas from neuroscience to ecology, from clinical research to shoppers behavior in retail stores. The training can significantly change the future professional career for the applicants.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Candidates must have a PhD in neuroscience, bioinformatics ingeneering, computer science, physics, math or related fields.
- Should have a minimum level of programming skills, in Python, Matlab or R.
- Should be proficient in english

#### Merits to be considered:

Important merits to be positively valued are:

- Experience analyzing animal or human behavior
- Experience in research (i.e. solid publication record in the related fields)
- Experience in research coordination

#### WHAT IS OFFERED

The training scheme is designed to equip junior researchers with the necessary skills and knowledge to achieve the objectives of developing AI tools for analyzing animal behavior in a neuroscience lab. The program will combine theoretical instruction with hands-on experience, covering essential topics in AI, machine learning, computer vision, data processing, and neuroscience. Candidates will be trained in Introduction to Artificial Intelligence and Machine Learning, Deep Learning for Behavioral Analysis, Computer Vision and Image Processing, Data Collection and Annotation. The candidate will also participate in conferences and visits to our collaborators labs.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Phone: +34 620562808 Pablo Jercog's cell-phone













Project: Development and validation of advanced and low-cost digital technologies for efficient and sustainable agro-ecosystem management (ECODigital)

Technological and scientific fields: Artificial Intelligence, Remote Sensing, Image Analysis and Computer Vision, Sensorisation, Digital Tools for Agriculture

Location: Madrid, Madrid, Institute of Agricultural Sciences (ICA), www.ica.csic.es/index.php/en

**Research Group/PI:** Geo-spatial and Precision Technologies for Sustainable Agriculture group (Tech4Agro) / PI: José Manuel Peña Barragán / https://tech4agro.csic.es/en

### **PROJECT SUMMARY**

ECOdigital proposes the application of technologies in the fields of remote sensing, sensorisation, artificial intelligence (AI), image analysis algorithms and computer vision for the development and validation of digital tools for agriculture. Digital technology will be used through ground and remote sensing (drone) to monitor crops and their habitat. The entire digitisation workflow will be covered, mainly through low-cost hardware and open source, free and accessible software. ECODigital will be implemented mainly in different plots of the experimental farm La Poveda (managed by the ICA-CSIC), through three pilot scenarios covering a wide range of agroecosystems (maize, vineyard and floral margins). In addition to promoting the use of technologies in the agricultural sector, this proposal aims to enhance the resources of the La Poveda estate and the ICA as reference centres for R&D in the digitisation of agriculture.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD degree, with university qualification in agricultural/forestry engineering, • environmental sciences, other engineering or sciences related to the scope of this project.
- High level of English.

#### Merits to be considered:

- Experience in remote sensing and/or Geographic Information Systems (GIS).
- Knowledge in programming oriented to image and data analysis with spatial component (e.g. Python, R), and use of sensors/equipments for agricultural data acquisition.
- Drone pilot license.

#### WHAT IS OFFERED

To carry out R&D activities in the Tech4Agro group, made up of researchers in agricultural sciences, remote sensing, geophysics and industrial engineering, with a clearly interdisciplinary nature. The contracted person will be trained and will work on cutting-edge digital technologies to advance the study of agro-systems, following the objectives set out in the group's current projects. An ambitious training plan is included (275 ECTS in 4 years), with courses in Python and C++, low-cost Sensorisation, and Machine/Deep Learning, including training stays in prestigious AI centres at UCO (Spain), SCSU (USA) and UCL (England).

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000 € - 52.000 €).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: *Phenotypic modeling through computation of massive complemented genomic data and its applications to forest genetic resource conservation and breeding in the face of global change* 

**Technological and scientific fields:** Digital tools for agriculture, livestock and aquaculture; Climate change and biodiversity; Computational Biology; Artificial intelligence; Data analysis and integration

**Location:** Madrid, Madrid, ICIFOR-INIA, https://www.inia.es/unidades/Institutos%20y%20Centros/ICIFOR/Pages/Home.aspx

**Research Group/PI:** Population Genetics and Evolution Group / PIs: Juan José Robledo Arnuncio and Ricardo Alía,

https://www.inia.es/investigacion/forestal/Ecolog%C3%ADa%20y%20Gen%C3%A9tica/Gen% C3%A9tica%20de%20poblaciones%20y%20evoluci%C3%B3n/Pages/Home.aspx

#### **PROJECT SUMMARY**

Based on the computational analysis of massive genomic and phenotypic data sets from several forest tree species, we will evaluate the genomic architecture of phenotypes of ecological and economic interest (biomass, resistance to biotic and abiotic factors, etc.) and train genomic selection models to predict related phenotypic values. Results will be transferred to public and private stakeholders involved in forest genetic resources conservation and breeding.

# **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Genetics, Computational Biology, Forest Sciences or similar
- Proficiency in English language
- Experience in bioinformatics, statistical genetics or computational modeling

#### Merits to be considered:

- Experience in genomics, especially in the analysis of the genetic architecture of complex phenotypic traits and in the usage and development of genomic prediction models
- Knowledge of Bayesian statistics, programming and AI algorithms
- Experience in handling and analysing big data sets
- Experience in forest genetics
- Availability to carry out research visits in international labs
- Profiency in Spanish language.

#### WHAT IS OFFERED

Collaboration with interdisciplinary team (molecular and quantitative geneticists, evolutionary ecologists, ecophysiologists) with extensive international contacts (EUFORGEN and EVOLTREE networks, EU FORGENIUS and OPTFOREST projects, etc.) and continuous outreach activity (e.g. project with MAPAMA in forest genetic resources conservation and breeding). Analysis of available genomic and phenotypic data, obtained from natural populations and genetic trials. Use and development of AI-based models in collaboration with the group. Access to high-performance computing facilities (CESGA and DRAGO). Training plan in digital skills, dissemination, mentoring and leadership, with a total of 240 ECTS, with at least six months of international research visits.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: Ultra-low cost sensors for wearables and Industry 4.0 (ULTRA-WEAR)

Technological and scientific fields: Sensors. Nanotechnology, Artificial Intelligence, Edge Computing

**Location:** Madrid, Madrid. Instituto de Ciencia de Materiales de Madrid. <u>https://www.icmm.csic.es/</u>

**Research Group/PI:** 2D Foundry. Andres Castellanos-Gomez and Carmen Munuera. <u>https://sites.google.com/view/2dfoundry</u>

#### PROJECT SUMMARY

The ULTRA-WEAR project focuses on the development of ultra-low cost light, temperature, strain, and humidity sensors using van der Waals materials and an innovative dry deposition method. These sensors will be integrated into wearables and Industry 4.0 applications. The project aims to launch the Proof of Concept and Prototyping platform of the institute and involves collaboration with the AI Lab platform to develop machine learning algorithms that optimize sensor performance, thus consolidating the ICMM's position as a center of excellence in information technologies.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic degree: PhD in Physical Sciences
- Proficiency in Spanish and English

#### Merits to be considered:

Proficiency in the following techniques: Atomic Force Microscopy (AFM), Magnetic Force Microscopy (MFM), and/or Scanning Probe Microscopy (SPM). Knowledge in the development and characterization of two-dimensional (2D) materials. Techniques for deposition and exfoliation of 2D materials. Experience in: technology transfer activities and commercialization of prototypes, including patents and other industrial or intellectual property activities (contracts, licenses, agreements, etc.). Collaboration on Proof of Concept and Prototyping platforms. Experimental setups. Development of programs for data acquisition and analysis. Development of machine learning algorithms in collaboration with AI platforms. Working in private industry.

#### WHAT IS OFFERED

A DRFC1-type contract for four years. The ULTRA-WEAR project utilizes advanced technologies and interdisciplinary collaborations to develop innovative sensors. The training plan includes 240 ECTS over four years, combining supervised lab work, autonomous training in data analysis and programming, and stays at international centers such as AMO GmbH and TU Delft. Courses in digital skills and artificial intelligence complete the training, ensuring comprehensive development of the doctoral candidate.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *Machine Learning Applied to the Catalytic Conversion of Greenhouse Gases into Clean Fuels* 

**Technological and scientific fields:** High-Performance Computing, Artificial Intelligence, Massive Data and Information Processing Technologies, Nanotechnology, New Materials, Climate Change, and Biodiversity

Location: Cantoblanco, Madrid, Instituto de Catálisis y Petroleoquímica, https://icp.csic.es

Research Group/PI: Modeling for Theoretical Catalysis / Pablo G. Lustemberg

#### **PROJECT SUMMARY**

In a circular economy, CO2 is valuable for its potential to be reduced with renewable hydrogen, a promising route for the synthesis of fuels and chemical feedstocks. This project aims to develop low-cost catalysts to produce methanol from CO2 and hydrogen. Using machine learning, the design of multicomponent catalysts based on non-noble metals and mixed oxides will be accelerated. The research will combine atomic-scale simulations with artificial intelligence to model and optimize catalysts, understanding reaction mechanisms at the molecular level, in collaboration with leading experimental and theoretical teams.

#### PROFESSIONAL PROFILE

#### Minimum requirements:

- Ph.D. in Sustainable Chemistry with a minimum of 2 years of postdoctoral experience.
- Experience in Theoretical Chemistry and Computational Modeling, Density Functional Theory (DFT), and VASP scientific code applied to heterogeneous catalysis.
- Proficiency in English at the C1 level.

#### Merits to be considered:

- Familiarity with the Linux operating system, Python programming, and high-performance computing.
- Experience in interdisciplinary work groups, especially with experimental teams.
- Basic knowledge of machine learning techniques.

#### WHAT IS OFFERED

The project focuses on catalyst innovation, specifically on the study of new catalysts. Advanced technologies such as artificial intelligence models (GOFEE and ML-NEB) and molecular dynamics will be employed to accelerate the analysis of these catalysts.

The project will feature prominent international collaborations, fostering an interdisciplinary approach that integrates several theoretical and experimental methods. The training plan includes digital and transversal skills, as well as opportunities for training in international environments through internships. It is planned to obtain 180 ECTS credits at several European institutions, ensuring comprehensive and robust training.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Generative Design and Topological Optimization in Additive Manufacturing of Soft Materials: From Material to Application

Technological and scientific fields: AI, Robotics, Virtual Reality, Additive Manufacturing

Location: Madrid, Comunidad de Madrid, ICTP-CSIC, C/Juan de la Cierva, 3

Research Group/PI: Macromolecular Engineering/Alexandra Muñoz Bonilla

### PROJECT SUMMARY

This project aims to implement generative design and topological optimization in additive manufacturing (AM), adapting models to soft materials in three application areas: soft robotics, aerospace seals, and medical orthotics. To achieve this, soft polymeric materials will be developed, and scanning techniques will be employed to verify the printed parts and provide feedback to the design and manufacturing process. The tasks include identifying and developing materials, implementing AI-assisted generative design (GD) techniques, obtaining parts with elastic properties through AM techniques, and scanning prototypes to validate models in real environments. To successfully carry out this project, the ICTP has extensive experience in the development and characterization of photopolymerizable resins and thermoplastic elastomers and offers an AM unit with various advanced manufacturing equipment. Additionally, there are current collaborations of interest for the selected applications.

# **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Science and Technology related to additive manufacturing.
- Proven proficiency in aerospace mechanical design software.
- Proven proficiency in additive manufacturing technologies for elastic/soft polymers.
- Proven research experience in FDM, SLA, SLS and 3D scanning.
- Proven proficiency in English.

#### Merits to be considered:

- Proven knowledge in finite element analysis using COMSOL.
- Proven knowledge in data analysis and programming.
- Proven knowledge in techniques for characterizing polymeric materials.
- Experience in the aerospace sector and hospital 3D printing.

#### WHAT IS OFFERED

Training in AI-assisted generative design for the manufacturing of elastic parts using advanced AM technologies, collaborating with CSIC research teams and industry companies. Extensive training in AI and data analysis for the implementation of generative design, training in generative design and topological optimization, and training in robotics and the healthcare sector. Short stays will be conducted at research centers such as CAR-CSIC, hospitals such as the Toledo Paraplegics Hospital, and companies in the aerospace sector such as Airbus. The mentorship of undergraduate, master's, and PhD students collaborating on the project will be promoted.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Project: *Developing Scalable and Standardized AI Tools for Register- Based Administrative Data Collection, Organization, and Analysis* 

**Technological and scientific fields:** Demographics, Artificial Intelligence (AI), Big Data processing technologies, Image analysis and computer vision, Ethical aspects of AI

Location: Madrid, IEGD-CSIC (CCHS), http://iegd.csic.es/?q=en

Research Group/PI: Demographic dynamics, Diego Ramiro Fariñas

#### **PROJECT SUMMARY**

This project leverages cutting-edge AI technologies, including deep learning and computer vision, to automate the extraction and organization of data from historical handwritten documents. By developing scalable multimodal AI tools, we aim to transform digitized images into structured, linked data, enhancing the reuse of statistical and administrative records. This initiative will create a rich longitudinal database, enabling the generation of new, valuable statistical products and revolutionizing data sharing and analysis.

### **PROFESSIONAL PROFILE**

#### Minimum requirements:

PhD degree in Demography, Geography, Statistics or Data Science.

Minimum 5 years of experience (including international collaboration) working with population data, including census and administrative records.

Strong foundation in statistical analysis and data management, including proficiency in statistical software (e.g., R, SAS, SPSS) and database management systems (e.g., SQL).

Proficiency in Spanish and English, both written and spoken.

#### Merits to be considered:

Knowledge of administrative and statistical data sources and protocols.

Experience in demographic and epidemiological research using diverse data types (e.g. satellite images).

Active participation in relevant conferences/meetings and a strong professional network in statistical and administrative data management.

Familiarity with image classification techniques and handling unstructured data.

#### WHAT IS OFFERED

This project offers an exciting opportunity for candidates to develop and implement advanced AI tools for the collection, organization, and analysis of historical and administrative data. Participants will gain expertise in cutting-edge technologies, including deep learning, computer vision, and natural language processing, to transform handwritten documents into structured, usable data. Research stays at leading institutions will provide international experience and specialized training in data integration, privacy, and ethical AI practices. The project aims to create a unique longitudinal database, enhancing the understanding of demographic trends and statistical products. This experience will significantly boost candidates' professional skills in data science and AI, making a meaningful impact on statistical data management and societal research.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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momentum@csic.es | https://momentum.csic.es/









# Project: Atomic-Level Study of Tribochemical Processes for Developing New Greenhouse Gas Emissions Reduction Technologies in the Construction Sector

Technological and scientific fields: Climate change and biodiversity

**Location:** Madrid, Madrid Community, C/Serrano Galvache 4, Eduardo Torroja Institute of Construction Sciences, <u>www.ietcc.csic.es</u>

**Research Group/PI:** Sustainable Interaction between Construction Materials an Environment, subgroup of Tribochemistry and Triboemissions

# PROJECT SUMMARY

The primary goal of this project is to develop groundbreaking technologies aimed at significantly reducing greenhouse gas emissions in the construction sector, with a particular focus on cement manufacturing. The radical innovation lies in the implementation of tribochemical reactions to minimize CO2, CH4, and other emissions. The project proposes exploring entirely novel tribochemical pathways and developing a "one-pot" process for low-temperature decarbonation of minerals and CO2 reduction, which would eliminate the need for costly CO2 capture and storage systems. Specific Objectives include: Determine the atomic mechanisms of tribochemical decomposition in metal carbonates; Determine the atomic mechanisms of active hydrogen generation in tribochemical processes using hydrides, hydrocarbons, agro-forestry residues, etc.; Elucidate the reaction pathways for tribocatalytic reduction of CO2 under H2 atmosphere; Explore tribochemical reaction pathways for direct synthesis of calcium silicates.

# **PROFESSIONAL PROFILE**

# Minimum requirements:

- Degree: Doctor of Physics, Chemistry, or Materials Science
- English Proficiency: B2 or higher
- Research Experience: Thesis in computational modeling of physical and/or chemical processes at the atomic level (molecular dynamics, Monte Carlo, Tight-Binding, DFT, etc.)

### Merits to be considered:

- Expertise in atomic simulation techniques for mechanical systems (deformation, friction, etc.)
- Postdoctoral experience in highly reputable institutions.
- Participation in research projects.
- High-impact scientific publications with significant candidate's contributions (first author, corresponding author, etc.).

# WHAT IS OFFERED

Collaborate within a diverse team: Engage with a multidisciplinary group of researchers, fostering cross-pollination of ideas and expertise.

Immediate Validation of Simulation Results: Leverage the group's experimental capabilities to promptly validate and refine atomic simulation outcomes.

Expanding Expertise in Tribochemical Simulations:

- Cultivate proficiency in advanced, atomic, and quantum simulation techniques (240 ECTS).
- Embark on enriching training stints with renowned groups in the field of tribochemistry;
- Gain proficiency in utilizing first-principles and hybrid methods for model development.
- Access to Cutting-Edge Resources: Advanced Computing Facilities.

# Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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Technological and scientific fields: Quantum Technologies & High-Performance Computing

Location: Madrid, Institute for Fundamental Physics, IFF-CSIC (https://www.iff.csic.es)

**Research Group/PI:** Quinfog group. PIs: L. Tagliacozzo & T. Ramos (<u>https://quinfog.hbar.es</u>) **PROJECT SUMMARY** 

In our data-driven world, the demand for computational resources is ever-increasing, significantly impacting our energy consumption. Our team pioneers new computational paradigms, including quantum computing, to address this challenge. This project aims to enhance software for benchmarking and optimizing quantum computer designs. The specific tasks are:

- (i) Numerically simulating and characterizing large many-body quantum systems as the hardware of quantum computers.
- (ii) Enhance the design of quantum computer components, especially quantum measurement and amplification processes.
- (iii)Design and benchmark quantum-inspired algorithms to compress exponentially large data sets for efficient classical and quantum data processing.

Our highly interdisciplinary approach combines high-performance computing techniques with advanced tensor network representations and stochastic quantum differential equations. You will work on developing dedicated software packages capable of simulating large-scale quantum systems under realistic conditions.

### **PROFESSIONAL PROFILE**

#### Minimum requirements:

• PhD in Physics

### Merits to be considered:

- Advanced experience in scientific computing with Python, Julia, Matlab, C++.
- Research background in quantum technologies and/or many-body quantum systems
- Demonstrable experience in tensor network programming with itensor, tenpy, seemps, yastn, etc.
- Deep knowledge of statistical mechanics, quantum-inspired algorithms, and/or variational algorithms.

# WHAT IS OFFERED

- Innovative research and collaborative environment: Be at the forefront of quantum technology and high-performance computing, working with a team of experts from IFF-CSIC and international collaborators.
- Professional growth: Enhance your digital skills and gain invaluable experience in the rapidly evolving field of quantum technologies by mastering advanced numerical techniques.
- Formation plan: During the project, you will be guided to complete 240 ECTS in digital skills, including 2 training stays in international centers, 3 summer schools, and 1 Bootcamp on data science.

# Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: luca.tagliacozzo@iff.csic.es, tomas.ramos@csic.es Phone: 34 915616800 (ext. 442460 and 943104)











Project: Computational Techniques at the Frontier of the Digital Transition for Particle Physics and Cosmology

**Technological and scientific fields:** HPC, Massive data and information processing, Artificial intelligence, Advanced data analytics, Edge computing, Particle Physics and Cosmology.

Location: Madrid, Madrid, Instituto de Física Teórica IFT UAM-CSIC https://www.ift.uam-csic.es

**Research Group/PI:** Quantum Fields, Gravity and Strings / Margarita García Pérez and Gregorio Herdoíza

### PROJECT SUMMARY

The IFT is a centre dedicated to theoretical research in fundamental physics, which has been awarded the Severo Ochoa Distinction three times in a row. The project cuts across several IFT research areas with a strong computational component, where digital transformation is key: i.e. 1) large scale simulations in particle physics; 2) data analysis from particle physics and cosmology experiments; 3) programming of new architectures such as Graphics Processing Units (GPUs) or quantum computers.

The position offers a hybrid researcher-technician profile with proven experience in HPC, scientific hardware and software. The person recruited will play a key role as the hub of IFT's research activities with HPC and/or AI/AA components. Essential elements will be the design and implementation of the strategy for the transformation of IFT's hardware and data management infrastructures, as well as the optimisation and benchmarking of software tools.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

• Doctorate in Physics

#### Merits to be considered:

- Knowledge of High Performance Computing and parallel programming.
- Knowledge of Machine Learning and Artificial Intelligence techniques.
- Knowledge of Information and Communications Technology security protocols.
- Experience in handling, deploying and managing supercomputing clusters.
- Experience in deploying and managing data storage infrastructures.
- Experience in deploying scientific software on different platforms.

#### WHAT IS OFFERED

The HPC/AI/AA group at IFT has a robust network of contacts and collaborations in the European supercomputing ecosystem, with a regular role of responsibility for managing and accessing HPC resources (e.g. in the EuroHPC domain). This will naturally enable the organisation of training and research visits to European HPC centres, from which the recruited person will benefit. A training plan in digital competences will be planned and agreed with the person recruited, aiming to cover as many ECTS as possible within the range of 60-180 ECTS. Complementary training focusing on the acquisition of transversal competences will also be provided. The total estimated effort of the training plan will be at least of 240 ECTS.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

### Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

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# Project: Artificial intelligence techniques applied to heritage conservation

Technological and scientific fields: Natural Resources (8903): Earth and Atmospheric Sciences: Petrology, Mineralogy, Crystallography; Earth and Atmospheric Sciences: Geological Hazards; Cross-cutting themes: Global Change. Materials Science and Technology (8906): Materials in Historical Heritage; Physical Properties of Materials; Advanced Characterisation of Materials.

Location: Madrid, Comunidad de Madrid, Instituto de Geociencias, https://igeo.ucm-csic.es

**Research Group/PI:** Petrology Applied to Heritage Conservation/ Rafael Fort González. www.conservacionpatrimonio.es

#### **PROJECT SUMMARY**

The project's main objective will be to estimate the degree of deterioration of cultural and geological heritage materials, as well as to assess their durability and evolution over time due to extreme natural events linked to climate change, using artificial intelligence techniques.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Qualification: Degree in Geological Engineering

PhD in Experimental Sciences

Master's degree or related postgraduate studies in heritage sciences or data processing Demonstrable experience in characterisation of heritage stone materials

Publication of scientific articles and participation in congresses

Completion of training courses

Proficiency in Spanish and English with a certificate

Proficiency in advanced statistics, data science and artificial intelligence techniques Knowledge of programming languages (e.g. Python or R) and machine learning Use of software (e.g. SPSS, MVSP, NCSS)

#### Merits to be considered:

Proficiency in other languages proficiency in petrographic and petrophysical techniques Knowledge of laboratory quality standards and certification Proficiency in X-ray diffraction, thermogravimetry and IR thermography techniques

### WHAT IS OFFERED

The candidate researcher will join a multidisciplinary research group and collaborate with other research groups from CSIC and Spanish universities (UCM, UPM, UA, UGR) from different areas of knowledge. The researcher will take training courses of around 250 ECTS. Research stays in research centres in Portugal (LREC) and foreign universities such as the University of Delf in the Netherlands.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: Rafael.fort@csic.es Phone: +34 913945166



momentum@csic.es | https://momentum.csic.es/









Project: Submerged History and Big Data: Management and Visualisation of Maritime and Underwater Heritage, 15th-19th Centuries (MMT24-IH-01)

Technological and scientific fields: Digital Humanities; Tools for knowledge and protection of maritime and underwater heritage; Massive data and information processing technologies

Location: Madrid, Comunidad de Madrid, Centro de Ciencias Humanas y Sociales, Instituto de Historia (IH-CCHS); https://ih.csic.es/es

Research Group/PI: Estudios Comparados del Caribe y Mundo Atlántico (Departamento de Estudios Americanos, Instituto de Historia); IPs: Ana Crespo Solana y María Dolores González-Ripoll; https://ih.csic.es/es/org-structure/estudios-comparados-caribe-mundo-atlantico

#### **PROJECT SUMMARY**

Underwater cultural heritage (UCH) is producing Big Data, characterised by its high volume, variety and speed of production. This heritage is in the process of being integrated into various databases, platforms, GISs, repositories and web viewers using complex and advanced tools and data managers that require new algorithms, spatio-temporal analysis tools and Artificial Intelligence (AI) elements. This contract is aimed at scientific-technical training in data processing, administration and data cleaning for inclusion in web viewers and geoportals and geohistorical analysis.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

PhD in History and Humanistic Studies, with expertise in Early modern history and archaeology; MA in Archaeology.

#### Merits to be considered:

Research experience in European projects; stays abroad; publications related to maritime and naval history; experience in cultural heritage; knowledge of GIS and databases; English, Portuguese, French and Spanish languages.

#### WHAT IS OFFERED

momentum@csic.es | https://momentum.csic.es/

Scientific-technical training in Big Data processing, administration and data cleansing.

Training in the implementation of technical algorithms and Artificial Intelligence (AI) tools, database management, web viewers and GIS.

Training to identify lines of research, management and monitoring of information in the field of maritime and underwater history from the 16th to the 18th centuries.

Training in information processing and information processing with database managers.

Study of the Web Map services associated with the cartographic viewer in accordance with the directive INSPIRE (IMAGO ORBIS Geoportal).

Training in directed courses and with personal advice from the PI (Total of approximately 250-280 ECTS).

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000 € - 52.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: ana.crespo@cchs.csic.es Phone: 916022329 (CSIC desk)











# Position Offered: POSTDOCTORAL RESEARCHER Project: *Machine Learning for the Acceleration and Optimization of Pharmacophores for the Design of New Medicines by STD NMR Spectroscopy*

### Technological and scientific fields: Design of New Medicines, Artificial Intelligence

Location: Seville, Andalucia, Spain, Institute for Chemical Research, <u>www.iiq.us-csic.es</u>

**Research Group/PI:** Biomolecular Interactions and Structural Glycobiology, Jesús Angulo, <u>http://angulolab.iiq.us-csic.es</u>

#### PROJECT SUMMARY

AI, STD NMR spectroscopy and computational chemistry techniques are combined to accelerate fragment based drug design. The low affinity of the fragments in the chemical libraries used for screening poses a major challenge to obtaining 3D structures, making NMR the preferred technique for their characterisation. NMR data are interpreted using 3D models, which requires an accurate assessment of the degree of agreement between the model and the experimental data (model validation), and it is here that this project will develop AI and computational chemistry protocols to provide better solutions. Recent contributions of our research group in the field of digital methods for the analysis of weak interactions by NMR include Anal. Chem, 2024, 96, 615, and J. Med. Chem, 2024, in press. Both papers have developed new digital tools to speed up the characterisation of weak interactions: RedMat (http://redmat.iiq.us-csic.es) y RedDat (https://stdrdweb.streamlit.app/).

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

1. PhD in Chemistry, preferably awarded "cum laude"

2. Pre- and/or postdoctoral experience in NMR and molecular modelling techniques such as docking calculations and molecular dynamics (MD) simulations.

3. Specialised experience in saturation transfer difference NMR spectroscopy (STD NMR), preferably demonstrating methodological contributions in this field.

4. Training/experience in Python programming, data analysis, and supervised/unsupervised machine learning algorithms.

#### Merits to be considered:

- 1. Experience in advanced MD techniques (funnel metadynamics).
- 2. Experience in STD NMR matrix analysis (CORCEMA-ST, RedMat).
- 3. Postdoctoral stay/s abroad.
- 4. Advanced level of English (C1 or higher).

# WHAT IS OFFERED

The candidate will work in a research group that is internationally recognised for its contribution to the study of weak protein-ligand interactions using STD NMR techniques, and that has a solid track record in the development of hybrid NMR/computational methods for biomolecular studies. The candidate will receive training equivalent to 270 ECTS, including training in machine learning, 3 research training periods at the CIC bioGUNE (Bilbao, Spain) and the University of La Rioja (Logroño, Spain), as well as participation in a series of advanced training schools in computational chemistry and NMR spectroscopy.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: j.angulo@iiq.csic.es Phone: +34 954489566



momentum@csic.es | https://momentum.csic.es/







**Technological and scientific fields:** Computer vision technology, AI, Massive data processing, Digital Humanities

Location: Madrid, CA Madrid, ILC, https://ilc.csic.es/

**Research Group/PI:** Historia Cultural del Mediterráneo, Jan Thiele, <u>https://ilc.csic.es/es/org-structure/historia-cultural-mediterraneo</u>

### PROJECT SUMMARY

4 years postdoc position in an innovative project to develop Handwritten Text Recognition (HTR) technology that adequately caters the features of Non-Latin Script. The successful candidate will work among a diverse array of experts specialized in the exploration of a nearly unparalleled spectrum of handwritten texts in non-Latin scripts, as well as in close collaboration with the ILC's Laboratory for Digital Humanities, affording access to state-of-the-art resources and know-how at the intersection of humanities and computational innovation.

# **PROFESSIONAL PROFILE**

### Minimum requirements:

- PhD within the broader field of Hellenic studies (language, literature and/or history)
- Proficiency in Spanish and English
- Advanced knowledge of Ancient Greek
- Experience in Greek paleography

#### Merits to be considered:

- Work experience in Digital Humanities projects
- Familiarity with existing HTR technologies (Transkribus, eScriptorium, ...)
- Experience in the paleographic analysis of manuscripts from the Byzantine and Renaissance era
- Experience in digital editions

# WHAT IS OFFERED

The successful candidate will be trained in developping cutting-edge HTR technologies from an interdisciplinary approach aimed at overcoming the challenges posed by the unique features of various non-Latin scripts. Appart from computational skills, the candidate will expand their philological expertise by acquiering complementary knowledge in Arabic to enhance their career perspectives by strengthening their transdisciplinary capacities as innovative philologians. The candidate will receive additional training during secondments in leading institutions abroad and will be offered to study a DH master's degree.

# Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

# Start of contract: before 31 December 2024

# PRINCIPAL INVESTIGATOR CONTACT

Email: jan.thiele@cchs.csic.es Phone: +34 916022432












Project: Updating the standard model common to vision and artificial neural networks, with an application to reduce the environmental impact of video streaming

Technological and scientific fields: Artificial Intelligence, Image analysis and computer vision, Massive data and information processing technologies, Green algorithms

Location: Madrid, Instituto de Óptica, https://www.io.csic.es

Research Group/PI: Marcelo Bertalmío, https://www.io.csic.es/marcelo-bertalmio/

#### **PROJECT SUMMARY**

Vision science and Artificial Neural Networks (ANNs) share the same standard model abstraction (SMA), where we try to represent arbitrarily complex processes as cascades of linear filters and nonlinearities. The SMA was originated in the mid-20th century as an approximation to how biological neurons in the visual system work, but time has shown that the SMA is an oversimplification that ignores fundamental cell properties. As a result, ANNs behave differently from the brain in many key aspects, and vision models have a modest performance for some basic phenomena both in low and high level vision.

Our main goal is to overcome the limitations imposed by the SMA through an unconventional interdisciplinary approach grounded on the interaction between neuroscience, mathematics, vision science and machine learning.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD degree in computer science, neuroscience, mathematics, artificial intelligence, or • related field
- Three years minimum of postdoctoral experience
- Proficiency in English

#### Merits to be considered:

- Knowledge of vision science, machine learning, neuroscience, and mathematics for deep learning, including mathematical optimization and partial differential equations.
- Experience with programming and tools for deep learning and computer vision.

#### WHAT IS OFFERED

Performing cutting edge interdisciplinary research at the intersection of vision and artificial intelligence, with a potentially enormous impact. Work involves collaboration with, and recurrent short stays at, world-leading labs in Europe.

In-person work at CSIC facilities in downtown Madrid, with the possibility of doing remote work up to two days per week.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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momentum@csic.es | https://momentum.csic.es/









Project: *Bioprinting of Glioblastoma Models for Molecular Imaging and Treatment* with Nano-radiopharmaceuticals (Glio3D)

#### Technological and scientific fields: 3D bioprinting, Nanotechnology, Medical Imaging

Location: Madrid, Madrid, Instituto de Química Médica (IQM) http://www.iqm.csic.es

**Research Group/PI:** Nanomedicine & Molecular Imaging group, Fernando Herranz, <a href="https://nanomedmol.com">https://nanomedmol.com</a>

#### **PROJECT SUMMARY**

The main objective of Glio3D is the use of 3D bioprinted glioblastoma models for the evaluation of new nano-radiopharmaceuticals in conjunction with biomedical imaging experiments. Glio3D will operate in three scientific fields to achieve this goal: 3D bioprinting, medical imaging, and nanotechnology. The hired individual will receive intensive training in aspects of 3D bioprinting, 3D tumor models, synthesis and radiolabeling of nanomaterials, as well as the use of biomedical imaging in 3D models and preclinical models.

The research will focus on the emerging field of 3D bioprinting, combined with the use of nanoradiopharmaceuticals, thus creating a unique research project in Spain.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Biology, Pharmacy or Chemistry
- Experience in the synthesis and application of nanomaterials combined with radioisotopes
- Experience in cell culture

#### Merits to be considered:

- Experience handling preclinical models for medical imaging
- Experience with nanomaterial characterization techniques
- Experience in medical imaging techniques, particularly PET/CT
- Experience in writing scientific articles

#### WHAT IS OFFERED

The Glio3D project offers the opportunity to work in a multidisciplinary field for the development of personalized therapies against glioblastoma, using nano-radiopharmaceuticals and 3D bioprinted models as the fundamental basis. This approach will, for the first time, allow for the screening of nanomaterials using 3D models with human cells, contributing to better therapy selection and a reduction in the use of research animals. Within the project framework, the hired individual will receive intensive training in aspects of 3D bioprinting, nano-radiochemistry, and medical imaging, including around 100 credits in courses, as well as research stays.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: fherranz@iqm.csic.es Phone: +34 912587635











Project: Digital Tools based on Artificial Intelligence for the detection of frauds in oregano essential oils

**Technological and scientific fields:** Advanced Data Analysis, Digital Tools for the Chemistry-Agriculture interface, Sensorization

**Location:** Madrid, Instituto de Química Orgánica General (www.iqog.csic.es) e Instituto de Química Física Blas Cabrera (www.iqf.csic.es)

**Research Group/PI:** Group of Instrumental Analysis in Environment, Food and Health (lab. ANAEN), Ana Cristina Soria Monzón; Group of Photolysis and Chromatography, Jesús E. Quintanilla López

#### PROJECT SUMMARY

The potential of Digital Tools based on Artificial Intelligence (Machine Learning, Deep Learning, metabolomic approaches, sensorization) in their application to the advanced analysis of 2D and 3D data obtained experimentally through various instrumental analysis techniques, will be evaluated in this project for the development of an improved and automated technology that allows the authentication of essential oils. The proposed multidisciplinary research, with great potential for transfer, will benefit from the experience and resources of the research groups of two CSIC Institutes and the advice of a company in the essential oils sector.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Doctor of Science (Chemistry, Food Science and Technology, etc.) with experience in the application of chemometric tools to experimental data.

#### Merits to be considered:

- Experience in analysis by chromatographic techniques coupled to mass spectrometry (preferably by GC-MS and LC-MS) of foods and plants.

- Knowledge of English (level B2).

#### WHAT IS OFFERED

The hired person will benefit from a Training Plan of 296 ECTS for specialization in Digital Skills that will include, among others, the enrollment in an online Master on Big Data and Data Science and in various postgraduate courses on advanced statistics and Python programming. Stays (total duration 9 months) in prestigious national/international laboratories specialized in this topic are also contemplated, as well as the participation in other activities (teaching, dissemination, attendance at conferences, etc.) that favor the candidate's professional development.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: Ana Cristina Soria (acsoria@iqog.csic.es) / Jesús E. Quintanilla (je.quintanilla@iqf.csic.es) Phone: Ana Cristina Soria (34 91 2587485) / Jesús E. Quintanilla (34 917459525)











## Position Offered: POSTDOCTORAL RESEARCHER Project: *Multi-modal imaging technology for pre-clinical research*

**Technological and scientific fields:** Artificial Intelligence, Medical devices, Medical Imaging, Edge Computing

Location: Madrid, Inst. of Physical and Information Technologies, <u>https://www.itefi.csic.es/es</u>

Research Group/PI: Ultrasonic Systems and Technologies Group / Jorge Camacho

#### PROJECT SUMMARY

Pre-clinical research is essential for the development of new drugs and medical treatments, and requires, in many cases, ad-hoc imaging technologies with high resolution standards and higher performance than those used in the clinical field. In this line, new AI and deep learning techniques have proven to be a disruptive tool, both for the generation of ultrasonic images and for their interpretation. The objective of the project is to train a PhD in digital competences, whose participation will reinforce the development of multi-modal imaging technology for preclinical research being developed by the participating groups, taking advantage of the growing multidisciplinarity in medical imaging among ITEFI groups and with external groups.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Ph.D. in electronics
- Experience in research/development of ultrasonic imaging systems/methods
- Experience in Python programming language and parallelization using GPUs

#### Merits to be considered:

- Expertise in artificial intelligence applied to medical imaging
- Knowledge of three-dimensional ultrasonic imaging
- Experience in research results protection and knowledge transfer
- Knowledge in edge-computing electronics (Microcontrollers, embedded Linux, etc.)

#### WHAT IS OFFERED

The general objective of the project is the development of a multi-modal electronic biomedical imaging technology for pre-clinical research using AI techniques, combining high-resolution three-dimensional ultrasound imaging, positron emission tomography imaging and opto-acoustics, incorporating deep learning methodologies in the formation and evaluation of the images. The specific objectives are O1) The training of a PhD in digital skills and the application of the knowledge acquired to improve the quality of the images obtained and their interpretation O2) The development and publication of an open database with the results obtained through the different technologies developed O3) The strengthening of national and international collaborations of the person hired and the groups involved. The first year will be largely devoted to training in digital competencies, taking an official master's degree in the subject. During the second year he/she will receive training in preclinical imaging, and will start collaborating in the research work, which will last until the end of the project. During the last year, he/she will be in charge of the publication of an open database with the images acquired during the project. The total training load will be equivalent to 240 ECTS credits.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: j.camacho@csic.es Phone: 915618806











## Position Offered: POSTDOCTORAL RESEARCHER Project: Artificial Intelligence for high-performance processing and analysis of massive data in natural sciences

**Technological and scientific fields:** Artificial Intelligence, Image Analysis and Computer Vision, Mass Data and Information Processing Technologies, Advanced data analytics/edge computing; Remote sensing, Climate change and biodiversity, Data analysis and integration, Sensorization.

Location: Madrid, Museo Nacional de Ciencias Naturales, https://www.mncn.csic.es/

**Research Group/PI:** MNCN research centre joint project. IP: Luis Pertierra, Dept. Biogeography & Global Change; Co-IP: Asunción de los Ríos, Dept. Biogeochemistry & Microbial Ecology

#### PROJECT SUMMARY

The processing, storage, analysis, and exchange of massive biological data faces significant operational challenges, creating a bottleneck between the collection of information and the generation of scientific outcomes. This centre project aims to lay the foundations for the creation of an Artificial Intelligence Laboratory (LIA) that transversally combines the processing needs of massive digital biodiversity and geodiversity data collected by MNCN research groups, scientific-technical services and natural history collections. The LIA-MNCN will develop protocols to process data resulting from various digital monitoring tools (soundscapes, computer vision, phototrapping, remote sensing), multi-scalar imaging techniques, and/or automated digitization of collections. A high focus will be set in developing guided protocols and workflows for assisting MNCN end-users in their natural science research endeavours.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Academic qualifications: PhD in Biological Sciences, Ecology, Imagery Technologies or similar
- Proficiency in Spanish and English

#### Merits to be considered:

- Experience with Artificial Intelligence training for species recognition with assisted / unassisted classification trees. Knowledge of computer vision and/or soundscapes depuration.
- Proficiency in automated digitalization, virtual modelling, and/or morphometrics.
- Processing of digital imagery at various ecological scales, from microscopy to remote sensing.
- Programming skills (R, phyton). Advanced skills in web scraping and data mining.

#### WHAT IS OFFERED

Experience and expertise in the development and application of AI methodologies for the digitization, management and analysis of different sources of ecological data. As a result of these scientific activities, the hired person will also receive complementary training skills, which will include improving their scientific leadership, writing and presentation skills, supervision of early career students and knowledge transfer capacities, publications in research journals and communications to scientific events or the general public. Additionally, the candidate will gain experience in project management and increase their internationalization.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

Email: luis.rpertierra@mncn.csic.es Phone: +34 654 09 39 10













## Position Offered: POSTDOCTORAL RESEARCHER Project: *Data science and digital twins for transport and building emissions control*

**Technological and scientific fields:** Data analysis and integration, Digital twins, Demography, Advanced techniques in earth and ocean observation. New materials/control sensors. Urban energy efficiency and GHG emissions.

Location: IETcc, Madrid. https://ietcc.csic.es

#### Research Group/PI: IETcc / Fernando Martín-Consuegra and Borja Frutos

#### **PROJECT SUMMARY**

The main objective is to build an integrated urban digital twin that allows considering emissions generated by mobility, transportation and buildings. Data on residential buildings and transportation in the city will be included, with attention to energy consumption and emissions of polluting gases into the atmosphere. The model will allow for the analysis of various scenarios and measures that contribute to achieving cleaner and more efficient cities. The city of Madrid will be taken as a case study, although the results could be extrapolated to other cities/regions. The partial objectives are:

1) Data collection and data space. A realistic synthetic population must be generated and the models must be validated and this involves having detailed data on buildings, population, homes, pollution levels, atmospheric situation, vehicle flows, etc. This aggregated information in a common space will make it possible to address many issues such as energy poverty, the identification of the largest sources of emissions and resource consumption in order to reduce the environmental impact of cities and improve health.

2) Development and integration of models. We have experience in the development of mobility and energy consumption models in homes. The development of these models in Madrid, linking them to emissions and integrating the models between them will be a challenge that will be undertaken.

3) Study of scenarios. The model will allow pre-evaluation of improvements, costs and benefits, including an idea of the order of magnitude of the cost of potential actions.

#### PROFESSIONAL PROFILE

#### Minimum requirements:

• PhD and Knowledge of programming and Urban Data Science

#### Merits to be considered:

• Experience on social modeling, urban sociology, energy poverty

#### WHAT IS OFFERED

Collaborations with other groups of the PTI Mobility 2030, especially those in the project a group of IDAEA in Barcelona, IFISC in Palma de Mallorca and in IEGD in Madrid. Stays in these centers and visits to international collaborators. Formation program in AI (compulsory)

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Digital Innovation in Agriculture: Remote Sensing, Sensors, and Advanced Data Analytics to Improve the Sustainability of Agricultural Production

**Technological and scientific fields:** Digital tools for agriculture, Remote sensing, Sensorization and advanced data analytics/edge computing, Artificial Intelligence

Location: Murcia, Región de Murcia, CEBAS-CSIC, www.cebas.csic.es

Research Group/PI: Plant Nutrition / Vicente Martinez

#### **PROJECT SUMMARY**

The AGROTECH project aims to promote the sustainability and resilience of the agrifood sector through the integration of advanced digital technologies. Utilizing remote sensing, sensorization, advanced data analytics, and artificial intelligence, AGROTECH seeks to optimize resource management and improve sustainability and efficiency in agricultural production.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

The AGROTECH project aims to promote the sustainability and resilience of the agrifood sector through the integration of advanced digital technologies. Utilizing remote sensing, sensorization, advanced data analytics, and artificial intelligence, AGROTECH seeks to optimize resource management and improve sustainability and efficiency in agricultural production

#### Merits to be considered:

<u>Knowledge in:</u> Drone image acquisition, monitoring of indoor hydroponic systems (LED lights), management and handling of woody crops in field conditions

<u>Experience</u>: Participation in viticulture projects, soilless crops, management of agricultural systems under climate change conditions, agricultural research projects, especially those related to remote sensing and sensorization. Use of omics techniques such as metabolomics and/or ionomics, plant physiology, etc.

<u>Other valuable aspects</u>: Scientific publications in high-impact journals, participation in international conferences, experience in supervising and mentoring students (supervision of bachelor's and master's theses), certification to operate drones, additional qualifications, awards, scholarships, and recognitions, stays at other national or foreign research centers different from where the thesis was conducted

#### WHAT IS OFFERED

The AGROTECH project offers the candidate the opportunity to work at the forefront of agricultural innovation through the use of advanced technologies such as remote sensing, sensorization, Big Data, and artificial intelligence. They will collaborate with prominent research groups and entities both nationally and internationally, enriching the interdisciplinary aspect of the work. Additionally, an extensive training plan will be provided, which includes obtaining a total of 277 ECTS over the four-year contract. This plan includes training in emerging technologies, training stays at prestigious institutions such as the University of Catania and the University Miguel Hernández of Elche, and participation in specialized master's programs. The hired individual will attend conferences, seminars, and receive training in advanced digital skills, ensuring comprehensive and continuous professional development

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Evaluation of the role of wind in wildfires through the use of big data and artificial intelligence (VENTAFOCS)

**Technological and scientific fields:** (1) Artificial intelligence; (2) Technologies for processing big data and information; (3) High performance computing; (4) Remote sensing; (5) Climate change and biodiversity; (6) Data analysis; (7) Image analysis and computer vision; (8) Climate services

**Location:** Moncada, Valencia, Valencia Region. Centro de Investigaciones sobre Desertificación (CIDE, CSIC-GVA-UV, <u>http://www.uv.es/cide/</u>)

**Research Group/PI:** Disturbances and evolutionary ecology (EvoFire) & Climate Variability and climate services (Climatoc-Lab) / Juli Garcia Pausas and César Azorín Molina

#### PROJECT SUMMARY

Wildfires depend, a large extent, on the atmospheric situation. High air temperatures, low relative humidity and, mainly, moderate to strong winds, increase the size and severity of fires. The objective of the project is to quantify the role of winds in the fire regime at different spatio-temporal scales (regional and global), and to identify areas where fires spread mainly by winds (wind-driven fire regimes) or fuel (fuel-driven fire regimes). This will allow us to generate the scientific and technological base to, in the future, improve prediction and offer a service (wind-driven fire service) for the prevention and management of wildfires.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Graduate in Physics of Data Science Master in Earth Sciences and/or Meteorology PhD in Environmental Sciences, Atmosphere Physics or Data Science Spanish (proficency); B2-English

#### Merits to be considered:

Python Machine learning / Deep learning Remote sensing Experience with research projects which applied Artificial Intelligence to Earth Sciences Participation in international conferences

#### WHAT IS OFFERED

A multidisciplinary project within 2 research groups that have their own network of collaborators for internships. A training plan of 240 ECTS with which he/she will acquire and/or deepen knowledge in artificial intelligence, data analysis and remote sensing, among others. Access to the CSIC's own annual Training Plan and to its own and national computational resources. A respectful and dynamic working environment with international connections.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: *PreDesPlant: Early and real-time detection of stress associated damage in plants using integrated digital sensors.* 

#### Technological and scientific fields: Digital tools for agriculture

Location: Paterna. Comunidad Valenciana. I2SysBio: <u>http://i2sysbio.uv.es/</u>

**Research Group/PI:** Non-coding RNA-mediated Regulatory Networks. PI: Dr. Gustavo G. Gómez Hoc. ncRNAlab: <u>https://www.ncrnalab.com/</u>

#### **PROJECT SUMMARY**

Objective: "To develop a novel, autonomous and integrative technology based on the use of plant biohybrids (plant + biosensors) driven by AI that will act as plant-human translators to report the physiological health status of a crop in real time". To meet this general objective, the following specific objectives have been set: 1- To develop an RNA recognition system that can be adapted to electrochemical sensors. 2- To validate the efficiency of: i) the analyte (RNA)-receptor (probe) interactions and ii) the fluidic capabilities of the detection system by image analysis at macroscopic and microscopic levels. 3- To adapt the sensitivity of this detection system to the accumulation levels of stress marker RNAs in plant fluids. 4- Identify new RNAs to increase the specificity and efficacy of these devices in multiple agricultural species. 5- To develop an AI-assisted system that allows remote and real-time analysis of the signals emitted by the sensor in order to determine the physiological and phytosanitary status of crops.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Academic qualification: PhD in Agricultural Engineering/ Biological Sciences or similar. Fluency in English (written and spoken). Experience in directing research work of undergraduate/master/pre-doctoral students. Experience in research related to: Study of stress response in plants of agronomic interest, Study and analysis of sRNAs in agricultural crops, POC systems for biomarker detection.

#### Merits to be considered:

Experience in plant molecular biology with agronomic interest, in particular: sRNA extraction and detection by RT-qPCR, NGS library development, biotechnological applications of CRISPR-Cas systems, plant transformation and pathogen infection.

#### WHAT IS OFFERED

Participate in the development of plant-integrated biosensors and offer cutting-edge technological solutions for application in the digitization of agriculture. Collaborate and interact with technological institutes and different agents of the agricultural sector. Work in a dynamic environment and a growing group. Participate in training activities (120 ECTs).

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: DigiAcuaSOS: Application of digital tools and artificial intelligence techniques for the development of sustainable and precise aquaculture in the context of climate change

Technological and scientific fields: Aquaculture, Digital tools for aquaculture, Computational biology, Bioinformatics, Massive data integration, Artificial Intelligence

Location: Cabanes, Castellón, Institute of Aquaculture Torre de la Sal (IATS), https://iats.csic.es/, https://nutrigroup-iats.org/

Research Group/PI: Nutrigenomics and Fish Growth Endocrinology Group, PI: Jaume Pérez Sánchez, https://nutrigroup-iats.org/; Co-PI: Juan Alberto Falcó Graciá

#### **PROJECT SUMMARY**

Aquaculture is the fastest growing animal production sector in the world, but it faces threats such as production intensification, climate change and pollution. The diversity and confluence of factors involved widen the range of possible scenarios, requiring holistic and versatile solutions to address this complexity. One approach to meet this challenge is the implementation of new (micro)electronic and digital technologies, already available by the PI of this proposal, for the development of advanced tools with massive, automated and continuous capacity for the acquisition, recording, integration and analysis of multifactorial data, with the ultimate goal of improving the monitoring, management and forecasting of aquaculture production in real time.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Ph.D. in Bioinformatics, Biostatistics or equivalent.
- At least 5 years of proven experience in bioinformatics and data analysis.
- Knowledge of programming languages (Python, R, SQL, Java).

#### Merits to be considered:

- Demonstrated experience in omics data analysis and integration.
- Demonstrated experience using Bayesian networks and membrane computing.
- Ability to understand, communicate and write documentation in English.

#### WHAT IS OFFERED

Selected candidate will be offered an employment contract under the conditions described here, in order to carry out and teach the use of digital tools and to lead the decision making from data analysis in the context of this project. In addition, this person will receive a complete official specialized training in digital skills to generate new knowledge in the field through multi-omics analysis, Bayesian networks, membrane computing and artificial intelligence. He/she will also carry out several stays of at least 3 months in national and international reference institutions, as well as attend specialized congresses in aquaculture, hologenomics and bioinformatics. He/she will also be provided with the necessary support and tools to organize a specialized course on data digitization in aquaculture.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000 € - 52.000 €).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Analysis and integration of massive sequencing and imaging data for the study of gene expression in eukaryotes.

**Technological and scientific fields:** Computational Biology, Image Analysis and Computer Vision, Data Analysis and Integration, Artificial Intelligence, High-Performance Computing

Location: Valencia, Valencian Comunity, IBV https://www.ibv.csic.es

Research Group/PI: Gene Expression and RNA metabolism, Susana Rodríguez Navarro

#### **PROJECT SUMMARY**

The study of gene expression regulation has advanced significantly thanks to the massive acquisition of multiomic data. This progress relies on new methods and specialized software, posing a challenge for the training of scientists with digital skills. In functional studies, these data are combined with advanced microscopy techniques. Automating the analysis and integration of omic and microscopy data requires learning new techniques combined with artificial intelligence and high-performance computing. The project will develop a specialized profile in the integration of multiomic data and advanced microscopy analysis to further the understanding of gene expression.

#### PROFESSIONAL PROFILE

#### Minimum requirements:

PhD in Biotechnology. Bachelor's Degree in Biochemistry and Biomedical Sciences. Basic knowledge of programming in R and multi-omic data integration.

#### Merits to be considered:

PhD with international mention and cum laude - Bachelor's Degree in Biochemistry and Biomedical Sciences-Master's Degree in Biomedical Biotechnology - Experience in molecular biology laboratories and with microorganisms - Basic knowledge of programming in R and multi-omic data integration - Proficiency in molecular biology techniques in yeast and confocal microscope handling - Knowledge of statistics applied to biology

#### WHAT IS OFFERED

The project will train in digital skills for the integration of omic data and image analysis, increasing the researcher's competitiveness and innovation. The group has experience in obtaining and analyzing omic data and collaborates with international leaders. Training stays will be conducted for both data integration and image analysis through the integration of Arivis with artificial intelligence and high-performance computing. The IBV has the infrastructure and resources to support this learning. Additionally, the hired person will complete a total of 240 ECTs through stays, courses in multiomic integration, statistics, continuous training in digital skills, and training in ARIVIS software.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Implementation of advanced strategies for the management of IFIC's general computing infrastructure (GLUON)

#### Technological and scientific fields: HPC, parallel programming, system administrator.

**Location:** Paterna, Valencia, Comunitat Valenciana. Institute of Corpuscular Physics (IFIC) <a href="https://webific.ific.uv.es/web/en">https://webific.ific.uv.es/web/en</a>

Research Group/PI: SOM / Alberto Ramos (<u>http://som.ific.uv.es/</u>)

#### **PROJECT SUMMARY**

This year GLUON, an IFIC HPC system is starting its operations. It will provide access to substantial computing resources to more than 300 researchers. This project aims at implementing and mantaining the system, and helping the researchers to exploit the full potential of the HPC cluster.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in Physics or computer science.
- She/He must be comfortable speaking and working in English.
- Previous experience working I HPC systems and in parallel programming.

#### Merits to be considered:

- Previous experience in administration of HPC systems based on the UNIX OS would be valued.
- Familiarity in shell scripting, managing batch systems and experience in parallel programming (OpenMP/MPI) would also be highly considered for the position

#### WHAT IS OFFERED

The candidate would be in charge of a cutting edge HPC system. He will assist researchers with the writing and optimization of the software to be run in the cluster. Possibility of performing research and receive training on administration of HPC clusters and writing high performant scientific software. Training includes courses in other institutions.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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## Project: An integrated computational analysis to decipher cancer vulnerabilities to fight therapy resistance and metastatic outgrowth

Technological and scientific fields: - Big Data Processing and Information Technology. -Computational Biology. - Data analysis and integration

Location: Alicante, Valencian Community, Spain. Institute for Neurosciences (IN). https://in.umh-csic.es/en/

**Research Group/PI:** Cell plasticity in health and disease/ M. Angela Nieto

#### **PROJECT SUMMARY**

Understanding tumour progression towards metastasis is a major challenge in biomedical research, as it is the cause of more than 90% of cancer deaths. During embryonic development, cells use a cellular plasticity mechanism, the epithelial-mesenchymal transition (EMT), to migrate and move to different destinations to form tissues and organs. This process is hijacked by cancer cell to form metastases. Recently, we have found that in addition, cancer cells that activate EMT can alternatively take a different pathway similar to that to repair tissue in adults after injury, which functions as an anti-tumour cell defence mechanism (Youssef et al., Nature Cancer, in press; Youssef and Nieto; Nature Rev Mol Cell Biol, 2024). In this new project, we aim to better understand these two EMT processes through a computational analysis that integrates singlecell multi-omics data generated in the lab (genomics, transcriptomics, chromatin conformation and spatial transcriptomics) from tumours in animal models, and their validation in patient datasets and biopsies. We will also analyse the data to predict interactions of cancer cells with the tumour microenvironment, and validate their impact on progression, metastatic burden and resistance to therapies. The aim is to understand tumour progression in a holistic way and to make progress in fighting metastasis and the emergence of resistance to therapies (chemo & immunotherapy or their combination) to try to offer better therapeutic approaches to patients.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- Bioinformatician with a PhD related to Biomedical Sciences ٠
- Extensive background in analysis of big data, including single-cell transcriptomics ٠
- Proficient in English

#### Merits to be considered:

Experience in analysis of different biological processes, including embryonic development and cancer

#### WHAT IS OFFERED

We offer a postdoc contract to work at one the few Severo Ochoa Centres of Excellence in Spain, recognized as leader in Neuroscience research and cancer in an internationally renowned group of around 20 people from different nationalities. This multidisciplinary project, supported by intense wet experimental work, is co-led by Dr. Nuria López-Bigas, a world expert on cancer genome evolution, and the contract includes the possibility of doing several stays at different institutions in Spain and abroad.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary (41.000  $\in$  - 52.000  $\in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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# Project: Lost in translation? Tracing the communication interface between science, society and the media: a computational social science approach

**Technological and scientific fields:** Science of Science, Economics of Science, Communication, Research Evaluation

**Location:** Valencia, Valencian Region, INGENIO (CSIC-UPV): Institute of Innovation and Knowledge Management. <u>https://www.ingenio.upv.es/en</u>

Research Group/PI: Adrián A. Díaz-Faes (PI), Pablo D'Este (co-PI)

#### PROJECT SUMMARY

From a science policy perspective, there is a growing determination to boost interaction between science and society, with the underlying rationale that research results must produce significant societal impacts. In partial respond to this demand, science is shifting from the exclusive domain of experts to recognising citizens as active contributors. This dynamic is evident in science communication, transformed by widespread internet access, digitalisation, open data, social media, and citizen science platforms. Although these changes have democratised content creation and dissemination, they directly impact the accuracy and effectiveness of science communication and question how general audiences can recognise, understand and use reliable scientific information. This project brings together science of science, communication, and computational social science frameworks with the aim to advance beyond the current state of the art on: (i) how scientific evidence is used, communicated and discussed in news and social media and; (ii) develop new methods and indicators to monitor accuracy and effectiveness in science communication, by applying natural language processing (NLP) techniques and advanced statistical methods (network analysis, science mapping, and econometrics).

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

- PhD in quantitative science studies, economics, data science, information technology, sociology or related fields
- Demostrated progamming skills in SQL, Python, and/or R
- Experience with bibliometric data and data visualisation
- Profficiency in both written and spoken English

#### Merits to be considered:

- Familiarity with NLP techniques and algorithms used in machine learning will be given strong consideration
- Expertise on multivariate analysis and econometrics
- Interdisciplinary research profiles are highly encouraged
- Good command of written and spoken Spanish
- Applications should include: cover letter explaining your interest (1 page), CV (3 pages) and description of your ongoing research and broader research agenda (1 page)

#### WHAT IS OFFERED

- Four-year contract with a competitive salary and dedicated funds for training
- An interdisciplinary and vibrant research environment with extensive networking opportunities
- A tailored training programme to strengthen your data science competences (240 ECTS)
- Opportunities to carry out visiting periods at leading international research institutes
- Develop your own research agenda within the scope of the project

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

#### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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Project: Development of innovative tools to identify determinants of complex phenotypes in infectious diseases: towards precision epidemiology and

personalized medicine

**Technological and scientific fields:** Artificial Intelligence. Computational Biology, Data Analysis and Integration, Systems Biology. Precision and Personalized Medicine. Large-Scale Demographic Analysis.

**Location:** València, Comunitat Valenciana, Instituto de Biomedicina de Valencia IBV, <u>https://www.ibv.csic.es</u>

**Research Group/PI:** Unidad de Genómica de la Tuberculosis, Iñaki Comas, <u>http://tgu.ibv.csic.es</u>

#### **PROJECT SUMMARY**

The project will enable the development of artificial intelligence approaches in the field of infectious diseases. The project offers a unique combination of large-scale genomic and phylogenetic analysis applications with artificial intelligence methodology to identify, for the first time, mutations related to treatment and transmission. Applied to Tuberculosis, the project will have high translational potential. Additionally, it involves collaboration with Maha Farhat, Associate Professor of Biomedical Informatics at Harvard Medical School. The training program (240 ECTS) includes a wide range of activities: a master's degree in AI, stays at Harvard and UPV, supervision of master's theses and doctoral dissertations. Leadership training will be emphasized.

#### **PROFESSIONAL PROFILE**

#### Minimum requirements:

Mandatory qualification: Ph.D. in Biomedicine, Biotechnology, or a similar field. Other academic merits: Master's degree in Biomedicine, Biotechnology, or a similar field. Master's degree in Biostatistics, Artificial Intelligence, Big Data, or a similar field. Specialized courses in Artificial Intelligence, Genomics, Phylogenetics, or similar fields. Certificate of English proficiency.

#### Merits to be considered:

Awards (Ph.D., conferences, etc.), knowledge or prior work in infectious diseases (biology, epidemiology, diagnostics), proficiency in genomic, transcriptomic, and phylogenomic techniques, proficiency in programming languages (Bash, Python, C++, etc.). Laboratory work in omics techniques.

#### WHAT IS OFFERED

The project will enable the development of artificial intelligence approaches in the field of infectious diseases. The project offers a unique combination of large-scale genomic and phylogenetic analysis applications with artificial intelligence methodology to identify, for the first time, mutations related to treatment and transmission. Applied to Tuberculosis, the project will have high translational potential. Additionally, it involves collaboration with Maha Farhat, Associate Professor of Biomedical Informatics at Harvard Medical School. The training program (240 ECTS) includes a wide range of activities: a master's degree in AI, stays at Harvard and UPV, supervision of master's theses and doctoral dissertations. Leadership training will be emphasized.

#### Contract conditions:

Indefinite contract for a Postdoctoral Researcher associated to the Momentum Project of 4 years' duration according to Spanish science law. Gross annual salary ( $41.000 \in -52.000 \in$ ).

### Start of contract: before 31 December 2024

#### PRINCIPAL INVESTIGATOR CONTACT

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## **MOMENTUM PROGRAMME:** DEVELOP YOUR DIGITAL TALENT



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