

# Position Offered: UNIVERSITY GRADUATE

## 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](http://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](http://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

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