

Position Offered: POSTDOCTORAL RESEARCHER

Project: *High-performance simulations to improve quantum and classical computations*

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 (<https://quinfog.hbar.es>)

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 € - 52.000 €).

Start of contract: before 31 December 2024

PRINCIPAL INVESTIGATOR CONTACT

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