The Barcelona Supercomputing Center - Centro Nacional de Supercomputación (BSC-CNS) is the leading supercomputing center in Spain. It houses MareNostrum, one of the most powerful supercomputers in Europe, and is a hosting member of the PRACE European distributed supercomputing infrastructure. The mission of BSC is to research, develop and manage information technologies in order to facilitate scientific progress. BSC combines HPC service provision and R&D into both computer and computational science (life, earth and engineering sciences) under one roof, and currently has over 500 staff from 44 countries.

Look at the BSC experience:

**BSC-CNS YouTube Channel**

**BSC-CNS Corporate Video**

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**Context and Mission**

The Quantic group is a BSC initiative to study Quantum annealers. These superconducting devices encode problems in their internal quantum interactions, and are a promising candidate for an operating quantum computer in the near future.

Completing the experimental construction of a quantum Annealer at BSC, a lot of key aspects of these devices have to be studied. These range from quantum algorithms available in such scenarios, to the design and study of the theoretical properties of superconducting circuits.
The final goal of this project is the application of this new computing power to real world problems. This will require a refinement of current algorithms to the particular properties of the quantum device, and an interaction between the quantum device and a classical control system. One of the approaches will involve using modern machine learning techniques (and in particular deep learning) to optimize both the design and the operation of a quantum device.

**Key Duties**

- Study and implementation of quantum algorithms on a real superconducting device
- Analysis of theoretical properties of the quantum annealing process
- Search of industrial applications of quantum algorithms
- Requirements for an interface between classical and quantum algorithms
- Control requirements of a superconducting circuit
- Develop and implement deep reinforced learning algorithms to control a quantum algorithm operating on a real device.

Aside from working with the Quantic group, the candidate will work closely with researchers from the data analytics and visualization group in the machine learning aspects of the project.

**Requirements**

- **Education**
  - PhD in Physics

- **Essential Knowledge and Professional Experience**
  - Knowledge of state of the art quantum algorithms
  - Expertise on quantum information processing techniques
  - Basic understanding of quantum computation based on superconducting circuits
  - Experience with general machine learning techniques
  - Experience with deep learning and other neural network architectures

- **Additional Knowledge and Professional Experience**
  - High degree of programming skills
  - Experience with Python programming Language
  - Experience with numerical optimization techniques
  - Fluency in spoken and written English, while fluency in other European languages will be also valued

**Conditions**

- The position will be located at BSC within the Computer Applications to Science and Engineering Department
• We offer a full-time contract, a good working environment, a highly stimulating environment with state-of-the-art infrastructure, flexible hours, extensive training plan, tickets restaurant, private health insurance, fully support to the relocation procedures
• Salary: we offer a competitive salary commensurate with the qualifications and experience of the candidate and according to the cost of living in Barcelona
• Duration of the contract: 1 year

Applications Procedure

All applications must include:

• A full CV including contact details

Diversity and Equal Opportunity Employment

BSC-CNS is an equal opportunity employer committed to diversity and inclusion. We are pleased to consider all qualified applicants for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, disability or any other basis protected by applicable state or local law.

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