

Position Offered: UNIVERSITY GRADUATE

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.us-csic.es>)

Research Group/PI: Multifunctional Optical Materials, Prof. Hernán Míguez (<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

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