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Institut d'Electronique, de Microélectronique et de Nanotechnologie
UMR CNRS 8520

POSTDOC on Mott Insulators at the Nanoscale for Neuromorphic Applications

Job title: Postdoctoral Research Associate
Title: Mott Insulators at the Nanoscale for Neuromorphic Applications (MINNA)
Location: Institut d'Electronique, de Microélectronique et de Nanotechnologies (IEMN-CNRS), Lille, France
Duration: 18 months
Closing date: Position should start between Nov 2020 and May 2021. The applications are evaluated on the fly. Seeking will continue until the position is filled.
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Gross living allowance: Around 2100 euros/month after taxes (to be confirmed)

MINNA Project description

Neuromorphic systems hold great promise for reducing power consumption and for creating new applications beyond the reach of conventional computers. To date, each artificial neuron is composed of thousands of transistors. The use of Mott insulators, a class of materials with fascinating non-linear properties, could significantly reduce the complexity of the circuit, reducing the number of components per neuron to one.

However, this property has only been reported in millimetre-sized single crystals. This project aims at performing a multi-scale analysis using a high-end equipment present at IEMN, a multi-probe scanning tunneling microscope coupled to a time-resolved optical system, to determine the fundamental properties required for the development of a neuron at the nanoscale.

The fellowship is founded by the ISITE ULNE Fundation.

Candidate profile :

A PhD degree in Physics or a related discipline and a background in Solid State Physics are required.
We are seeking for a talented, enthusiastic F/M candidate with excellent analytical and communication skills, having proven experience in one or more of the following items:
- Near field microscopy and spectroscopy
- Time resolved optical experiments
- Strongly correlated electronic systems
- Implementation of neuromorphic devices

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Context

The team Physics of Nanostructure Devices works on the electrical and optical properties of promising nanomaterials, with both fundamental and device-oriented approaches. We currently have 4 permanent researchers, 1 research engineer and 3 PhD students, working in strong connection with all the members of the Physics group.

IEMN is a research institute created by the National Centre for Scientific Research (CNRS), two universities and an engineer school of France northern region. IEMN is part of the RENATECH network and as such, the equipment for design, fabrication and characterization of micro/nano devices are at the best european level. The institute has a total staff of about 500 persons including 150 permanent researchers, 100 engineers and administrative agents, about 150 PhD students. The lab is very open to international collaborations; more than 100 foreigner scientists coming from 20 different countries are currently working at IEMN. The IEMN scientific activity covers a large domain going from the physics of materials and nanostructures to microwaves, telecommunications and acoustics instrumentation.

Website: https://www.iemn.fr/la-recherche/les-groupes/physique/nanostructures-quantum

The City of Lille

Lille offers an attractive living and cultural environment, and sits at the crossroad of three capital cities of Europe (Paris, London and Brussels being reachable within an hour train ride).