

Permanent full-time research scientist in quantum electrical metrology

REF : ML/IREHQ/DMSI

Open position on permanent contract

Location: Trappes, France

Keywords: Condensed matter physics, Mesoscopic physics, Quantum electronic transport, Quantum Hall effect, Fundamental metrology, International System of units (SI), High-precision measurements, Quantum electrical standards and sensors, Instrumentation, Quantum technologies, Nanotechnology

LNE:

Founded in 1901, LNE (Laboratoire national de métrologie et d'essais), appointed by the French Ministry of Economy, is the French National Metrology Institute (NMI), and an internationally recognized testing laboratory. Relying on an excellent scientific and technical skill set, LNE's research efforts have formed the basis of multiple applications: calibration, testing, certification, etc. LNE performs reliable measurements that serve innovation, economy competitiveness and a safer society.

Context:

In the Fundamental Electrical Metrology Department of LNE, the work carried out in quantum electrical metrology concerns: i) the engineering of quantum electrical standards based on solid-state quantum phenomena for the realization of the electrical units of the System international (SI) with improved performance, ii) the development of the associated instrumentation for their implementation at state of the art level, iii) the provision of high-level calibration services to internal users for the traceability to the quantum Hall resistance standard and Josephson voltage standards at the highest accuracy, iv) research on quantum materials and phenomena, new instruments, new methods to answer needs for reliable measurement in the SI and beyond, in particular in emerging domains.

To carry out its work successfully, the team can rely on a long-standing experience in the research mentioned above: world leader for the quantum Hall resistance standard (notably in graphene), expert for the Josephson voltage standard, and pioneer of the development of quantum current standards based on single-electron devices and other approach by combining the above mentioned quantum electrical standards.

The recent revision of the SI has put the quantum electrical metrology at the centre of the game: the quantum electrical standards based on the Planck constant and the elementary charge can now realize the main electrical units with unprecedented accuracy.

Moreover, the rise of quantum technologies, with the promise of breakthroughs in many fields, like quantum computing, quantum communications, quantum sensing, also open flourishing perspectives in metrology. Opportunities are emerging for measurement tools with unprecedented sensitivity or accuracy. Besides, the development of these technologies, together with the industrialization perspective create metrology needs. LNE is involved in several initiatives in the field and notably in the French National Quantum Strategy.

Missions:

As a research scientist, you will participate in the current work on the quantum Hall effect particularly in graphene and in other promising (Dirac) materials for applications in quantum metrology. You will

take part to the necessary experimental work, including high-precision measurements as well as the development of related setups and instrumentation. You will analyse and interpret the data, promote the results in scientific communications (publications, conferences, etc.) and possibly through more specific actions (new calibration services, standardization, patents, prototypes, etc.). You will also be in charge of the national traceability to the primary quantum Hall resistance standard.

In addition, you will have the opportunity to contribute to or lead new research projects in the field of quantum technologies, as part of the LNE strategy.

You must be able to take part into national or European research and innovation programmes and must have the capacity to develop collaborations with academic and industrial partners, from your own network and/or that of the team.

Profile:

You have a PhD in physics with a solid academic background in condensed matter physics / quantum physics, a strong interest in experimental science, measurement, instrumentation as well as a strong interest in technological and applied research. You are used to implement demanding experiments in cryogenic environments with nanodevices. A few-year professional experience in academic research, R&D in industry or metrology, after your PhD thesis, will be an asset. Beyond your technical expertise and knowledge, you are also recognized for your excellent communication, your organization skills and your added value in team efforts. Occasional travel to be planned for all scientific exchanges necessary for the mission: France, Europe, International.

To apply:

Send your CV and motivation letter to recrut@lne.fr by recalling in the subject line of the email the reference of the offer (ML/IREHQ/DMSI).