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# FTC Post-doctoral Scientist

## Phononics, MEMS/NEMS, Quantum Acoustics

The FEMTO-ST Institute (Besançon, France) invites applications of post-doctoral researchers to work within the European Research Council funded project uNIQUE (NanophononIcs for QUantum Information ProcEssing). The project aims at elaborating an information processing platform at the crossing of phononics, nano-electromechanical systems and quantum acoustics. The overarching project objective is to develop a fully coherent mechanical playground that can be used either as an independent classical or quantum signal processing device or at the interface with either solid-state or photonic qubits.

### General Context of the Project

The field of Phononics, aiming at the control and analysis of phonons over multiple scales, has recently emerged as a potential route towards coherent control of mechanical oscillations, for applications ranging from information processing to light-matter interactions. The scope of Phononics is now expanding to quantum technologies, with the recent demonstration of the relevance of nanomechanical and acoustic wave devices for quantum information processing. Advanced control of mechanical vibrations at the micro- and nano-scale hence opens even richer prospects, both for fundamental investigations and in view of implementing quantum acoustical devices that promise a high-level of integrability into complex electromechanical platforms.

In the proposed project, we will develop linear and nonlinear radio-frequency phononic devices operating at cryogenic temperatures (below 50 mK). We will pursue different strategies for the advanced control of mechanical vibrations and potentially of phonon states, based on the interaction of nanomechanical resonators with travelling acoustic waves, including notably surface acoustic waves (SAW), Lamb waves and bulk acoustic waves (BAW) on highly-coupled piezoelectric substrates.

### Job description

The successful candidate will be involved in the fabrication and characterization of linear and nonlinear phononic and nanomechanical devices, both at room temperature and in the tens of mK range. He/She will contribute to the development of nanofabrication processes using the high-end micro & nanotechnological facilities available at FEMTO-ST and will contribute to microwave and optical measurements with near quantum-limited noise performance in cryogenic conditions, in conjunction with the other team members. The candidate will also be expected to participate in the supervision of the scientific activities of younger graduate students.

### Requested skills and background

Candidates must hold a PhD in Physics, Applied Physics, Engineering or closely-related discipline. A strong background in general physics (e.g. solid-state physics, optics, acoustics) is required.

The applicant should show a clear enthusiasm for experimental physics and for the development of state-of-the-art nanofabrication and characterization methods. An interest or experience in at least two of the following areas is expected: nanomechanical or optomechanical devices, nanofabrication, radio-frequency acoustics, quantum acoustics, microwave engineering, cryogenics.

The candidates are expected to show initiative, teamwork and excellent writing and communication skills in an international environment.

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## **Selection process**

Applicants shall submit a detailed CV and a statement of purpose relevant for the post-doctoral project through the CNRS job portal: <https://bit.ly/3H3LX50>.

For additional information, please kindly contact Sarah Benchabane ([sarah.benchabane@femto-st.fr](mailto:sarah.benchabane@femto-st.fr)).

This position will be assigned to a Restricted Regime Area (ZRR), as defined in Decree No. 2011-1425 on the Protection of the Scientific and Technical Potential of the Nation (PPST). Authorization for access to an area is issued by the head of the institution, after favorable ministerial opinion, as defined in the order of 03 July 2012, relating to the PPST. An unfavorable ministerial opinion for a position posted in a ZRR would result in the cancellation of the recruitment.

## **Host Institution**

CNRS-FEMTO-ST

15B avenue des Montboucons

25 030 Besançon

France

FEMTO-ST ([www.femto-st.fr](http://www.femto-st.fr)) is a large scale public research laboratory which is active in various areas of engineering research: mechanics, optics, time & frequency metrology, micro and nano technologies, energy, control and computer sciences. The institute is under the authority of the Université de Bourgogne Franche-Comté (UFC) and the Centre National de la Recherche Scientifique (CNRS). Mostly located in Besançon in France, FEMTO-ST is one of the largest French laboratories in the fields of engineering sciences (about 700 members including 230 researchers, 95 engineering and technical staff members and more than 220 PhD students). The Institute hosts high-level technological facilities in the MIMENTO Technology Center, a nation-wide recognized nanofabrication technology cluster part of the French Basic Technological Research (BTR) network. The successful applicant will join the MOSAIC (Micro-Nanotechnologies for Physical Sciences) group of the Micro Nano-Sciences & Systems department. The group has a well-established expertise in the fields of phononics, microsystems, instrumentation and nanoscience.

Websites: [www.femto-st.fr](http://www.femto-st.fr) ; [teams.femto-st.fr/MOSAIC](http://teams.femto-st.fr/MOSAIC)

## **Funding Information**

Contract type: Fixed Term contract.

Expected starting date: From May, 1<sup>st</sup> 2022.

Contract duration: 12 months, renewable.

Salary: Gross salary from 2.663 to 3.783 € depending on experience.

Funding Source: European Research Council.