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# Postdoc Position Available

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## Superconductor-to-Insulator Transitions in a-Nb<sub>x</sub>Si<sub>1-x</sub> thin films

### *Subject :*

The physics of disordered materials has been a long standing object of study but important aspects of this problem are still not understood to date. This field is indeed complex : in those systems, disorder has the double effect of i. modifying and enhancing quantum interferences and ii. of reinforcing Coulomb interactions. The possibility of superconducting fluctuations can also considerably enrich the study of these materials. In particular, the dimension 2 is the inferior critical dimension for the existence of both the superconducting and the metallic states. It is therefore particularly interesting to study disordered systems in the vicinity of this dimension.

The present postdoc position is part of a on-going ANR project, aiming at studying the possible two dimensional ground states and the Quantum Phase Transitions (QPT) between them. This issue will be tackled, starting from a 2D homogeneously disordered superconductor, for which an increase in disorder, the application of an external magnetic or electric field can destroy the superconducting ground state. We will address three issues : 1. the phase diagram of such systems and the nature of the phases ; 2. the nature of the QPT between the different ground states ; 3. the mechanisms driving the transitions.

The considered material - amorphous Nb<sub>x</sub>Si<sub>1-x</sub> films (typically 8% < x < 19%) - is known to exhibit a Superconductor-to-Insulator Transition<sup>1</sup> and will be investigated through original and complementary experimental techniques : STM, AC transport measurements, electric-field effect and DC transport measurement at very low temperature. The candidate will more specifically deal with AC transport measurements, but will take part in all aspects of the project.

### *Profile :*

The candidate will have to be an experimental physicist with a good knowledge of solid state physics, preferably with a background in superconductivity and/or disordered materials. Ideally, he/she has experience in low temperature measurements (cryogenics, electronics, data acquisition and data analysis) as well as in thin films fabrication (ultra-high vacuum co-deposition, lithography, RIE, thin films characterization, ...). A knowledge in high-frequency measurements would be appreciated. The position is a joint appointment between the CSNSM and the LPS in Orsay and it will be supported by a renewable 1 year contract (up to 2 years) of the French Agency of Science (ANR).

The candidate will first participate to the fabrication of NbSi thin films, both in the dedicated CSNSM clean room and in the Technology Center within the Orsay Campus. He/she will be in charge of DC transport measurements at very low temperature (dilution refrigerator) under a magnetic field and will participate to microwave measurements, at the LPS (Julien Gabelli and Marco Aprili). He/she will participate to data analysis and along with Claire Marrache-Kikuchi, he/she will be the referent in the ANR collaboration.

For further information, please contact :

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<sup>1</sup>Marrache-Kikuchi, *Phys. Rev. B*, **78**, 144520, 2008 and references therein.