Postdoc Opportunity**:**

Synthesis and characterization of new topological superconductors

Context:

Lanef is offering a post-doc position in Grenoble-France, in the field of Quantum materials, associated to the Chair of Excellence of Valentin Taufour (UC Davis, USA). The project aims at the discovery and the exploration of topological superconductors. Indeed, when superconductivity is combined with topology in a material, unconventional properties often arise, providing new challenges for our current understanding of materials. Artificially engineered nanostructures with conventional superconductors and topological materials have been proposed. However, intrinsic topological superconductivity can also exist in bulk unconventional superconductors such as p-wave or d-wave superconductors. Presently, promising candidates among known superconductors are rare and require still efforts on the crystal growth of high-quality samples. Among these, uranium-based systems like UPt_3, URu_2Si_2, UCoGe, UTe_2 are prominent cases where topological superconductivity is most likely to occur, and the Grenoble teams of LANEF have a strong record in the discovery and exploration of their superconducting properties.
A new approach to discover promising materials will also be developed: we will use symmetry indicators to identify unconventional superconductors with topological band-structure similar to $LaNiGa_2$. The project will be carried out at the Pheliqs laboratory and the Néel Institute, both hosting complementary crystal growth and low temperature physics groups.

Objectives and means available:

The project aims to establish new kinds of topological quantum materials through crystal synthesis of candidate materials, and to explore their physical properties.
This project will involve extensive work in synthesizing intermetallic crystals using flux and Czochralski methods. Broader synthetic exploration will be possible with the available growth techniques in our labs (chemical vapor transport, optical floating zone, etc). The samples will be characterized by standard techniques. X-ray and Laue diffraction will be performed for crystal structures and orientation. Refined annealing and purification techniques such as solid-state electro-transport will be developed for progress on the quality of uranium-based systems. Physical characterization will be carried out by measuring transport, heat capacity and magnetic properties.
Opportunities will be given to participate in the advanced studies performed by physicists using innovative techniques such as scanning SQUID microscopy, Raman spectroscopy thermodynamic and thermal/electrical transport measurements under extreme conditions (very low temperature, high pressure and high field). Neutron scattering and synchrotron experiments can be performed at large scale facilities situated in Grenoble (ILL and ESRF), as well as very high field experiments at the LNCMI.

Required profile:
The candidate must have a PhD degree with experience in solid-state synthesis and characterizations. A track record of working in collaboration with multiple researchers is also desirable.

Foreseen start for the grant: ASAP
Amount: 2300 € monthly net salary
Duration: 24 months

Application:
CV, motivation letter and references (pdf format) should be uploaded through the following link: upload
If required, further information can be asked at one of the following contacts:

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