PhD in Resonant-cavity spectroscopy of rare-earth magnets.

The Laboratory for Quantum Magnetism (LQM) is looking for a motivated candidate who wishes to perform his/her Ph.D. in a stimulating and dynamic atmosphere at the forefront of scientific research in magnetism and solid-state physics in general. LQM is part of the Swiss Federal Institute of Technology in Lausanne (EPFL), a world-renowned science and education center, offering prospective students an ideal environment to start their scientific carrier as well as an excellent connection with industry.

Project Description:

Many rich and complex physical phenomena in the real world are actually harbored in simple models. One such example is the Ising model. Despite the many milestones and intense research in the field since its debut in the 1920s, there have been by far no analytical solutions found to the three-dimensional case. A full understanding of this model and its various derivatives are instrumental to the advancement of condensed matter physics, which motivates many concurrent types of research around the globe. One experimental approach to the problem is by studying a real-life manifestation of the model. In the present project, by utilizing microwave spectroscopy methods at millikelvin temperatures, we strive to gain insights on the quantum version of the three-dimensional Ising model, or transverse field Ising model, embodied by the rare earth magnet LiHoF4. The goal is to not only probe directly the model’s behavior in regions of interest on the phase diagram but as well to ultimately drive and control its quantum states, paving ways for applications in areas such as quantum simulations and quantum computing.

Main tasks and responsibilities:

- Continuation of existing experimental studies by microwave experiments in GHz range on a dilution fridge.
- Refining and redesigning experimental methods when necessary
- Data analysis and (analytical + numerical) model developing

The successful candidate is expected to hold a master's degree in physics or equivalent. In addition, the following qualifications are desired:

- Cryogenic and vacuum system control, maintenance, and troubleshooting.
- Basic electronic shop skills (soldering, circuit analysis, etc.)
- Programming fundamentals (MATLAB, Python, Labview, COMSOL, etc.)
- Machine shop skills (CAD design, manual lathe, milling machine, etc.) (Optional)
The selected PhD student will need to enroll in the Physics program of the EPFL doctoral school. After one year of successful probation, the initial contract will be extended up to a total of four years. Doctoral school information and employment conditions at EPFL are described at:

- [https://www.epfl.ch/education/phd/programs/edpy-physics](https://www.epfl.ch/education/phd/programs/edpy-physics)
- [https://www.epfl.ch/education/phd/doctoral-studies-structure/doctoral-students-salary](https://www.epfl.ch/education/phd/doctoral-studies-structure/doctoral-students-salary)
- [https://www.epfl.ch/about/working/working-at-epfl/employment-conditions](https://www.epfl.ch/about/working/working-at-epfl/employment-conditions)

**Starting date:** As soon as possible.

**For inquiries and applications,** please contact us at [lqm.jobs@epfl.ch](mailto:lqm.jobs@epfl.ch). Applications should include CV, grade transcript and names of 3 persons who can be contacted for reference letters.