



PhD on the microscopic origin of the Thermal Hall Effect in Quantum Materials

At the Division for Synchrotron Radiation Research we perform fundamental research into materials using X-ray and neutron scattering techniques. The division is part of the Department of Physics within the Faculty of Science at Lund University (LU), Sweden, one of world's top universities and founded in 1666.

As the world's flagship centre for neutron science, the Institut Laue-Langevin (ILL), France, provides scientists with a state-of-the-art suite of neutron scattering instruments for research in a variety of fields and in particular for fundamental material science and condensed matter. Neutron spectroscopy probes the dynamics of materials which hold the key for understanding quantum phenomena.

An anomalously large thermal Hall effect has been reported in many materials, but the microscopic origin of this effect remains unknown. This project will carefully study the effect of large magnetic fields on the excitations and high-resolution measurements of the crystal structure in a selection of these materials (initially $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ and UBe_{13}). This will require the development of a specialist sample stick for use in high field magnets that mimics the setup of a thermal Hall measurement but on a larger scale to test for lattice effects. With this information, we will be able to test theoretical explanations, and provide clarity on what types of mechanism are permissible. Our overall aim is to explain the origin of the anomalous thermal Hall effect in quantum materials.

We offer a challenging and exciting project in the field of experimental quantum magnetism under the supervision of Prof. Elizabeth Blackburn and instrument scientists PD Dr. Arno Hiess (ILL) and Dr. Ursula B. Hansen (ILL). The project is based at the ILL for the first 3 years followed by 1 year at LU. The selected PhD student will benefit from the full integration in these dynamic international research communities and take part at the graduate schools available at LU and ILL.

We are looking for a highly motivated candidate with a master in physics or related fields. The successful candidate has a strong command of solid state physics and quantum mechanics, good communication skills in English (spoken and written) and a willingness to learn and engage in challenging research. Programming skill in python or matlab as well as prior experience with neutron or X-ray scattering is a plus but not mandatory.

The successful applicant will be registered as a doctoral student at Faculty of Science of Lund University, Sweden. The admission requirements for registration are that the applicant has been awarded a second-cycle qualification, or has satisfied the requirements for courses comprising at least 240 ECTS of which at least 60 ECTS were awarded in the second cycle, or has acquired substantially equivalent knowledge in some other way in Sweden or abroad. The applicant should also have completed an independent project (for example a research project as a part of a Masters course) in a relevant subject that consists of at least 30 ECTS of work. This specific requirement may also be obtained through other equivalent training, which will be considered on a case-by-case basis – please contact elizabeth.blackburn@sljus.lu.se if you wish for further information.

Applications should include grade transcript, CV, motivation letter and three contact persons for references. Applications should be sent to Prof. Elizabeth Blackburn (elizabeth.blackburn@sljus.lu.se) and PD Dr. Arno Hiess (hiess@ill.eu). You are also very welcome to contact us for more information. We encourage people of all backgrounds and genders to apply.

Deadline: The position remains open until filled.