

2017 Helmholtz – OCPC – Programme for the involvement of postdocs in bilateral collaboration projects

PART A

Title of the project: Neutron scattering on topological quantum materials

Helmholtz Centre and institute: Forschungszentrum Jülich,
Centre for Neutron Science (JCNS) at the Heinz Maier-Leibnitz Zentrum (MLZ), Garching

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Description of the project:

Topological quantum materials have become a focus of intense research owing to the remarkable possibilities to realize emergent quasiparticles such as Skyrmions, magnetic monopoles, Majorana and Weyl fermions. Realization and eventual manipulation of those exotic quasiparticles in condensed matter may lead to potential applications for future information technology such as decoherence-free quantum computing architecture. We are seeking highly motivated postdoctoral candidates to carry out neutron scattering studies of novel topological quantum materials with particular focus on the quantum spin liquid (QSL) states, in which a defining feature connected to their topological nature is excitations that carry fractional quantum numbers.

The central focus of this project is thus to search for possible experimental signatures of fractionalization in various QSL candidate materials, including frustrated rare-earth pyrochlore oxides, honeycomb-lattice based Kitaev compounds as well as triangular-lattice based frustrated magnets, mainly via inelastic and polarized neutron scattering techniques. The objective is to reveal the microscopic governing principle for the emergence of these exotic quantum states.

As one of the leading neutron science centers in the world, the Jülich Centre for Neutron Science JCNS operates many advanced neutron scattering instruments at some of the most powerful neutron sources in the world such as FRM II (Garching, Germany), ILL (Grenoble, France) and the SNS (Oak Ridge, USA), which can be ideally used for this project. Candidates are also expected to be actively involved in the synthesis and characterization of topological quantum materials using our in-house equipment. This postdoctoral position will be based at the JCNS institute at the Heinz Maier-Leibnitz Zentrum (MLZ) at Garching in the Munich area. This project is an integral part of the research program at the JCNS institute headed by Prof. Thomas Brueckel.

Description of existing or sought Chinese collaboration partner institute:

We are looking for collaboration partners in China who are strongly engaged in condensed matter research and materials physics from top-ranking universities and institutes from the Chinese Academy of Science.

Required qualification of the post-doc:

- PhD in experimental condensed matter physics
- Experience with experimental methods and theory in magnetism and/or strongly correlated electrons and/or superconductivity
- Additional skills in neutron and/or x-ray scattering, numerical methods and crystal growth would be an advantage

PART B

Documents to be provided by the post-doc:

- Detailed description of the interest in joining the project (motivation letter)
- Curriculum vitae, copies of degrees
- List of publications
- 2 letters of recommendation

PART C

Additional requirements to be fulfilled by the post-doc:

- Max. age of 35 years
- PhD degree not older than 5 years
- Very good command of the English language
- Strong ability to work independently and in a team