

Helmholtz Call for Chinese Applicants Interested in Running for CSC 2021 Fellowship

Helmholtz Centre: Forschungszentrum Jülich GmbH – www.fz-juelich.de

Department/Institute: Jülich Centre for Neutron Science (JCNS),
Quantum Materials and Collective Phenomena (JCNS-2/PGI-4)
http://www.fz-juelich.de/jcns/jcns-2/EN/Home/home_node.html

Supervising scientist: Priv.-Doz. Dr. Oleg Petravic

University for registration or for a future degree: RWTH Aachen

Research Field: Condensed Matter Physics, Materials Science, Solid State Chemistry

Position open for: **PhD Student** **Sandwich PhD Student**

Title of the research: Microscopic understanding and control of the magnetic anisotropy in iron oxide nanoparticles

More description of research topic:

The thesis project consists of two parts: (a) The first part aims at obtaining a detailed understanding and control of the magnetic anisotropy in magnetic nanoparticles. When scaling down the size of physical objects interesting effects arise, i.e. so-called finite-size effects. The understanding and control of these effects is crucial both from a fundamental point of view and for technological applications. In this project we will focus on the fundamental aspects of anisotropy, where a systematic study of the effect of the size of magnetic nanoparticles onto their anisotropy will be undertaken. Of particular interest will be the strain anisotropy [L.-M. Wang, O. Petravic, et al., *Nanoscale* 9, 12957 (2017)]. (b) The second part comprises the tuning of the magnetic anisotropy by ligands. The effect of exposing iron oxide nanoparticles to various ligand molecules [Prado et al., *Nature Comm.* 6:10139 (2015)] will be studied. For both parts state of the art experimental techniques will be employed, e.g. X-ray diffraction both lab based and Synchrotron based, small-angle neutron scattering, magnetometry and susceptometry.

Specific requirements:

- Completed study in physics, material science or chemistry
- Experience and passion for experimental lab work
- Solid experience with usual computer software for e.g. for analyzing and presenting data, writing scientific texts or presenting results, etc..
- Ideally but not necessarily prior experience in at least one of the following fields: nanoparticles, nanostructures, X-ray scattering, neutron scattering, nanomagnetism

Working Place: Forschungszentrum Jülich, Germany (near Cologne)

Earliest Start: September 2021

Language Requirement: Very good knowledge of English language, written and spoken. German language courses are organised in the context of our in-house training program and are free of charge.

Name and Address of the Supervisor: Priv.-Doz. Dr. Oleg Petravic, Forschungszentrum Jülich, Quantum Materials and Collective Phenomena, JCNS-2/PGI-4, 52425 Jülich, Germany, o.petravic@fz-juelich.de