

## Double Exchange Spin Dynamics within Valence Delocalised Molecular Magnets

PhD studentship jointly held between The University of Manchester (U.K.), The Centre de Recherche Paul Pascal, Bordeaux (Fr.) & Institut Laue-Langevin, Grenoble (Fr.)

### Overview

Applicants are invited to pursue a fully funded PhD studentship affiliated with the University of Manchester and hosted at international neutron research centre, Institut Laue-Langevin (ILL), France. The ILL is the world's flagship centre for neutron science, providing very high flux neutrons for research. The PhD project will apply inelastic neutron scattering to investigate new and unexplored types of magnetic exchange interactions present within molecules synthesized for their potential in molecular electronic applications. Inelastic neutron scattering is arguably the most powerful and detailed experimental technique for measuring the magnetic interactions present within magnetic molecules.

### Project Description

Molecular magnets are finite assembly of metal ions distributed within a crystalline lattice such that their magnetic properties persist on the molecular scale. Over the last decades such systems have represented ideal test beds to investigate the collective behaviour of unpaired electrons using inelastic neutron scattering. Published studies to date have been performed on molecules where the unpaired electrons are localised on the complex metal ion orbitals. Here, we propose to investigate a class of molecules where electrons exhibit mobility within the molecule resulting in a ferromagnetic interaction between electron spins, known as double exchange. The objective of this project is to directly measure double exchange dynamics for the first-time using neutron scattering for samples with varying degrees of electron delocalisation. The results will then be analysed to test theoretical models and to develop understanding how these molecules could be applied in molecular spintronic devices.

### Position Description

You will be affiliated within the Department of Chemistry at The University of Manchester, supervised by Dr. Michael L. Baker (University of Manchester) and co-supervised by Rodolphe Clérac (Centre de Recherche Paul Pascal, Bordeaux). In addition to university supervision, you will work with an ILL supervisor (Dr. Jacques Ollivier). The project will be carried out at the ILL where you will benefit from working at a large-scale facility in an international environment. You will obtain unrivalled hands-on experience leading to future employment opportunities in some of the world's leading research centres. The ILL is positioned the heart of the French Alps, with excellent opportunities for skiing and other outdoor activities, one hour from Lyon, and only three hours from Paris, the Côte d'Azur and Provence. The successful candidate will receive three years of funding with a gross salary of 2400 euros/month plus other benefits (see:<https://www.ill.eu/careers/all-our-vacancies/phd-recruitment/phd-work-at-the-ill/> for further details). Applications are welcomed from UK and EU candidates with a good degree in chemistry, physics or a related discipline. The project is due to start in September 2020.



Application enquires can be sent to Dr. Michael L. Baker ([michael.baker@manchester.ac.uk](mailto:michael.baker@manchester.ac.uk)) and Dr. Rodolphe Clérac ([clerac@crpp-bordeaux.cnrs.fr](mailto:clerac@crpp-bordeaux.cnrs.fr)).