# PhD studentship:
# lattice dynamics of coordination frameworks under pressure

A three-year PhD studentship in condensed matter physics, supervised by Dr Anthony Phillips (QMUL) and Dr Helen Walker (ISIS), is available to start in October 2019. The studentship will be jointly funded by ISIS Neutron and Muon Source and Queen Mary, University of London, and covers fees at the Home/EU rate; stipend at the UKRI rate, including London allowance; and an allowance for research training expenses including the cost of travelling to and from the Rutherford Laboratory in Didcot, Oxfordshire.

The aim of the project is to measure the phonon dispersion of coordination frameworks under applied pressure. Materials in this family have many potential applications, including in environmentally friendly solid-state cooling and energy harvesting; in particular, they are promising materials for *barocaloric refrigeration*, which involves cycling them between high and low pressures in order to pump heat. In order to develop materials that are useful for such technologies, we need to understand at the atomic level the mechanism for their behaviour under pressure. However, experiments under applied pressure are technically challenging. In particular, neutron spectroscopy, which measures the tiny changes in energy of a neutron as it interacts with a sample, relies on being able to measure very weak signals: it is vital that the pressure cell itself does not mask these.

In this project, you will prepare samples of barocaloric coordination frameworks, measuring their neutron spectra under pressure for the first time and hence helping to understand and improve their properties. In order to perform these experiments, you will help to design 3D printed collimators to amplify the signal on specific spectrometers, commission a new pressure cell, and optimise its working conditions. This will involve substantial periods working at both QMUL and ISIS, with a total of one year of the project spent at ISIS. There may also be the opportunity to perform experiments at Diamond Light Source and the Institut Laue-Langevin (France).

In addition to specific training in the experimental techniques necessary for the project, you will benefit from general training both locally and through the South-East Physics Network's GRADnet programme, the largest regional programme for Physics PhD training in England.

This is an ideal project for a student interested in the physics and chemistry of materials in the broadest sense; we encourage applications from those with any relevant background, including physics, chemistry, materials science, engineering, and applied mathematics.

QMUL and ISIS are committed to building a diverse, equitable, and inclusive research community, and welcome applications regardless of age, disability, gender, race, religion or belief, sex, sexual orientation, marital status, or pregnancy and maternity.

To apply, please follow the instructions at https://www.qmul.ac.uk/spa/phd/how-to-apply-for-a-phd/. We would be pleased to discuss the project or answer queries informally: please get in touch at a.e.phillips@qmul.ac.uk and helen.c.walker@stfc.ac.uk.

Applications should be submitted at the latest by **Friday 1 March**.