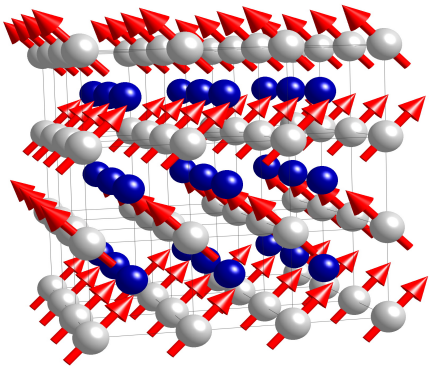
PhD Research Project Opportunities for 2016/2017

Physics of Rare Earth – Transition Metal Magnets

The interactions between the *f*-electrons of rare earth elements and the *d*-electrons of transition metals give rise to extremely useful properties such as hard ferromagnetism – as used in today's strong permanent magnets – and giant magnetostriction – as used e.g. in acoustic transducers.
These materials are also fascinating in terms of their fundamental materials physics. Teams at the University of Birmingham and the University of Warwick are working together to understand the intrinsic properties and so devise key design principles of the rare-earth transition-metal magnets, supported by an EPSRC grant entitled 'PretAMag' ("Investigations of the Physics underlying the principles of design of Rare Earth Transition metAl permanent MAGnets").
In addition to two postdoctoral researchers, we are recruiting several PhD students:

- One **experimental** PhD project will involve the growth of materials and use advanced characterisation techniques (synchrotron X-rays, neutron scattering, muon spin rotation) to probe these materials in detail. The ideal candidate would be keen to travel for experiments at large-scale facilities. The position will be based in the School of Metallurgy and Materials at the University of Birmingham and supervised by Dr. Mark Laver (m.laver@bham.ac.uk) and Dr. Allan Walton (a.walton@bham.ac.uk).
- A second **experimental** PhD position, based at the University of Warwick, will focus on materials synthesis and the development of sensor devices, such as electromagnetic acoustic transducers (EMATs). Supervised by Dr. Rachel Edwards (r.s.edwards@warwick.ac.uk) and Dr. Martin Lees (m.r.lees@warwick.ac.uk), the candidate will be trained in a range of laboratory techniques and have many opportunities to engage with industry.
- A third **theoretical** PhD project, based at the University of Warwick and supervised by Prof. Julie Staunton (j.b.staunton@warwick.ac.uk), will develop the theory for the large magnetoelastic effects in these materials and compare the results with experimental data. It will show how elastic and magnetic degrees of freedom soften, and inform the design of new compounds. The ideal candidate will have a strong interest and aptitude for theoretical development and scientific computing.



All three of these positions offer the opportunity to work alongside theorists and experimentalists at both Universities and to collaborate with other leading groups in this area in the USA and Japan. For further information, please contact Dr. Mark Laver at m.laver@bham.ac.uk or Prof. Julie Staunton at j.b.staunton@warwick.ac.uk

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