Steve BLUNDELL lecturing in Grenoble

We have the pleasure to host Steve BLUNDELL in Grenoble for two days of lecturing on 27-28 November 2018. Steve BLUNDELL is University Professor for Physics in Oxford, with wide recognition in research and teaching in condensed matter, in particular on magnetism-related topics (http://users.ox.ac.uk/~sjb). Among others, he authored the widely-used textbook *Magnetism in Condensed Matter* (OUP, 2001). The venue of Steve BLUNDELL has been made possible thanks to the support of the IDEX, under the auspices of the doctoral school for Physics.

The content of the two lectures is on the next two pages. Lectures are being organized for PhD students, however the lectures are held publicly and any person interested is more than welcome (please contact Virginie SIMONET ahead of the lecture to be granted access to the CNRS Campus). If you wish to meet Steve BLUNDELL in your lab on 27-28th when he is not lecturing, please contact one of us, so that we can organize his schedule.

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An introduction to muon-spin rotation: a local probe to study magnetism and superconductivity

Schedule: November 27th 2018, 10:00 – 12:00
Venue: Institut Néel, room K223

Implanted muons give a unique local perspective on magnets and superconductors [1]. By measuring the rotation of the implanted muon spin in the local magnetic field, which in turn results from the dipolar field arising from nearby magnetic moments, one can follow the magnetic order parameter as a function of temperature. If there are a range of muon sites the technique can provide information about the internal magnetic field distribution. Even above the magnetic transition temperature, the measured relaxation of the muon spin can provide information about magnetic fluctuations and spin dynamics. In superconductors the technique is particularly valuable because the measured internal field distribution can allow us to infer the pairing mechanism. In iron-based superconductors, for example, competition between magnetism and superconductivity can be studied very effectively with this technique. However, there is a fundamental limitation of this technique which comes from the lack of knowledge of the implantation site of the muon and the uncertainty about the muon's perturbation of its host. We have found that this problem can be addressed using electronic-structure calculations using a technique my group and the Parma group have developed which we call "DFT+μ", density functional theory with an included muon [2-3]. I will describe some recent experiments that illustrate the application of these ideas [4-5].

REFERENCES

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A tutorial lecture on magnetic exchange and order

Schedule: November 28th 2018, 14:00 – 17:00
Venue: CNRS Campus Presqu'île, conference room (building A)

The exchange interaction between magnetic moments arises from the effects of the Coulomb interaction (which corresponds to a large energy) and the exchange symmetry of identical particles. I will consider particular incarnations of the exchange interactions: direct exchange, indirect exchange (superexchange and RKKY), and anisotropic exchange. The exchange interaction leads to the presence of magnetic order, and I will consider this in both localized and itinerant systems. In the latter case, the magnetization of the electron gas will be treated, including a discussion of Pauli susceptibility and the Stoner criterion. These ideas will be illustrated using the model system of a triangle of spins and I will solve the problem exactly, revealing the key symmetries. The Heisenberg model possesses rotational symmetry because the interaction Si.Sj has no preferred direction. However, magnetic moments in solids are sensitive the presence of the lattice. One consequence of this is magnetocrystalline anisotropy, which has an effect on the thickness of domain walls.

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