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“Magnetism at the interface: observing the buried physics of magnetic nanostructures ”

ABSTRACT

The understanding of electron behaviour in systems with reduced dimensionality and lengthscale is a central theme of contemporary condensed matter physics. Nanomagnetic systems allow us to rigorously test our understanding of such phenomena with the additional benefit that many of the observed properties have direct technological relevance. So successful is their application that they are now ubiquitous in modern life. Much of the interesting physics and functionality resides within nanometres of the interface. Providing an atomic understanding of such phenomena presents a significant experimental challenge. The interfaces of interest are often buried and not readily accessible to more conventional techniques. Neutron and x-ray scattering complemented with magnetic dichroism techniques are ideally suited to the study of such magnetic nanostructures providing for example, separation of orbital and spin contributions to the magnetisation, absolute, quantitative information on the *intra* layer magnetic coupling and on the *in-plane* magnetic ordering with sub-nanometre resolution. These observations complement measurements such as magnetometry and transport and allow us to provide a detailed multi-scale, multi-physics understanding.

We shall introduce the relevant techniques and present recent research examples where such complementary techniques have been employed to contribute to some of the grand challenges in nanomagnetism.