THE PHYSICS COLLOQUIUM

Thursday 28 November 2024, 4:00 p.m.
Nijenborgh 4, Lecture Hall 5111.0080

Probing and tuning spins in solid-state systems

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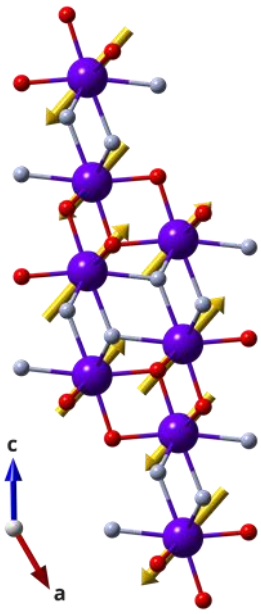
Spin interactions in solid-state systems are fundamental to understanding a wide range of physical phenomena and play a critical role in determining the electronic and magnetic properties of materials. In magnetic systems, exchange interactions drive spin alignment, giving rise to magnetic behaviours observed in, for example, ferromagnets, antiferromagnets, and spin glasses.



In this talk, I will put neutron scattering forward as a suitable scientific tool to study the magnetism in these phases of matter, and I will demonstrate this by discussing our latest advances in probing and tuning the magnetism in various chemical systems.

First I will focus on structurally frustrated rare-earth antiferromagnets. Geometric frustration occurs in systems where the spatial arrangement of interacting components, in this case spins, prevents all pairwise interactions from being simultaneously satisfied. This typically arises in systems with antiferromagnetic interactions on specific lattice geometries, such as triangular, Kagome, or pyrochlore lattices. Here I will demonstrate how this leads to a complex magnetic phase diagram in a rare-earth antiferromagnet.

After that I will discuss the magnetism in electron-doped cuprate superconductors, that plays a dominant role in the superconducting behaviour. In contrast to the hole-doped cuprates, as-grown electron-doped cuprates are not superconducting and a post-synthesis reductive annealing is necessary to introduce superconductivity in the system. However, the role of the reductive annealing has been a longstanding issue. By directly comparing an as-grown and annealed sample from the same crystal growth, I will show that annealing reduces the spin pseudogap, most likely caused by a reduction of oxygen impurities.

Join us for coffee starting 3:30 p.m. Refreshments will be served after the lecture.

For more information contact the host: Marcos Guimaraes (m.h.guimaraes@rug.nl)
Website: http://www.rug.nl/research/vsi/colloquia/