Stuttgarter Physikalisches Kolloquium

Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme
Fachbereich Physik, Universität Stuttgart

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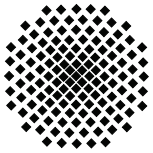

Dienstag, 6. Mai 2014 | **17.15 Uhr** | **Hörsaal 2 D5**

Stuttgarter Max-Planck-Institute, Heisenbergstraße 1, 70569 Stuttgart-Büsnau

Condensed Matter Particle Physics in Chiral Magnets

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Abstract

In condensed matter physics and particle physics analogies exist between large scale effects of local quantum degrees of freedom. An example par excellence is the emergence, stability and decay of skyrmions in chiral magnets and their emergent electrodynamics. Characterised by a non-zero topological winding, which corresponds to precisely one quantum of emergent magnetic flux, skyrmions exhibit an extremely efficient coupling between the conduction electrons and the magnetic properties. The emergent flux generates a topological Hall signal, spin transfer torques at ultra-low current densities and emergent electric fields. Additionally skyrmions are characterised by an exceptional stability, which cannot be simply suppressed under large hydrostatic pressures or doping. In fact, measurements of the Hall effect suggest the survival of non-trivial topological winding akin that of the skyrmion lattice in a non-Fermi liquid regime at high pressures, where neutron scattering suggests the absence of long-range magnetic order. The topological unwinding of skyrmions, which involves emergent magnetic monopoles, may be at the heart of this loss of long-range order.