



SEMINAIRE ISMO

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Electrons with Topological Charge – a Novel Probe for Solids

Shortly after the discovery of vortex electrons in 2010, free electrons with topological charge could be routinely created in the electron microscope. Such vortices are characterized by a spiraling wavefront and a phase singularity at the center, similar to optical vortices that were described by Nye and Berry 40 years ago.

Owing to their short wavelength, these matter waves can be focused to the atomic size. Another novel aspect is their magnetic moment $\mu_B m$ quantized in multiples of the Bohr magneton, independent of the electron spin. These features make electron vortices extremely attractive as a nanoscale probe for solid state physics. Nanocluster rotation, detection of spin polarisation of single atomic columns, and peculiar rotation in magnetic fields characteristic for Landau states has been demonstrated, and we are exploring novel applications.

Vortices could serve as electron tweezers to move or rotate single atoms or molecules, to distinguish enantiomers, or to detect sub-meV energy differences in the electron microscope.

Attention!
Jour inhabituel

Judi 2 octobre 2014 à 11h
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