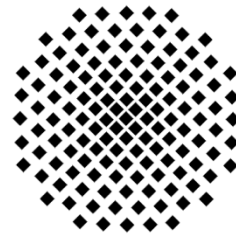


Stuttgarter Physikalisches Kolloquium

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

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Dienstag, 30. Mai 2017

17:15 Uhr

Hörsaal V 57.01

Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Prof. Peter Michler, Universität Stuttgart, Telefon: 0711 - 685-64660

Seeing is Believing - Imaging Quantum Materials on the Nanoscale

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Abstract

One of the most exciting areas of modern condensed matter physics is the discovery and study of exotic phases in new quantum materials – such as unconventional superconductors, 'electron nematics' or topological Dirac and Weyl semimetals to name but a few. Their unusual physics is a direct consequence of unconventional electronic excitation spectra reflecting the non-intuitive effects of e.g. quantum fluctuations or the topological character of electronic wave functions. Such physics can, in many cases, be most readily revealed in the response to *local* perturbations - dopant atoms, step edges or surfaces - whose study requires both real- and momentum-space insights.

As a consequence, visualising the physics of these phases on the atomic scale by scanning tunnelling microscopy has become one of the most revealing and intriguing approaches to studying the surprising wealth of nanoscale phenomena in these materials. In this colloquium I will introduce some of the key concepts of the research field such as quantum interference of electronic wave functions and 'condensation' of incipient order parameters at local defects. I will set these in context using examples of the physics of unconventional superconductors along with our recent experiments on Dirac semimetals.