TECHNISCHE UNIVERSITÄT WIEN

INSTITUT FÜR ANGEWANDTE PHYSIK
WIEDNER HAUPTSTR. 8-10/E134, 1040 WIEN
http://www.iap.tuwien.ac.at

Invitation

Institute of Applied Physics – TU Wien

Prof. Dr.

Hugo Dil

Institute of Physics, Ecole Polytechnique Fédérale de Lausanne (EPFL)
Switzerland

Discovery of emergent materials for spintronics applications

Abstract:

Spintronics, the use of the spin of the electron rather than its charge, bears significant promise to expand on current technology. Besides a reduced energy consumption and increased flexibility, spintronics also can function as the basis for quantum computing. To make true on this promise, materials with novel electronic and spin properties are required. In our research we primarily focus on how spin-orbit interaction can be used as a powerful tool for creating novel properties, especially when combined with magnetism or correlation effects. Spin-orbit interaction can also drive the system to new physical phases as exemplified by topological insulators and Weyl semimetals. Using various spectroscopic techniques we explored a wide variety of materials with different characteristics. After a brief introduction to the used techniques and the scientific background, I will give an overview of our recent results in the field. For a manipulation of the spin structure polar, ferroelectric, or multiferroic surfaces, interfaces, and thin films will prove to be essential. It will be shown how polar order significantly enhances the spin splitting and how it is possible to switch between spin-split electron- and hole-like states on transition metal oxide surfaces. Using magnetic dopants an entanglement of ferroelectric and ferromagnetic order can be achieved with antiparallel orientation. This combination yields an electronic structure, which can function as a template for the formation of Majorana fermions. Finally an outlook will be given into the fascinating possibilities that open up when ARPES can be performed in combination with device operation or when SARPES is combined with attosecond time resolution.

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Venue:

TU Wien, Freihaus
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