TECHNISCHE UNIVERSITÄT DRESDEN

Institut für Festkörper- und Materialphysik

IFMP Institut für Festkörper- & Materialphysik

IFMP Seminar

Date Monday, February 02, 2026, at 14:50

REC/C213

Zoom: 633 2801 2201, Passcode: IFMP2025-6

Speaker **Olena Fedchenko**

Johannes Gutenberg University, Mainz and
Goethe Universität Frankfurt

Title **Photoelectron Spectroscopy of Electronically Correlated Materials: Chirality in the Kagome Metal CsV_3Sb_5**

Abstract Kagome metals AV_3Sb_5 (where A = Cs, K, Rb) have a complex electronic structure comprising flat bands, Dirac crossings and van Hove singularities. These features can lead to unconventional charge-density-wave (CDW) order, superconductivity and topological phenomena. In CsV_3Sb_5, the CDW transition has been associated with time-reversal symmetry breaking, orbital magnetism, and chirality. This talk summarises x-ray photoelectron diffraction (XPD) and angle-resolved photoemission spectroscopy (ARPES) studies of this system using circularly polarised photons.

XPD reveals a loss of mirror symmetry and the formation of a locally chiral atomic structure in the CDW phase. Complementary ARPES measurements reveal pronounced nontrivial magnetic circular dichroism in the valence-band electronic structure, suggesting the presence of electronic chirality and time-reversal symmetry breaking. Partially substituting V atoms with isoelectronic Nb atoms results in band broadening and increased gap opening at the Dirac-like crossings due to the resulting chemical pressure. Isoelectronic Nb substitution also results in stronger coupling of orbital magnetic moments to three van Hove singularities near the Fermi level at the M points. This enhances the magnetic circular dichroism (MCD) signal compared to pristine CsV_3Sb_5 and confirms the predicted coupling of orbital magnetic moments to three van Hove singularities near the Fermi level at the M points.

Host: D. Inosov

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