TECHNISCHE UNIVERSITÄT WIEN

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INVITATION to IFP-SEMINAR

Charge excitations in strange metals, measured by EELS and RIXS

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Host: Neven Barišić and Karsten Held
Date: 25.06.2026, 16:00
Place: TU Wien, Freihaus Building
Wiedner Hauptstraße 8-10, 1040 Wien
Seminar Room DC red 07 (red section, 7. OG)
Zoom: https://tuwien.zoom.us/j/63688006927?pwd=XckArWGba1sLbBJMp7adfZYb4f9dkL.1

Abstract:

Studies of the scattering rates in doped cuprates and ruthenates signals a breakdown of the quasiparticle concept. In these strange metals, the dynamic conductivity is explained by a continuum of low-energy electronic excitations. The latter are possibly related to strong quantum fluctuations which are also supposed to mediate unconventional superconductivity in cuprates and ruthenates. Holographic theories have predicted that this continuum would cause an overdamping of plasmon excitations. Here we present EELS and RIXS experiments on doped cuprates and ruthenates which show well defined optical and acoustic plasmons in the momentum range below the Lindhard continuum. The dispersion of the high-energy optical plasmon can be explained by a mean-field RPA calculation using an unrenormalized effective mass. In contrast, the dispersion of the acoustic plasmon can be explained using a renormalized mass. Compared to nearly-free electron metals, a large width of the plasmon is detected. Both, the dispersion and the damping of the plasmon, derived from two-particle spectroscopies (EELS, RIXS, and optical spectroscopy), are discussed in terms of an energy-dependent self-energy determined by the one-particle spectroscopy ARPES.

Supported by: FWF Österreichischer Wissenschaftsfonds

Q-M&S Correlated Quantum Materials & Solid State Quantum Systems