



## Einladung zum Physikalischen Kolloquium im Wintersemester 2021/22

Physikzentrum, Mendelssohnstraße 2/3  
dienstags, 14:15 Uhr, Hörsaal MS 3.1

**Prof. Dr. Ilya Eremin**

Institut für Theoretische Physik III, Ruhr-Universität Bochum

**11. Januar 2022**  
**14:15 Uhr, online:**

<https://webconf.tu-bs.de/chr-u3m-qmn>

### **Collective modes in pumped unconventional superconductors with competing ground states**

The recent technological development of THz spectroscopy makes it possible to probe properties of quantum matter, which cannot be observed in equilibrium. This is of considerable interest in the field of unconventional superconductivity, where controlled probing of the relaxation dynamics yields access to understanding ground state properties of the underlying system.

Motivated by the recent development of terahertz pump-probe experiments, I will discuss in my talk the short-time dynamics in superconductors with multiple attractive pairing channels and competing nematic instability. Studying a single-band and multiband superconductors, we analyze the signatures of collective excitations of the pairing symmetries (known as Bardasis-Schrieffer modes) as well as the order parameter amplitude (Higgs mode) in the short-time dynamics of the spectral gap and quasiparticle distribution after an excitation by a pump pulse. We show that the polarization and intensity of the pulse can be used to control the symmetry of the non-equilibrium state as well as

frequencies and relative intensities of the contributions of different collective modes.

Finally I address the question of whether pump-probe technique can be used to reveal an interplay between various collective modes visible in the superconducting state and to distinguish the Pomeranchuk nematic collective mode from the BS mode due to the subdominant Cooper-pairing channel.

**Für die Dozenten der Physik:  
Prof. Dr. Andreas Hördt, Telefon: 0531 391-5218**