SFB1242

SFB 1242 Nichtgleichgewichtsdynamik kondensierter Materie in der Zeitdomäne

UNIVERSITÄT DUISBURG ESSEN

Open-Minded

16.06.2026 / 10 Uhr c.t., Raum MG 272
Campus Duisburg

Chasing Charge with X-ray Free-Electron Lasers: Time-Resolved X-ray Photoemission Spectroscopy of Ultrafast Interfacial Dynamics

PD Dr. habil. Friedrich Roth

TU Bergakademie Freiberg

Understanding charge motion across interfaces is essential for advancing photovoltaic, photocatalytic, and molecular electronic systems. Following optical excitation, charge and energy transfer can proceed on femtosecond to picosecond timescales and are shaped by the interplay of local electronic structure, chemical environment, and interfacial morphology. Resolving these ultrafast processes therefore requires experimental approaches that combine high temporal resolution with chemical and elemental specificity. Time-resolved X-ray photoemission spectroscopy (tr-XPS) offers this capability by tracking transient changes in core-level binding energies and spectral line shapes. In particular, X-ray free-electron lasers provide access to interfacial charge-transfer dynamics with femtosecond time resolution and site-specific sensitivity. By probing chemically distinct core levels, ultrafast XPS makes it possible to follow charge localization, screening, and recombination from the perspective of the individual atomic species involved.

In this talk, I will present recent FEL-based time-resolved photoemission experiments on photoactive interfaces and thin-film systems. These studies demonstrate how ultrafast XPS can reveal photoinduced interfacial charge-transfer dynamics with exceptional site-specificity and temporal resolution across different sample systems. Special emphasis will be placed on the role of FEL radiation as a powerful tool for accessing the microscopic mechanisms that govern photoinduced interfacial dynamics in complex materials.

Acknowledgement: This work was supported within the program “Structure of Matter” of the Helmholtz Association and by the BMFTR (Grant No. 05K22OF2 within ErUM-Pro).

Für diese Zeit steht eine Kinderbetreuung nach vorheriger Anmeldung zur Verfügung.

Contact: Prof. Dr. Björn Sothmann, Faculty of Physics
Phone: +49 (203) 37-93330 / Mail: bjoerns@thp.uni-due.de