

Combined femtosecond time-resolved photoemission at the FEL and the HHG

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The combination of time-resolved core-level photoemission spectroscopy using the free-electron laser FLASH and time- and angle-resolved photoemission spectroscopy with a table-top higher-harmonics-generation source opens the way to study the nonequilibrium dynamics of condensed matter systems with full momentum, elemental, chemical, and atomic-site selectivity. We present our experimental approaches and discuss important technical challenges at these light sources such as vacuum space-charge effects and synchronization issues. We show recent results of the atomic-site and momentum specific charge-order dynamics of the Mott insulator 1T-TaS₂ and the Peierls insulator RbTaS₂.

Author: HELLMANN, Stefan (University of Kiel, Germany)

Co-authors: ROSSNAGEL, Kai (University of Kiel, Germany); BAUER, Michael (University of Kiel, Germany)

Presenter: HELLMANN, Stefan (University of Kiel, Germany)

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