

## Two color x-ray pump-probe experiment on GaAs(100)

Motivated by the x-ray induced ultra-fast transient drop of optical reflectivity of semi-conductors, we performed time-resolved photoemission (trPES) experiments with x-ray pump x-ray probe in order to understand the x-ray induced changes in the electronic structure of GaAs(100). To accomplish our measurements we were using the split-and-delay unit at PG2 beamline at the free-electron laser facility FLASH, which allows, due to the existence of high harmonics in FEL radiation, (jitter free) x-ray pump x-ray probe experiments (40eV pump (fundamental) / 120eV probe (3rd harmonic)). For our trPES measurements we were using a newly developed electron time-of-flight spectrometer (SPECS THEMIS 1000 WAL) including a novel four quadrant delayline detector, which allows high transmission and high repetition rate measurements on single shot basis (400bunches@1MHz).

Compared to prior trPES measurements done with conventional hemispherical analyzers and CCD-detectors the present data show improved space-charge analyzing capabilities caused by the high read out speed of the detector and the resulting possibility to analyze each FEL shot independent. A first analysis of the time-resolved measurement show changes of the electronic structure on sub-ps timescale.

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