

264

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Title:Light-field streaking for FELs

Authors:Frühling, Ulrike (1)

Author affiliation:(1) Institut für Experimentalphysik, Center for Free-Electron Laser Science (CFEL), Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg, Germany

Corresponding author:Frühling, U.(ulrike.fruehling@desy.de)

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Abstract:Free-electron lasers provide intense femtosecond radiation pulses with wavelengths in the extreme ultraviolet to x-ray range. Due to the stochastic nature of the light generation scheme, based on self-amplified spontaneous emission, the duration and temporal profile fluctuate from shot to shot. The temporal profile can be measured in a single-shot experiment by light-field streaking, where an infrared light field is used to accelerate photoelectrons generated by the x-ray pulse. The photoelectron energy change depends on the phase of the infrared field at the time of ionization. This technique is extensively used in attosecond metrology where near-infrared streaking fields are employed for the temporal characterization of attosecond XUV pulses. Here, it is adapted for the analysis of pulse durations in the femtosecond range by choosing far-infrared (terahertz) streaking fields.

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