SFB1242

SFB 1242 Nichtgleichgewichtsdynamik kondensierter Materie in der Zeitdomäne

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Next-Generation Source for Ultrafast Imaging

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Femtosecond hard X-ray pulses have enabled the direct observation of ultrafast dynamics on the atomic scale. Typically, such pulses are generated in large-scale facilities with kilometer-size spatial dimensions costing hundreds of millions to billions of money units. In this talk I will discuss a novel compact ultrafast X-ray sources with nearly three orders of magnitude reduction in both, the spatial and cost dimensions. The source is based on the synchrotron emission of relativistic electron bunches generated by a laser-plasma accelerator. The brilliance of the source is comparable to that of third generation storage-ring based synchrotron sources but it is capable of generating X-ray pulses with three orders of magnitude shorter (femtosecond) duration. Furthermore, the source can provide imaging capabilities that not even state-of the art X-ray free-electron lasers (XFELs) can provide. This includes for example the ability to provide multiple perfectly time-synchronized X-ray pulses incident from multiple different angles and at different wavelengths for pump-probe experiment or tomographic imaging. It can also provide femtosecond X-ray pulses at high photon energies (around 100 keV or higher). I will also discuss more “exotic” pump/probe modalities that the source might be able to provide in the future that might be particularly interesting for advanced imaging of ultrafast dynamics in solids. This includes the (time-synchronized) generation of half-cycle magnetic fields with a peak field up to several Teslas, half-cycle THz pulses with V/A fields or weakly relativistic electron bunches for ultrafast electron diffraction.

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

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