Explored and unexplored pathways for investigating structural dynamics at synchrotrons

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Laser-driven structural dynamics in condensed matter span many decades in time and different length scales that require different approaches of sensing. Within this talk scattering, imaging and spectroscopical probes with X-rays will be presented to resolve thermal transport phenomena or structure formation in nanoparticle synthesis. Emphasis will be given to on specific requirements in methodology from the choice of lasers to time and spectral structure of the probing X-rays.

One example is the thermal transport on the nanoscale, which concerns issues of temperature derivation ultra-short time scales or the relation of transport and phonon interactions [1,2]. Atomic dynamics are typically studied with diffraction methods. On the other hand, dynamics in disordered systems require other approaches, such as small angle scattering, spectroscopy or X-ray multimodal imaging. This will be demonstrated in laser-based nanoparticle synthesis and fragmentation [3,4,5].

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