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[L] Imaging FEL-induced dynamics in single nanoparticles

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Novel types of experiments with both high spatial and temporal resolution have become possible with the intense and short short-wavelength pulses from free-electron lasers. By measuring the diffracted light of a single non-crystallin nanoparticle, fragile objects such as isolated viruses or rotating superfluid helium nanodroplets can be directly visualized. Due to the short pulse duration also ultrafast dynamics like e.g. laser-induced melting or even electronic processes on the nanoscale can be followed by diffractive imaging.
In our experiments we use clusters and nanodroplets as model systems to probe the light-induced processes. For the study of FEL-induced dynamics, two temporally delayed short-wavelength pulses are used, each creating a diffraction image. Therefore, novel methods to separately detect the diffraction images of the same particle created by pump and probe pulse had to be developed. Two recent approaches via non-collinear detection geometries and the use of two-color pulses will be presented and results will be discussed.

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