

Probing laser-solid interactions with Resonant Small-Angle X-ray Scattering

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SAXS has been applied in two beam times at LCLS (2014, 2018) in order to study the plasma expansion dynamics following the interaction of solid-density samples with an ultrahigh intensity laser. The first experiment demonstrated, that SAXS in combination with nanostructured grating targets enables to measure the plasma surface expansion with fs and nm resolution [Kluge et al., Phys. Rev. X 8, 031068 (2018)]. In the follow-up experiment, the pump laser intensity reached the relativistic intensity regime and allowed for the generation of highly ionized plasma states. In this scenario, probing at resonant X-ray energies has shown to give new insight into the ionization process, plasma opacity and density dynamics by studying asymmetries in SAXS patterns [Gaus et al., arXiv: 2012.07922 (under review)]. This talk aims to give an overview on the experimental results from these experiments with respect to resonant SAXS.

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