HZDR Seminar on

WEDNESDAY, March 24 at 10:00 CET

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Probing laser-solid interaction with XFELs

The development of short-pulse laser-driven radiation sources requires a mature understanding of the relativistic laser-plasma processes such as heating and transport of relativistic electrons as well as the occurrence of plasma instabilities. These dynamic effects occur on femtosecond and nanometer scales and are therefore very difficult to access experimentally. Ultrashort pulses of modern XFELs provide the necessary penetration power and high spatial and temporal resolution for pump-probe experiments.

In a first study at the “Matter in Extreme Conditions” facility at LCLS we demonstrated that Small-Angle X-ray Scattering (SAXS) allows for measuring plasma expansion dynamics in a direct in-situ pump-probe experiment at the relevant time and length scales [Phys. Rev. X 8, 031068 (2018)].

In this talk, I will focus on a follow-up experiment performed with laser intensity reaching the relativistic domain, improved targetry and complementary particle diagnostics. In particular, probing at resonant X-ray energies has shown to give new insight into the ionization process, plasma opacity and density by studying asymmetries in SAXS patterns from nanostructured grating targets [Gaus et al., arXiv: 2012.07922 (under review)].