

Plenary Talk

PV IV Tue 9:00 RW 1

Intense laser cluster interactions: nanoscale plasmas in motion — •THOMAS FENNEL — Institut für Physik, Universität Rostock, Rostock, Germany — Max-Born-Institut, Berlin, Germany

Exposing matter to intense laser light leads to the ultrafast generation of transient finite plasmas. A detailed understanding of the involved nonlinear electron and ion dynamics promises a fundamental route towards realizing active control of the plasma evolution via appropriately structured light fields – with implications for a broad spectrum of applications, ranging from nanomachining over particle acceleration to high-harmonic generation. Atomic clusters provide ideal grounds to explore the correlated and collective laser-matter processes in a well-defined nanoscale plasma. This talk will highlight two advances in

controlling and imaging cluster nanoplasmas using intense XUV and x-ray laser fields.

First, the combination of ultrashort IR and XUV fields enables the highly selective steering of laser-driven nanoplasmas via seeded avalanching. The resulting control capabilities mark an exciting new frontier in ultrafast nanoscience. The second part addresses the characterization of structural dynamics with nanometre spatial and femtosecond temporal resolution via single-shot x-ray diffraction, which is a major challenge of current x-ray science. Laser-driven atomic clusters provide a robust platform for developing and demonstrating the technology required to extract dynamical information from diffraction images. An outlook will sketch possible routes towards resolving electron dynamics with attosecond resolution.