Ultrafast Dynamics in Pure and Doped Helium Nanodroplets

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Superfluid helium nanodroplets are unique systems that are widely used as a cryogenic high-resolution spectroscopic matrix due to their properties, such as ultracold environment, extensive transparency range and weak interaction with the dopant species. They are also interesting model systems to understand the transition from atomic properties to those observed in the condensed phase. This complex species can interact with laser light in distinct and interesting ways, and in this talk, two laser induced processes in He droplets will be discussed. First, XUV light from a high-harmonic generation setup is used to electronically excite pure and doped nanodroplets and the subsequent relaxation dynamics are probed via time-resolved photoelectron imaging. Secondly, strong-field NIR pulses are used to induce anisotropic nanoplasma formation in large He droplets. The evolution of the plasma is investigated via time-resolved, single-shot coherent diffractive imaging, possible due to the unprecedented peak brightness of x-rays produced at free electron lasers.