

Stimulated X-ray Emission Spectroscopy: Probing Chemical Structure and Attosecond Dynamics

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We present our progress in exploring the phenomenon of stimulated x-ray emission spectroscopy (S-XES) at 6 – 8 keV as a new spectroscopy tool, and as a new source of ultrafast hard X-ray pulses. We first discuss the principle of S-XES, and the experimental methods required for generating and measuring it. We then discuss recent results for spectroscopy applications of S-XES and its potential and challenges of providing enhanced electronic structure sensitivity. We then discuss applications of S-XES as a powerful new x-ray source for probing attosecond dynamics. Here we present the observation of strong lasing effects and a new technique, X-ray coherent attosecond pulse pair spectroscopy (X-CAPPS) enabling interferometry for probing phenomena in the 500 attosecond to 5 femtosecond time window.