

Probing Ultrafast Electron Dynamics using Attosecond X-ray Free Electron Lasers

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The ultrafast motion of electrons is a frontier problem for photochemical processes, as electron motion is a key ingredient of all chemical reactions. For this reason, accessing the electronic timescale in small quantum systems has become an important technical achievement. With recent innovations in XFEL technology, which provide the brightest source of x-ray radiation, are now able to produce attosecond-scale pulses. Producing attosecond-scale soft x-ray pulses enables the probing of ultrafast electron motion with atomic-site specificity. I will highlight our recent developments probing ultrafast electron dynamics in both core-excited and low-lying cationic systems. Exploiting the interaction between strong-laser fields and the Auger-Meitner emission from core-excited systems we can probe electronic coherence. I will also show our first results on attosecond pump/probe experiments of ultrafast charge dynamics following valence ionization by attosecond x-ray pulses.