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Attosecond X-ray Experiments at Free Electron Laser Facilities¹

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This talk will discuss the potential of using x-ray free electron lasers (XFELs) for applications in attosecond science. I will show recent results on the production and measurement of sub-femtosecond soft x-ray pulses at the Linac Coherent Light Source (LCLS) XFEL facility. Our measurement technique exploits phase-dependent energy modulation of a photoelectron ionized in the presence of a strong laser field with circular polarization. Beyond pulse characterization, this attoclock method can be applied to study molecular photoionization dynamics in the time domain, including the ultrafast decay of core-excited states produced via core-shell ionization. We have also made use of the broad bandwidth of attosecond x-ray pulses to demonstrate coherent electronic population transfer via stimulated X-ray Raman scattering in small molecular systems.

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