Disentangling ultrafast electronic and nuclear dynamics in isolated molecules

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Molecules selectively transform light energy into other forms of energy like heat, electricity, or chemical energy with high quantum efficiency. The energy conversion process is the result of a correlated motion of electrons and nuclei after photoexcitation, often under breakdown of the Born-Oppenheimer approximation. This talk is about ultrafast experiments aimed at resolving light-induced molecular dynamics separately from the perspective of electronic structure and nuclear geometry. I will show experiments that use probe pulses in the extreme ultraviolet and soft x-ray spectral domain, which are highly sensitive to electronic structure. In addition, I will show first experimental results from a gas phase ultrafast electron diffraction campaign resolving coherent nuclear wavepackets in small molecules.