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Probing ultrafast excited state dynamics of the nucleobase thymine with photon energies beyond the UV

The building blocks of DNA, the nucleobases, exhibit considerable absorption cross-sections in the ultraviolet spectral regime. They are, though, surprisingly stable against structural damage by these hazardous photon energies. The mechanism responsible for this photostability involves ultrafast relaxation through conical intersections to lower-lying states and leads to efficient conversion of the absorbed photon energy into heat. Its details are, however, not well understood.
In my talk, I want to show at the example of the nucleobase thymine, how we can achieve state-sensitive information about excited state dynamics by probing them with photon energies beyond the ultraviolet. I want to discuss our results from a recent experiment probing photoexcited thymine with soft x-ray pulses from the free-electron laser Linac Coherent Light Source (LCLS). By employing near-edge absorption fine structure (NEXAFS) spectroscopy at the oxygen edge, we directly observe internal conversion through a conical intersection between two states with different electronic character.
In an outlook, I want to show at the example of thymine, how the well established time-resolved photoelectron spectroscopy method benefits from probing with ultrashort EUV pulses from high harmonic generation.