# FIRST RESULTS FROM ATTOSECOND X-RAY PUMP-PROBE EXPERIMENTS IN LIQUIDS

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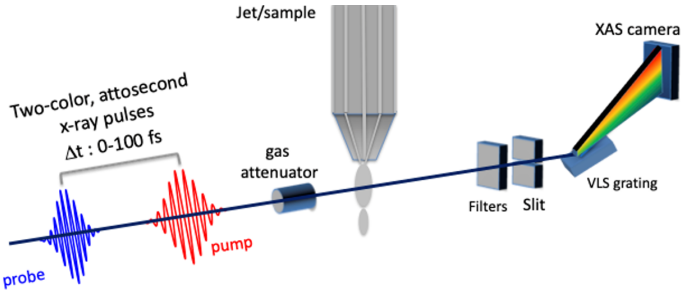
Understanding the elementary steps following ionization in aqueous systems provides a framework for radiation-matter interactions in chemistry and biology. However, a microscopic understanding of the reaction mechanisms in the relevant physico-chemical time regime is missing as typical techniques, EPR, and UV spectroscopies, lack either time resolution or spectral clarity. A powerful two-color sub-femtosecond time-resolved X-ray pump/X-ray probe scheme developed at LCLS provides a qualitatively new window to systematically understand the electronic and nuclear dynamics following outer-, inner-valence, and core ionization in aqueous systems.




Recently we investigated radiation-induced reactions in liquid water by X-ray transient absorption in a sheet jet using sub-fs XLEAP pulses on the ChemRIXS beamline at LCLS. The x-ray pump (255 eV to 275 eV) produces outer- and inner-valence holes, and the probe (510-550 eV) covers the valence hole through oxygen K-edge absorption. Starting from 0.6 fs delay absorption spectra were measured to capture ultrafast processes, e.g. Auger decay, intermolecular Coulombic decay (ICD), electron transfer mediated decay (ETMD), and proton transfer.