

# Attosecond Charge Migration and Charge Transfer in Molecules

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The development of table-top attosecond soft-X-ray spectroscopy in the gas and liquid phases will be discussed. This technique has been applied to observe the decoherence and revival of attosecond charge migration driven by nuclear motion, as well as the transfer of electronic coherence through a conical intersection in the neutral silane molecule [1]. These results demonstrate a broadly applicable approach to inducing and probing charge migration in molecules, opening the door to controlling molecular dynamics on the electronic time scale. Extending this technique from the silicon L-edge to the carbon K-edge [2] has enabled the observation of the fastest conical-intersection dynamics observed to date, i.e. the sub-7-femtosecond electronic relaxation from the A to the X state in the ethylene cation [3]. Turning from the gas phase to the liquid phase, I will discuss recent results on the observation of femtosecond proton transfer in aqueous urea dimers, which highlight the capability of transient X-ray absorption to distinguish electronic from nuclear rearrangements [4]. These results demonstrate the potential of attosecond soft-X-ray spectroscopy for studying electronic dynamics of chemically relevant systems in aqueous solutions under ambient conditions.

## References

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