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(I) Coherent Ultrafast Electronic Dynamics in Molecules

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The non-adiabatic coupling of nuclear and electronic degrees of freedom underlies many fundamental processes in Nature, including solar energy conversion and photosynthesis. The formation of electronic coherences by nuclear motion is a new aspect of such dynamics and requires new measurement techniques and methods of analysis. We will discuss Ultrafast Time-Resolved X-ray Absorption and Time-Resolved Photoelectron Spectroscopy, powerful methods suited to addressing this problem. In particular, we present a new approach to fully separating electronic coherences from electronic population dynamics, a long-standing problem, based on the use and analysis of Time-Resolved Photoelectron Angular Distributions.

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