UCLA College | Physical Sciences Chemistry & Biochemistry

PHYSICAL CHEMISTRY SEMINAR

Dr. James Gaynor

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12:00 PM
Young Hall 2033

Stories of Coherence: From Vibronic to Electronic Phenomena

A robust understanding of chemical reactivity in excited states is essential for designing and discovering new ways of harnessing energy flow at the atomic and molecular level. Photo-induced coherent processes, which utilize atomic or molecular motions moving with a well-defined phase relationship, may enhance control over important photochemical events. This presentation explores a wide range of timescales over which coherence and decoherence occur in solution phase molecules, gas phase atoms, and in “atomic-like” excitations of a crystalline ionic solid. We will begin with a new perspective on the first two picoseconds of excited state charge transfer involving coupled electronic and vibrational (i.e., “vibronic”) motions in solution phase solar cell dye molecules. Next, pure electronic coherences in a noble gas are investigated in the absence of vibrational or environmental perturbations, lasting for hundreds of femtoseconds. Finally, we return to the condensed phase in the solid form, where many-body electron correlations appear to cause core-excited state dephasing on sub-10 femtosecond timescales.

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