



Department of Chemistry, July 2015

**POSTDOCTORAL SCHOLAR POSITIONS
THEORETICAL AND COMPUTATIONAL CHEMICAL PHYSICS**

RESEARCH TOPICS:

(A) Attosecond X-ray Spectroscopy of Molecules

Developing time-dependent many-body approaches to nonlinear x-ray core-electron spectra and their description in terms of real-space and real-time wavepackets of electrons and nuclei. Computational tools will be implemented for the design and analysis of measurements involving multiple ultrafast optical and x-ray pulses.

(B) Nonlinear Spectroscopy with Quantum Optical Fields

Novel optical signals which use entangled photons, pulse shaping, and coherent control algorithms are designed and simulated for probing vibrational and exciton dynamics in molecular aggregates and semiconductor nanostructures.

(C) Many Body Theory of Nonlinear Response in the Condensed Phase

Developing and applying time-dependent density functional, nonequilibrium Green's Function techniques and exciton models for computing electronic excitations of molecular assemblies, energy and charge separation in photosynthetic complexes and current-carrying molecules. Connection to quantum information processing and manipulation will be explored.

Recent Ph.D. is required (2012 or later). Salary will be commensurate with experience. Send a curriculum vitae, publication list and arrange for three letters of recommendation to be sent to:

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and
apply online at: <https://recruit.ap.uci.edu/apply/JPF02945>

Relevant Publications

1. "Optical Multidimensional Coherent Spectroscopy", S. Cundiff and S. Mukamel. *Physics Today* (July 2013)
2. "Quasiparticle Representation of Coherent Nonlinear Optical Signals of Multiexcitons", O. Roslyak, B.P. Fingerhut, K. Bennett, and S. Mukamel. *New J. of Physics*, 15, 083049 (2013).
3. "Multidimensional Attosecond Resonant X-ray Spectroscopy of Molecules; Lessons from the Optical Regime", J. Biggs, D. Healion, Y. Zhang, and S. Mukamel. *Ann Rev Phys Chem*, 64, 101-127 (2013).
4. "Suppression of Population transport and Control of Exciton Distributions by Entangled Photons", F. Schlawin, K.E. Dorfman, B.P. Fingerhut, and S. Mukamel. *Nature Communications*, 4:1782:DOI:10.1038/ncomms2802 (2013).
5. "Watching Energy Transfer in Metalloporphyrin Heterodimers Using X-ray Raman Spectroscopy", J.D. Biggs, Y. Zhang, D. Healion, and S. Mukamel. *PNAS*, 110, 15597-15601 (2013)
6. "Probing the Conical Intersection Dynamics of the RNA Base Uracil by UV-Pump Stimulated-Raman-Probe Signals; Ab-Initio Simulations", B.P. Fingerhut, K.E. Dorfman and S. Mukamel. *JCTC*, DOI: 10.1021/ct401012u (2014)
7. "Stimulated Raman Spectroscopy with Entangled Light; Enhanced Resolution and Pathway Selection", K. Dorfman, F. Schlawin, and S. Mukamel. [dx.doi.org/10.1021/jz501124a](https://doi.org/10.1021/jz501124a) | *J. Phys. Chem. Lett*, 5, 2843-2849 (2014)
8. "Nonlinear Spectroscopy of Core and Valence Excitations Using Short X-ray Pulses: Simulation Challenges", Y. Zhang, W. Hua, K. Bennett, and S. Mukamel. *Topics in Current Chemistry*, 2015, DOI: 10.1007/128_2014_618

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