



Department of Chemistry, April 2017

**POSTDOCTORAL SCHOLAR POSITIONS  
ULTRAFAST NONLINEAR X-RAY SPECTROSCOPY; THEORY AND COMPUTATIONS**

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.

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

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949/824-7600 (phone); <http://mukamel.ps.uci.edu> (website)

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

**Relevant Publications**

1. "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).
2. "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).
3. "Catching Conical Intersections in the Act; Monitoring Transient Electronic Coherences by Attosecond Stimulated X-ray Raman Signals", Markus Kowalewski, Kochise Bennett, Konstantin Dorfman, and Shaul Mukamel. *Phys. Rev. Lett.* 115, 193003 (2015).
4. "Nonlinear optical signals and spectroscopy with quantum light", Konstantin E. Dorfman, Frank Schlawin, and Shaul Mukamel. *Reviews of Modern Physics* (In Press, 2016) arXiv:1605.06746v1
5. "Multidimensional Resonant Nonlinear Spectroscopy with Coherent Broadband X-ray Pulses", Kochise Bennett, Yu Zhang, Markus Kowalewski, Weijie Hua, and Shaul Mukamel. 2016 *Phys. Scr.* T169,014002.
6. "Study of double core hole excitations in molecules by X-ray double-quantum coherence signals: a multi-configurational simulation", Weijie Hua, Kochise Bennett, Yu Zhang, Yi Luo, and Shaul Mukamel. *Chemical Science*, 2016, 7, 5922 – 5933. DOI: 10.1039/C6SC01571A
7. "Cavity femtochemistry; Manipulating nonadiabatic dynamics at avoided crossings", Markus Kowalewski, Kochise Bennett, and Shaul Mukamel. *J. Phys. Chem. Lett.*, 2016, 7, 2050-2054
8. "Monitoring nonadiabatic electron-nuclear dynamics in molecules by attosecond streaking of photoelectrons", Markus Kowalewski, Kochise Bennett, Jeremy Rouxel, and Shaul Mukamel. *Phys. Rev. Lett.* 117, 043201 (2016)

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