



PHYSICAL CHEMISTRY SEMINAR

New Opportunities for Biological and Materials Imaging and with Multidimensional Spectroscopic Contrast



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ZOOM

<https://udel.zoom.us/j/92777070899>

Coherent multidimensional spectroscopies (CMDS) have been applied to a wide range of condensed-phase systems, revealing the life-sustaining structural rearrangements of liquid water, ultrafast energy conversion in photosynthesis, protein folding pathways and many-body interactions in semiconductors. Conventional experimental implementations of CMDS are poorly-suited for imaging. Motivated by the desire to track ultrafast energy conversion processes in space and time we have developed an acousto-optic phase-modulation approach to enable fully collinear fluorescence-detected CMDS in a microscope, combining femtosecond time-resolution, sub-micron spatial resolution, and the sensitivity of fluorescence detection. I will discuss our application of this approach to studies of photosynthetic bacteria, and our recent work to combine rapid-scanning and phase-modulation with digital lock-in detection, providing simultaneous linear and nonlinear signals for multiplex multidimensional spectroscopic contrast. I will discuss future directions for enhancing the spatial resolution and capabilities of the approach, and its potential for studying the electronic structure and dynamics in biological and materials systems.



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