

# JOINT ANALYTICAL, CHEMBIO, MATERIALS & PHYSICAL CHEMISTRY SEMINAR

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### “Quantum-mechanical Optimization of Light-harvesting in Photosynthesis”

Light-harvesting in photosynthesis involves amplification and regulation of light capture by reaction centers using antenna proteins. Efficient energy transfer from specialized antenna proteins enables organisms to adapt to local solar spectra (e.g. deep in the ocean) and to function even under extraordinarily low light fluxes. The key biophysical processes at play have been discovered by investigating electronic energy transfer in a variety of photosynthetic proteins. A new twist on this old problem is suggested by recent research that provides evidence that these dynamics can involve quantum-coherence, even at ambient temperature conditions.<sup>1</sup> Our experiments, using two-dimensional photon echo spectroscopy, have revealed that in light-harvesting antenna proteins isolated from a family of marine cryptophyte algae, quantum-coherence effectively ‘wires’ together the light-absorbing molecules in order to facilitate efficient long-range energy transfer. The talk will introduce electronic energy transfer, report new developments in experimental probes and theoretical studies of energy transfer mechanisms, and will debate how quantum mechanics is relevant to biological function.



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**Friday, Sept. 10, 2010**  
**1:30 pm Seminar Hall**