Abstract for an Invited Paper
for the MAR09 Meeting of
The American Physical Society

Investigation of Excitonic Coherence in LHCII by 2D Electronic Spectroscopy

TESSA CALHOUN, University of California, Berkeley

Photosynthesis has evolved with the ability to transfer energy through a matrix of light-harvesting pigment-protein complexes with almost no loss. The accomplishment of this near unity quantum efficiency is a feat that man has yet to understand or replicate. One proposed mechanism integral to this process requires long-lived coherent superpositions of the excitons, delocalized electronic excitations, in these systems. Two-dimensional Fourier transform electronic spectroscopy, already proven to be an ideal technique for investigating these coherences, has been employed to study Light Harvesting Complex II (LHCII), the most abundant light harvesting complex in higher plants. As in other photosynthetic systems previously studied, we observe long-lived coherence lasting beyond many of the excitons' lifetimes. Furthermore, unique coherence signatures allow the energies of the individual excitons to be located in an otherwise highly congested spectrum. This technique, by which 2D FT electronic spectroscopy can pinpoint excitonic spectral positions, and the resulting implications for LHCII will be discussed.