Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Accessing exciton transport in light-harvesting structures with plasmonic nanotip SEMION K. SAIKIN, Department of Chemistry and Chemical Biology, Harvard University, JOHANNES FEIST, ITAMP, Harvard-Smithsonian Center for Astrophysics, Harvard University, M.T. HOMER REID, Research Laboratory of Electronics, Massachusetts Institute of Technology, MIKHAIL D. LUKIN, Department of Physics, Harvard University, ALAN ASPURU-GUZIK, Department of Chemistry and Chemical Biology, Harvard University — Natural light-harvesting complexes, such as that of plant cells or photosynthetic bacteria, are considered as possible prototypes for artificially designed solar cell materials. In these structures the energy of light absorbed by a peripheral antenna is transmitted very efficiently in a form of excitons to a reaction center. Usually, information about the exciton transport is obtained from time-resolved nonlinear optical experiments where the frequencies of a pump and a probe fields select particular electronic transitions in the light-harvesting complex. We explore a complimentary setup utilizing a plasmonic nanotip as a local sub-wavelength probe of excitation dynamics. As specific examples we consider an LHII complex involved in the light-harvesting process of purple bacteria and a Fenna-Matthews-Olson pigment-protein complex of green-sulphur bacteria.

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Date submitted: 12 Dec 2011 Electronic form version 1.4