Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Non-Linear Optical Response Simulations for Strongly Corellated Hybrid Carbon Nanotube Systems[1] AREG MELIKSETYAN, IGOR BONDAREV, North Carolina Central University, MAXIM GELIN, Technical University of Munich, Germany — Hybrid carbon nanotube systems, nanotubes containing extrinsic atomic type species (dopants) such as semiconductor quantum dots, extrinsic atoms, or ions, are promising candidates for the development of the new generation of tunable nanooptoelectronic devices – both application oriented, e.g., photovoltaic devices of improved light-harvesting efficiency, and devices for use in fundamental research. Here, we simulate non-linear optical response signals for a pair of spatially separated two-level dipole emitters (to model the dopants above) in the regime where they are coupled strongly to a low-energy surface plasmon resonance of a metallic carbon nanotube. Such a coupling makes them entangled [1], and we show that the cross-peaks in 2D photon-echo spectra are indicative of the bipartite entanglement being present in the system [2]. We simulate various experimental conditions and formulate practical recommendations for the reliable experimental observation of this unique quantum phenomenon of relevance to the solid-state quantum information science.

[1] I.V. Bondarev, J. Comp. Theor. Nanosci. 7, 1673 (2010).
[2] M.F. Gelin, I.V. Bondarev, A.V. Meliksetyan, Chem. Phys., at print.

[1]ARO-W911NF-11-1-0189 (AM), DOE-DE-SC0007117 (IB), DFG-MAP (MG)

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Date submitted: 12 Nov 2012 Electronic form version 1.4