

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Biexcitonic Non-Linearities in Semi-conducting Carbon Nanotubes¹ TOROS TOROSYAN, IGOR BONDAREV,

North Carolina Central University — We obtained an analytical expression for the biexciton binding energy as a function of the inter-exciton distance and binding energy of constituent quasi-one-dimensional excitons in single-wall semiconducting carbon nanotubes. This allows one to trace biexciton energy variation and relevant non-linear absorption under external conditions whereby the exciton binding energy varies. In particular, we show the biexciton-plasmon coupling tunability by means of the quantum confined Stark effect, both for the ground-ground state and for the ground-excited state biexcitonic configurations. The non-linear absorption lineshapes calculated exhibit characteristic asymmetric Rabi splitting as the exciton energy is tuned to the nearest interband plasmon resonance. These results are useful for tunable optoelectronic device applications of optically excited semiconducting carbon nanotubes, including the strong excitation regime with optical non-linearities.

¹NSF (ECCS-1045661, HRD-0833184), NASA (NNX09AV07A), and ARO (W911NF-10-1-0105) support acknowledged.

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Date submitted: 22 Nov 2010

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