Abstract Submitted
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Quantum Confined Stark Effect for Exciton-Plasmons in Carbon Nanotubes[1] IGOR BONDAREV, JUSTICE MCCONNELL, NC Central University — We study theoretically the perpendicular electrostatic field effect (the quantum confined Stark effect) for excitons and interband plasmons in small-diameter (<∼1nm) semiconducting carbon nanotubes (CNs). The exciton excitation energy and the plasmon energy both shift to the red due to the decrease in the CN band gap as the field increases. However, the exciton red shift is much less than the plasmon one due to the decrease in the absolute value of the (negative) exciton binding energy [1]. This brings the exciton in resonance with the interband surface plasmon. The exciton total energy may be tuned to the nearest interband plasmon resonance this way, to form the strongly coupled exciton-surface-plasmon excitation[2,3]. We propose this effect for the development of CN based tunable optoelectronic device applications in areas such as nanophotonics, nanoplasmonics, and cavity quantum electrodynamics.
REFERENCES: [1] I.V. Bondarev, K .Tatur and L.M. Woods, Phys. Rev. B, submitted. [2] I.V. Bondarev and H. Qasmi, Physica E 40, 2365 (2008). [3] I.V. Bondarev, K. Tatur and L.M. Woods, Optics Communications, to appear in Dec. 2008.

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