Abstract Submitted
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Exciton-Plasmon Interaction Effects in Individual Carbon Nanotubes[1] IGOR BONDAREV, AREG MELIKSETYAN, North Carolina Central University — We have recently developed a theory for the electrostatically controlled coupling between excitons and low-energy inter-band plasmons in individual semiconducting carbon nanotubes [1]. Here, we report on our studies towards the applications of this effect of both applied and fundamental interest. One practical application is the electromagnetic absorption/photoluminescence control for individual nanotubes [2]. Another, fundamental one, comes from the fact that the coupling of the excitons to the same inter-band plasmon resonance results in their entanglement, a pre-requisite for strong quantum correlations/quantum phase transitions in many-particle systems [3]. Our coupled exciton-plasmon excitation is a quasi-1D Bose system and could possibly be Bose-condensed in an individual carbon nanotube under appropriately created external conditions — despite the mathematical statements [4] of the BEC impossibility in ideal 1D and 2D quantum systems and previously reported evidence [5] for no free-exciton BEC in carbon nanotubes.

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Igor Bondarev
North Carolina Central University

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