Abstract Submitted
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**Possibility for exciton Bose-Einstein condensation in carbon nanotubes**[1] IGOR BONDAREV, AREG MELIKSETYAN, North Carolina Central University — We demonstrate theoretically a possibility for exciton Bose-Einstein condensation (BEC) in individual small-diameter (∼1-2 nm) semiconducting carbon nanotubes [1]. The effect occurs under the exciton-interband plasmon coupling controlled by an external electrostatic field applied perpendicular to the nanotube axis. The effect requires fields ∼1 V/nm and temperatures below 100 K that are experimentally accessible. The effect offers a testing ground for fundamentals of condensed matter physics in one dimension and opens up perspectives to develop tunable highly coherent polarized light source with carbon nanotubes. Possibilities for achieving BEC in 1D and 2D systems are theoretically demonstrated in the presence of an extra confinement potential [2]. We show that the strongly correlated exciton-plasmon system in a carbon nanotube presents such a special case. We find the critical BEC temperature and the condensate fraction as functions of temperature and electrostatic field applied. We discuss how the effect can be observed experimentally.

[1] I.V.Bondarev, A.V.Meliksetyan, arXiv1304.2804 (submitted to PRB);
[2] V.Bagnato, D.Kleppner, PRA 44, 7439; W.-S.Dai, M.Xie, PRA 67, 027601.

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