

Cavity QED, Nanophotonics and Quantum Communication with Atomically Doped Carbon Nanotubes

Prof. Igor Bondarev

Physics Department

North Carolina Central University

1801 Fayetteville Str, Durham, NC 27707, USA

E-mail: ibondarev@ncu.edu

ABSTRACT

This talk reviews recent theoretical efforts towards understanding the near-field electrodynamic properties of carbon nanotubes doped with single atoms (ions). The research is motivated by the progress in the growth techniques of centimeter-long small-diameter single-walled nanotubes[1], experiments on the encapsulation of single atoms into single-walled nanotubes[2], and the need for the development of materials that may host quantum coherent states with long coherence lifetimes[3]. A variety of quantum optics phenomena, such as spontaneous decay and van der Waals interactions[4], light absorption and entanglement of atomic states[5], will be discussed.

REFERENCES:

- [1]L.Zheng et al., Nature Materials 3, 673 (2004).
- [2]G.-H.Jeong et al, Phys. Rev. B 68,075410(2003).
- [3]T.Brandes, Phys. Rep. 408, 315 (2005).
- [4]I.V.Bondarev and Ph.Lambin, Phys. Rev. B 70, 035407 (2004);
ibid. 72, 035451 (2005); also in: Trends in Nanotubes Research
(NovaScience, NY, 2006).
- [5]I.V.Bondarev and B.Vlahovic, Phys. Rev. B 74, xxxxxx (2006);
cond-mat/0605579.