

Abstract Submitted
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Theory of electroabsorption in semiconducting single-walled carbon nanotubes¹ HONGBO ZHAO, SUMIT MAZUMDAR, University of Arizona — Electroabsorption (EA) is a standard nonlinear optical technique to probe the excitonic characteristics of semiconductors.² In the context of single-walled carbon nanotubes (SWCNTs) the advantage of EA is that it can directly probe the excitons associated with higher bands, which lie in the continuum region of the lowest band, and cannot be probed by other nonlinear optical techniques like photoinduced absorption or two-photon absorption. Although currently it is still difficult to carry out EA experiments, because it requires separation of semiconducting SWCNTs from metallic ones, theoretical calculations can provide a benchmark results for future study. We have calculated EA for several S-SWCNTs with both zigzag and chiral tubes.³ For the lowest exciton we find the usual Stark shift, the emergence of absorption due to two-photon states and continuum band. We also find unusual and interesting behavior of the higher energy excitons from second band.

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²L. Sebastian and G. Weiser, *Phys. Rev. Lett.* **46**, 1156 (1981); D. Guo *et al.*, *Phys. Rev. B* **48**, 1433 (1993).

³J. W. Kennedy, Z. V. Vardeny, S. Collins, R. H. Baughman, H. Zhao, and S. Mazumdar, cond-mat/0505071.

Hongbo Zhao
University of Arizona

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