Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Exciton binding energies in metallic single-walled carbon nanotubes are comparable to those in semiconducting ones ZHENDONG WANG, SUMIT MAZUMDAR, University of Arizona — Excitons in metallic single-walled carbon nanotubes (M-SWCNTs) have attracted both theoretical [1] and experimental [2] attention recently. It has been claimed that exciton binding energies in M-SWCNTs are an order of magnitude smaller than those in semiconducting single-walled carbon nanotubes (S-SWCNTs). We have investigated M-SWCNTs within a π-electron Hamiltonian that has previously reproduced quantitatively the absolute energies as well as the binding energies of both longitudinal [3] and transverse [4] excitons in S-SWCNTs. We are able once again to reproduce quantitatively the available absolute exciton energies and the optical absorption spectra of M-SWCNTs with diameters 0.9 - 1.4 nm. While we need a dielectric constant larger than in the S-SWCNTs, our calculated exciton binding energies in this diameter range are 0.2 - 0.3 eV, only slightly smaller than those in S-SWCNTs with similar diameters. [5]

[1]J. Deslippe *et al.*, Nano. Lett. **7**,1626-1630 (2007).
[2]F. Wang *et al.*, unpublished
[3]Z. Wang, H. Zhao and S. Mazumdar, Phys. Rev. B **74**, 195406 (2006).
[4]Z. Wang, H. Zhao and S. Mazumdar, Phys. Rev. B **76**, 115431 (2007).
[5]Supported by NSF-DMR-0705163.

Sumitendra Mazumdar
University of Arizona

Date submitted: 29 Nov 2007 Electronic form version 1.4