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Electron-electron interaction effects on cross-polarized optical absorption in semiconducting single-walled carbon nanotubes (S-SWCNTs)[1] ZHENDONG WANG, SUMIT MAZUMDAR, University of Arizona — Within the tight binding theory of S-SWCNTs optical transitions polarized transverse to the nanotube axis, E_{12} and E_{21}, are degenerate, and occur at $(E_{11} + E_{22})/2$, where E_{11} and E_{22} are the optical transitions polarized along the nanotube axis. Electron-electron interactions split the degeneracy of the transverse transitions, giving new eigenstates that are a redshifted optically forbidden odd superposition and a blueshifted (by several tenths of 1 eV) optically allowed even superposition of the one-electron excitations [2]. Recent experiments [3] have confirmed our qualitative prediction. Here we report quantitative calculations of the longitudinal versus transverse optical absorptions in the four S-SWCNTs studied by Miyauchi *et al.*, within a π-electron Hamiltonian with long range Coulomb interactions [4]. We make detailed comparisons between experiments and theory. We also comment on the role of electron hoppings beyond nearest neighbor and the binding energy of the transverse exciton.

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