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Quasiparticle and exciton renormalization effects in carbon nanotubes near metallic surfaces CATALIN SPATARU, Sandia National Labs — We study theoretically the influence of a metallic surface on electron excitations (quasiparticles and excitons) in carbon nanotubes. Long-range polarization effects are included in the calculations using many-body *ab initio* approaches such as the GW approximation [2] for the electron self-energy and the Bethe-Salpeter equation [3] for excitonic effects. In the case of semiconducting carbon nanotubes and when charge transfer effects between nanotube and metal are not important, we find that the image charge effect can lead to significant renormalization of the quasiparticle energies in nanotubes even for an apparent height (of the nanotube relative to the metallic surface) of the order of nm (in agreement with experiment [1]). The calculations reveal the important role played by the intrinsic dielectric screening properties of the nanotubes in establishing these renormalization effects. Also, we find that the optical gap of the nanotubes is barely affected by the metallic surface due to the weaker interaction between the exciton transition dipole in the nanotube and its induced image in the metallic surface.. [1] H. Lin et al, *Nature Mater.* **9**, 235 (2010). [2] M.S. Hybertsen and S.G. Louie, *Phys. Rev. B* **34**, 5390 (1986). [3] M. Rohlfing and S.G. Louie, *Phys. Rev. B* **62**, 4927 (2000).

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