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Effect of spin-orbit interactions on the static polarizability of single-wall carbon nanotubes* G. S. DINIZ, S. E. ULLOA, Ohio University — The electronic structure of carbon nanotubes (CNTs) is known to exhibit different metallic or insulating behavior as different chiral vectors are considered. Application of external electric fields and the presence of spin-orbit interaction (SOI) result in the Rashba effect modifying the level structure of CNTs, strongly coupling spin and orbital degrees of freedom, as demonstrated in recent experiments [1]. In this work we calculate the static long-wavelength limit of the dielectric response of different single-wall CNTs when subjected to uniform external electric fields both along and across the longitudinal direction (parallel to the nanotube axis). Our calculation uses a π-band tight-binding formalism, considers Rashba and intrinsic SOI, and utilizes the random phase approximation to evaluate $\epsilon(q \to 0, \omega = 0)$ [2]. We use parameters from the literature and find that the metallic-to-semiconductor transition induced by the intrinsic SOI is suppressed as the Rashba field is taken into account. We further show that this behavior has a clear signature on measurable quantities, such as the static polarizability. We discuss its dependence on nanotube size and chirality and propose possible nanoprobe experiments to study this phenomenon. [1] F. Kuemmeth *et al.*, Nature 452, 448-452 (2008). [2] M. L. Cohen *et al.*, Phys. Rev. B 52, 8541 (1995). *Supported by Fulbright, CAPES and NSF-DMR MWN.

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