Abstract Submitted
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Aromatic trends in single-walled carbon nanotubes: diamagnetic anisotropy for arbitrary chiralities[1] O.N. TORRENS, D.E. MILKIE, H.Y. BAN, Dept. of Physics and Astronomy, Univ. of Pennsylvania, M. ZHENG, G.B. ONOA, T.D. GIERKE, DuPont CR&D, J.M. KIKKAWA, Dept. of Physics and Astronomy, Univ. of Pennsylvania — The chirality dependence of single-walled carbon nanotube (SWNT) properties often leads to "fan-out" diagrams whose departure from the large diameter scaling limit is of fundamental interest. Here we present the first experimental indication of fan-out behavior for orbital magnetic anisotropy ($\Delta\chi$), which has long been an important probe of electronic structure in aromatic molecules. We will discuss the experimental approach (polarized resonant photoluminescence) that made this background-free measurement possible, and explain how these results can be used to predict $\Delta\chi$ for *arbitrary* SWNT chiralities. Taking into account general symmetry considerations, *ab initio* calculations, large-diameter tight-binding theory, and our experimental data, we obtain a chiral expansion for $\Delta\chi$ using a single fitting parameter. The results show (2n+m) family trends whose asymmetry between "mod 1" and "mod 2" semiconducting families is reminiscent of those seen in other SWNT optical, phonon, and exciton properties. Finally, we discuss the (n,m) dependence of zone-folding tight binding calculations when applied to realistic tube sizes.

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