Abstract Submitted
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Asymmetric resonance Raman excitation profiles and violation of the Condon approximation in single-wall carbon nanotubes STEPHEN DOORN, JUAN DUQUE, HAGEN TELG, Los Alamos National Laboratory, HANG CHEN, ANNA SWAN, Boston University, ERIK HAROZ, JUNICHIRO KONO, Rice University, XIAOMIN TU, MING ZHENG, NIST — DNA wrapping-based ion exchange chromatography and density gradient ultracentrifugation provide nanotube samples highly enriched in single chiralities. We present resonance Raman excitation profiles for the G-band of several single chirality semiconducting and metallic species. The expected incoming and outgoing resonance peaks are observed in the profiles, but contrary to long-held assumptions, the outgoing resonance is always significantly weaker than the ingoing resonance peak. This strong asymmetry in the profiles arises from a violation of the Condon approximation [1]. Results will be discussed in the context of theoretical models that suggest significant coordinate dependence in the transition dipole (non-Condon effects). The generality of the behavior across semiconducting and metallic types, nanotube family, phonon mode, and Eii will be demonstrated.

[1] J. Duque et. al., ACS Nano, 5, 5233 (2011).

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