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K-momentum dark exciton energy in carbon nanotubes[1] O. N. TORRENS, J. M. KIKKAWA, Department of Physics and Astronomy, University of Pennsylvania, M. ZHENG, DuPont CR&D — Phonon sideband optical spectroscopy determines the energy of the dark K-momentum exciton for (6,5) carbon nanotubes (CNTs). One-phonon sidebands appear in absorption and emission, split by two zone-boundary (K-point) phonons. Their average energy locates the E_{11} K-momentum exciton 36 meV above the E_{11} bright level, higher than available theoretical estimates. A model for exciton-phonon coupling shows the absorbance sideband depends sensitively on the K-momentum exciton effective mass and has minimal contributions from zone-center phonons, which dominate the Raman spectra of CNTs.

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