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Coupled Radial Breathing Oscillation in Double-Walled Carbon Nanotubes KAIHUI LIU, XIAOPING HONG, UC Berkeley, ENGE WANG, Peking University, China, FENG WANG, UC Berkeley, UC BERKELEY COLLABORATION, PEKING UNIVERSITY, CHINA COLLABORATION — Double-walled carbon nanotubes (DWNTs) provide a model system for quantitative study of electronic and vibrational couplings in the nanoscale. Here we investigate coupled radial breathing mode (RBM) oscillations in structurally defined DWNTs by combining electron diffraction, Rayleigh scattering, and Raman scattering spectroscopy on the same individual nanotubes. We find that the two RBM oscillations in DWNTs are strongly coupled, with vibration energies significantly higher than those of constituent inner- and outer-wall nanotubes. In addition, the oscillation strength of these two coupled modes shows an interesting quantum interference behavior between the inner- and outer-wall electronic resonance channels.

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