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Interactions between individual carbon nanotubes studied by Rayleigh scattering spectroscopy TONY HEINZ, Columbia University, FENG WANG, MATTHEW SFEIR, LIMIN HUANG, X.M. HENRY HUANG, YANG WU, JAEHEE KIM, JAMES HONE, STEPHEN O'BRIEN, LOUIS BRUS — Single-walled carbon nanotubes (SWNTs), with diameters of nanometers and lengths up to millimeters, represent highly one-dimensional (1D) systems. Because all the carbon atoms of a SWNT lie on its surface, the physical properties of SWNTs depend sensitively on local environment.[1] In particular, the electronic properties of SWNTs are altered by inter-tube coupling whenever nanotube bundles are formed. We examine such inter-tube interactions experimentally at the single nanotube level. This is achieved by applying Rayleigh scattering spectroscopy[2] to probe the optical transitions of individual SWNTs in their isolated and bundled forms. Upon bundling, the transition energies of SWNTs are observed to undergo red shifts of tens of meVs, without any significant line broadening. These inter-tube coupling effects can be understood as arising from the mutual dielectric screening of SWNTs in a bundle. 1. Kong, J., et al., Science, **287,** 622 (2000). 2. Sfeir, M.Y., et al., Science, **306,** 1540 (2004).

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