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Direct measurements of electron-phonon coupling of radial breathing modes in carbon nanotubes and their chirality dependence Y. YIN, A. WALSH, B.B. GOLDBERG, Physics Department, Boston University, S.B. CRONIN, Electrical Engineering Department, University of Southern California, M. TINKHAM, Department of Physics, Harvard University, A.N. VAMIVAKAS, M.S. ÜNLÜ, A.K. SWAN, Electrical and Computer Engineering, Boston University — A method for direct measurement of electron-phonon coupling matrix elements, M_{e-ph}, is proposed and demonstrated experimentally by correlating resonant Raman excitation profiles of the first and second harmonics of the radial breathing mode. M_{e-ph} values are quantitatively determined for individual carbon nanotubes (CNT) excited in small ropes suspended in air. The results show that the matrix elements satisfy S. V. Goupalov and coworkers empirical tight binding theory calculation[1] with quantitative values that show a smaller electron-phonon coupling than reported from ab initio calculations[2] for isolated carbon nanotubes. We find that resonant excitation profile broadening η for CNTs in small ropes show a correlation with chiral angles that appears to be unchanged from isolated carbon nanotubes. 1 S. V. Goupalov, Satishkumar B. C., and S. K. Doorn, Pre- print (2005). 2 M. Machon, S. Reich, H. Telg et al., Phys. Rev. B 71 (3) (2005).

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