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Dynamic AC Conductivity and Radiative Dipole Coupling of Carbon Nanotubes DANIEL JOH, Cornell University — Rayleigh scattering spectroscopy has recently emerged as a powerful technique for probing CNTs at optical frequencies, but quantitative understanding of the electrical properties of CNTs, most importantly the dynamic AC conductivity $\sigma(\omega)$, at optical frequencies is currently missing. Using a new Rayleigh imaging technique, we are able to measure the elastic scattering intensity of individual carbon nanotubes while we vary the excitation wavelength, and for the first time, we show that the AC conductivity is uniform over many different CNTs for different resonances. We explain this surprising discovery using a model that includes energy dependent electron-(acoustic) phonon scattering. Finally, we present evidence of long-range radiative coupling between parallel CNTs, which suggests that a transfer of electric dipole is possible over a large distance (>300nm) when there is a significant resonance overlap.

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