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Absolute Rayleigh Intensity and Uniform Optical Conductivity in Carbon Nanotubes LIHONG HERMAN, Cornell Applied Physics, DANIEL JOH, JESSE KINDER, SANG-YONG JU, MICHAEL SEGAL, JEFFREYS JOHNSON, GARNET CHAN, JIWOONG PARK — We used a novel on-chip Rayleigh imaging technique to measure the absolute intensity of Rayleigh scattering of single-walled carbon nanotubes. The spatial distribution of the radiation scattered by the nanotubes is determined by their shape, but the intensity and spectrum of the scattered radiation are determined by exciton dynamics, quantum-dot-like optical resonances and other intrinsic properties. Moreover, the nanotubes display a uniform peak optical conductivity ∼8 e^2/ h, which we derive using an exciton model, suggesting universal behaviour similar to that observed in nanotube conductance. We further demonstrate a radiative coupling between two distant nanotubes, with potential applications in metamaterials and optical antennae. This is in contrast to the optical properties of metal nanostructures and show that nanotubes can form ideal optical wires.

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