

Abstract Submitted
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The emissivity of an incandescent carbon nanotube¹ B.C. REGAN, SCOTT SINGER, MATTHEW MECKLENBURG, EDWARD WHITE, UCLA Department of Physics and Astronomy, and CNSI — A classical thermal emitter has physical dimensions large compared to the wavelength λ of the emitted light, and radiates power in proportion to its surface area. To explore the non-classical limit, we build tiny incandescent lamps with individual multi-walled carbon nanotubes as their filaments. We image a filament with atomic resolution in a transmission electron microscope, determining its length L and radius r . Separately we apply Joule heating to reach temperatures ~ 2000 K, where the nanotube radiates in the visible ($L \sim \lambda \gg r$), and collect the light with an optical microscope. Comparing the filament's brightness with its tiny physical dimensions, we find that a single carbon nanotube is surprisingly black.

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B.C. Regan
UCLA Department of Physics and Astronomy, and CNSI

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