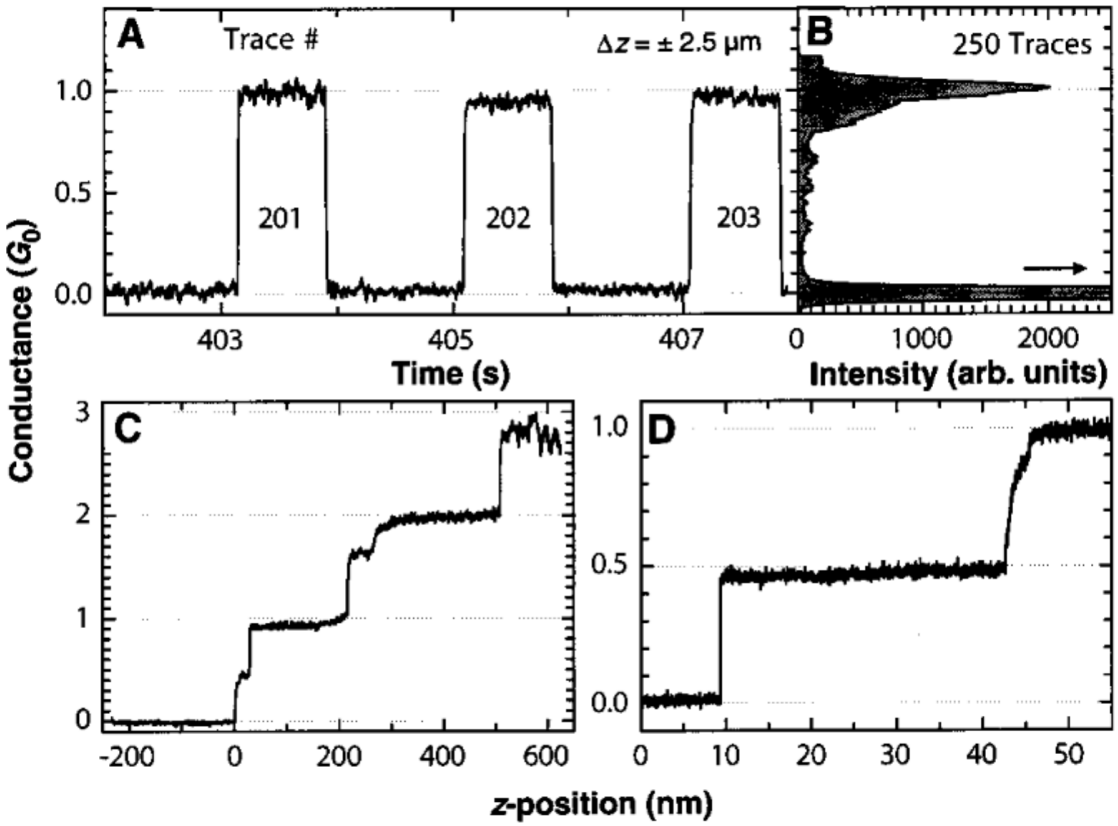
Quantum Transport

PH671 - Transport

Carbon nanotube conductance measurements. (**A**) Conductanceof a nanotube contact that is moved at constant speed into and out of the mercury contact as a function of time. The period of motion is 2 s and the displacement z 2.5 m. The conductance "jumps" to $1G_0$ and then remains constant for $\approx 2\ \mu$m of its dipping depth. The direction of motion is then reversed and the contact is broken after 2 μm SCIENCE VOL. 280 12 JUNE 1998 p1774



Isolated SWNTs were synthesized on a degenerately doped silicon wafer with a 1-m oxide layer by chemical vapour deposition. Individual SWNTs with 1-nm height were located by atomic force microscopy, and nanotube devices were fabricated by defining two Au/Cr electrodes on top of the SWNTs by electron-beam lithography. Electrical properties of nanotube devices were characterized as a function of bias voltage (V) and V_g. The degenerately doped silicon substrate was used as a gate electrode to modulate the charge density and the Fermi-level position within the nanotubes. The dotted curve shows a sinusoidal function with the same average period as the measured data. Comparison between these two plots shows that the measured data is quasi-periodic in V_g. Inset, a schematic diagram of the SWNT device, showing a nanotube with attached leads, the insulating gate oxide and the degenerately doped silicon gate.