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Toward Single-Walled Nanotube Aharonov-Bohm interferometers JINSEONG HEO, Caltech, MARC BOCKRATH, Caltech — Single-walled carbon nanotubes (SWNTs), which have micron-scale phase coherent lengths at low temperatures, are grown so that they cross themselves, producing a loop that may act as an Aharonov-Bohm interferometer. In order to determine electron pathways at the junction, we performed scanned gate microscopy (SGM) using an Atomic Force Microscopy(AFM) tip as a local gate. If a SGM signal is observed when the tip is over any particular segment it indicates current flow in that segment. Surprisingly, one semiconducting tube showed that most electrons tunnel into the other segment at the junction without flowing through the loop. For other samples, however, current flow was observed in the loop. Taken together, this suggests the possibility of controlling tunneling probabilities at the junction. Moreover, for metallic or small bandgap nanotubes, we reproducibly observe an unusual conductance peak near zero gate voltage, obtaining nearly identical behavior from devices made from the same 100 micron long nanotube. The results and interpretations of our ongoing experiments will be discussed.

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