Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Mott Insulating State in Ultra-clean Carbon Nanotubes VIKRAM DESHPANDE[1], Caltech, BHUPESH CHANDRA, ROBERT CALDWELL, Columbia University, DMITRY NOVIKOV, Yale University, JAMES HONE, Columbia University, MARC BOCKRATH, Caltech — The Mott insulating state is a manifestation of strong electron interactions in nominally metallic systems. Using transport spectroscopy, we show that an energy gap exists in nominally metallic carbon nanotubes, and occurs in addition to the band-gap in small-band-gap nanotubes, indicating that carbon nanotubes are never metallic. This gap has a magnitude ∼10-100 meV and nanotube radius dependence ∼1/r, in good agreement with predictions for a nanotube Mott insulating state. We also observe neutral excitations within the gap, as predicted for this state. Our results underscore nanotubes' exceptional capabilities for studying correlated electron phenomena in 1D.

Ref: V. V. Deshpande et al, *Science* (in press)

[1]Current affiliation: Columbia University

Vikram Deshpande
Columbia University

Date submitted: 21 Nov 2008 Electronic form version 1.4