Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Conductance Switching in Gated Graphene Nanoribbons JESSE M. KINDER, JONATHON J. DORANDO, GARNET K.L. CHAN, Cornell University — We have investigated transport through locally gated metallic graphene nanoribbons using a numerical tight-binding method. We consider a device in which the orientation of the gate with respect to the axis of the ribbon is variable. We find that the conductance, as calculated within the nonequilibrium Green function formalism, depends strongly on the gate voltage and the orientation of the gate. In particular, we identify specific angles at which a small change in gate voltage results in a large change in the probability of transmission. This response occurs in ribbons with zigzag or armchair edges and could provide a mechanism for a nanometer-scale electronic switch. Using the effective Dirac Hamiltonian for electrons in graphene, we provide a qualitative explanation for the ON-OFF response at particular angles and characterize its dependence on the geometry of the ribbon.

Jesse Kinder
Cornell University

Date submitted: 20 Nov 2008 Electronic form version 1.4