Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Quantum electron transport in toroidal carbon nanotubes with metallic leads. MARK JACK, MARIO ENCINOSA, Florida A&M University, Department of Physics, Tallahassee, FL 32307. — Carbon nanotubes and carbon nanotori possess all the interesting new electronic features seen in graphene e.g. massless Dirac fermion characteristics, small spin-orbit coupling effects, and quantized conductance, along with interesting curvature and boundary condition effects closing the tube to form a torus. The authors calculate electronic transport properties such as density-of-states and transmissivity for toroidal carbon nanotubes with attached metallic or carbon nanotube leads as functions of the lead positions. A tight-binding Hamiltonian for the nanotorus is applied to a 24-carbon-atom armchair unit cell. The closure of the straight tube to a toroidal geometry introduces an additional off-diagonal coupling term, not encountered for the straight case. The device Green's function is then evaluated in tight-binding approximation using a recursion method to systematically determine its diagonal and off-diagonal matrix elements. *References:* 1. M. Encinosa and M. Jack, Phys. Scr. 73 (2006) 439-442. 2. M. Encinosa and M. Jack, Excitation of surface dipole and solenoidal modes on toroidal structures. Photonics and Nanostructures (Elsevier), May 2006. (Submitted) 3. M. Encinosa and M. Jack, Dipole and solenoidal magnetic moments of electronic surface currents on toroidal nanostructures. J. of Computer-Aided Materials Design (Springer), May 2006. (In Press)

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Date submitted: 03 Dec 2006 Electronic form version 1.4