Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Effects of intrinsic spin-orbit coupling in carbon nanotubes[1] CARLOS A. BÜSSER, MAHDI ZAREA, NANCY SANDLER, Department of Physics and Astronomy, Ohio University, Athens OH 45701 USA. — The electronic structure and transport properties of carbon nanotubes (NTs) are the subject of intense theoretical and experimental studies. Tight-binding model predict these quasi-1D systems to be metallic or insulating depending on their chiral wrapping. Furthermore, external magnetic fields applied along the NT's axis, are expected to change these behaviorsby opening (metallic) or closing (insulating) gaps.
In this work we present preliminary numerical results obtained solving a tight-binding Hamiltonian [1] for band structures of armchair and zigzag NTs in the presence of the intrinsic spin-orbit (I-SO) interaction and magnetic fields. The I-SO interaction has dramatic effects, opening gaps for metallic NTs that are proportional the I-SO coupling constant. When considering an external field, the I-SO generated gaps show a quadratic dependence on the field strength in contrast with the linear dependence predicted in the absence of this interaction. Insulating tubes show increased gaps that do not close even in the presence of external fields.
[1] F.D. Haldane, Phys. Rev Lett. **61**, 2015 (1988).

[1]NSF DMR 0710581

C. A. Büsser
Department of Physics and Astronomy, Ohio University, Athens OH 45701 USA.

Date submitted: 27 Nov 2007 Electronic form version 1.4