Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Relaxation and dephasing in a two-electron ^{13}C nanotube double quantum dot HUGH CHURCHILL, FERDINAND KUEMMETH, JENNIFER HARLOW, ANDREW BESTWICK, EMMANUEL RASHBA, Harvard University, KARSTEN FLENSBERG, University of Copenhagen, CAROLYN STWERTKA, THITI TAYCHATANAPAT, Harvard University, SUSAN WATSON, Harvard University and Middlebury College, CHARLES MARCUS, Harvard University — We use charge sensing of Pauli blockade (including spin and isospin) in a two-electron ^{13}C nanotube double quantum dot to measure relaxation and dephasing times. The relaxation time, T_1, first decreases with parallel magnetic field then goes through a minimum in a field of 1.4 T. We attribute both results to the spin-orbit-modified electronic spectrum of carbon nanotubes, which suppresses hyperfine mediated relaxation and enhances relaxation due to soft phonons. The inhomogeneous dephasing time, T_2^*, is consistent with previous data on hyperfine coupling strength in ^{13}C nanotubes. This work was supported by the National Science Foundation under grant no. NIRT 0210736 and the GRFP, ARO/iARPA, the Department of Defense, and Harvard's Center for Nanoscale Systems.

Hugh Churchill
Harvard University

Date submitted: 20 Nov 2008 Electronic form version 1.4