Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Gated Spin Transport through an Individual Single Wall Carbon Nanotube[1] BHASKAR NAGABHIRAVA, TANESH BANSAL, Department of Electrical and Computer Engineering, University of Louisville, Louisville, GAMINI SUMANASEKERA, Department of Physics, University of Louisville, Louisville, LEI LIU, Department of Physics, McGill University, Montreal, BRUCE ALPHENAAR[2], Department of Electrical and Computer Engineering, University of Louisville — We report on the fabrication and characterization of ferromagnetically contacted "short channel" SWNT devices that show clear hysteretic switching in the magnetoresistance, and provide strong evidence for SWNT spin transport. The main difference between our work and previous studies is that we have greatly reduced the transport length separating the ferromagnetic contacts to distances on the order of 10 nm. Preliminary measurements demonstrate this reduction to be extremely beneficial. We have observed clear hysteretic switching in the magnetoresistance in 75% of our devices, and are able to modify the magnetoresistance between +15% and -10% as a function of gate voltage. The gate mediated change in magnitude *and sign* of the magnetoresistance switching allows us to discount other non-spin related sources for the observed signal and provides the basis for the first SWNT spin transistor. We note that the short channel contacting scheme is generally applicable to non-ferromagnetic contacts as well, and provides a straightforward technique for fabricating SWNT quantum dot devices.

[1]ONR/NSF, NASA
[2]Primary Reference

Bhaskar Nagabhirava
Department of Electrical and Computer Engineering,
University of Louisville, Louisville

Date submitted: 01 Dec 2005 Electronic form version 1.4