Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Electron spin relaxation in carbon nanotubes: Dyakonov-Perel mechanism[1] YURIY SEMENOV, JOHN ZAVADA, KI WOOK KIM, NCSU, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING TEAM — The long standing problem of unaccountable short spin relaxation in carbon nanotubes (CNT) meets a disclosure in terms of curvature-mediated spin-orbital interaction that leads to spin fluctuating precession analogous to Dyakonov-Perel mechanism. Strong anisotropy imposed by arbitrary directed magnetic field has been taken into account in terms of extended Bloch equations. Especially, stationary spin current through CNT can be controlled by spin-flip processes with relaxation time as less as 150 ps, the rate of transversal polarization (i.e. decoherence) runs up to 1/(70 ps) at room temperature while spin interference of the electrons related to different valleys can be responsible for shorter spin dephasing. Dependencies of spin-relaxation parameters on magnetic field strength and orientation, CNT curvature and chirality have been analyzed.

[1]Supported in part by the US ARO, NSF, and the FENA.

Yuriy Semenov
NCSU

Date submitted: 28 Nov 2009 Electronic form version 1.4