Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Anisotropic phonon-assisted spin relaxation in elliptical quantum dots[1] OLEG OLENDSKI, TIGRAN V. SHAHBAZYAN, Jackson State University — We study theoretically phonon-assisted spin relaxation of an electron confined in elliptical quantum dot subjected to a tilted magnetic field. We show that in the presence of both Rashba and Dresselhaus spin-orbit terms the relaxation rate exhibits anisotropy with respect to the in-plane field orientation. This anisotropy originates from the interference, at non-zero tilt angle, between the two spin-orbit terms that couple adjacent spin-split energy levels. The variation of the relaxation rate for different azimuthal angles is determined by the quantum dot geometry and by the relative strengths of the Rashba and Dresselhaus coupling constants. The effect is strongest when adjacent spin-split levels are brought into resonance by tuning the total field magnitude and tilt angle. In this case, for certain values of tilt angle, the relaxation rate can be drastically reduced by varying the in-plane field orientation. Calculations were performed for InSb quantum dots.

[1]Supported by NSF grant DMR-0305557

Oleg Olendski
Jackson State University

Date submitted: 24 Nov 2005 Electronic form version 1.4