Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Ballistic anisotropic magnetoresistance in nanowires JULIAN VELEV, University of Nebraska - Lincoln, RENAT SABIRIANOV, University of Nebraska - Omaha, SITARAM JASWAL, EVGENY TSYMBAL, University of Nebraska - Lincoln — We have performed an *ab-initio* study of the ballistic conductance of very thin ferromagnetic nanowires for magnetization parallel and perpendicular to the axis of the wire. We find that there can be a significant difference in the resistance for the two orientations of the magnetization giving rise to an appreciable ballistic anisotropic magnetoresistance (BAMR).This effect is similar to the AMR observed in the bulk systems. BAMR is due to the change in the number of bands crossing the Fermi energy produced by the spin-orbit interactions. The spin-orbit interactions lift the degeneracy of d-type bands for magnetization parallel but not perpendicular to the wire axis. This can cause a change in conductance if the degenerate levels are close to the Fermi energy. We find that BAMR can be either positive or negative. Similar ballistic magnetoresistance effect can be achieved by mechanical deformation caused, for example, by strain or magnetostriction.

Julian Velev
University of Nebraska

Date submitted: 03 Dec 2004 Electronic form version 1.4