Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Spin scattering in Pt and at its interfaces RYAN FREEMAN, ANDREI ZHOLUD, SERGEI URAZHDIN, Emory University, URAZHDIN GROUP TEAM — We study spin transport in Pt utilizing current perpendicular-to-plane (CPP) giant magnetoresistance (GMR) in nanoscale Permalloy (Py)-based spin valves with Pt inserted in the nonmagnetic spacer. The spin diffusion length and interfacial spin flipping coefficients are extracted from the dependence of GMR on the Pt thickness. We interpret our results in terms of two relevant spin scattering mechanisms: the EY mechanism resulting in spin flipping due to orbital scattering, and the Dyakonov-Perel (DP) mechanism caused by spin precession around the effective spin-orbit field. Our results are consistent with the published value of the spin diffusion length, showing the dominance of the EY mechanism, but show an unexpected temperature dependence. We also measure GMR in the ballistic limit, where the Pt is made thinner than its mean free path. Anomalous temperature dependence of the GMR of these samples is consistent with the observation of DP relaxation. Finally, the interfacial scattering is found to be significantly smaller at Pt/Py interfaces than at Pt/Cu interfaces. We argue that DP relaxation is suppressed at Pt/Py interfaces, due to the dominance of the proximity-induced effective exchange field.

Ryan Freeman
Emory Univ

Date submitted: 11 Nov 2016 Electronic form version 1.4