Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Temperature dependence of the spin Hall effect in mixed-valent $YbAl_3$[1] NEAL REYNOLDS, SHOUVIK CHATTERJEE, ARIEL SEIDNER, DARRELL SCHLOM, KYLE SHEN, DANIEL RALPH, Cornell University — The spin Hall effect results in a spin current that flows transverse to an applied electric field in non-magnetic materials, and that can be used to apply an efficient spin-transfer torque in magnetic memory devices. Theoretical predictions suggest that the strength of the spin Hall effect might be enhanced by rare-earth f-electron elements, if the f levels are hybridized with itinerant states and are sufficiently close in energy to the Fermi level. $YbAl_3$ is a rare-earth mixed-valence system, where Yb $4f$ states become increasingly itinerant at low temperatures. This is accompanied by a shift in binding energy of the $4f$ derived heavy bands towards the Fermi level and an enhanced $4f$ contribution to the YbAl3 Fermi surface, as temperature is lowered. We report on temperature dependent measurements of the spin Hall effect using spin-torque ferromagnetic resonance in YbAl3/Fe bilayers, and discuss implications for the spin Hall effect of increasing $4f$ density of states at the Fermi level.

[1]This work was supported by the National Science Foundation (DMR-1406333 and through the Cornell Center for Materials Research, part of the NSF MRSEC program, DMR-1120296) and the Office of Naval Research.

Neal Reynolds
Cornell Univ

Date submitted: 11 Nov 2016 Electronic form version 1.4