Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

**Weak anti-localization in ultrathin Sb(111) films** S. CAIRNS, N. MCGLOHON, C. ROBISON, J. KEAY, C.K. GASPE, K.S. WICKRAMASINGHE, T.D. MISHIMA, M.B. SANTOS, S.Q. MURPHY, University of Oklahoma, Norman
— We report the first studies of localization in ultrathin Sb films. Sb is a topological semi-metal with a negative bandgap of 180meV, however it is anticipated that in ultra-thin films, quantum confinement will open the bulk gap, such that transport is dominated by the topological surface states. We have studied the magneto-transport of nominally 4.5nm thick films of Sb(111) grown via molecular beam epitaxy at a temperature of 300C on nearly lattice matched epilayers. The longitudinal resistance shows positive magneto-resistance, well described by the standard weak anti-localization (WAL) theory of Hikami, Larkin and Nagaoka. The WAL response is consistent with that of a single conducting channel with a phase breaking length of $\sim$200nm at 1.8K. Scanning electron microscopy shows that the Sb growth proceeded by a Volmer-Weber (islanding) process resulting in disordered films. More recent growths performed at lower temperature have yielded significantly less resistive, smoother and thinner films for which transport measurements are ongoing.

Shayne Cairns
University of Oklahoma, Norman

Date submitted: 27 Nov 2012 Electronic form version 1.4