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Transport in Quantum Confined Sb(111)[1] SHAYNE CAIRNS, NOLAN TEASDALE, KAUSHINI WICKRAMASINGHE, CHOMANI GASPE, LIN LEI, TETSUYA MISHIMA, JOEL KEAY, MICHAEL SANTOS, SHEENA MURPHY, University of Oklahoma — 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 topological surface states. We have studied the magneto-transport of 1.5 nm to 3.2 nm films of Sb(111) grown via molecular beam epitaxy on nearly lattice matched epilayers of GaSb(111). SEM shows the Sb growth yielded smooth and continuous films that show significantly reduced bulk conduction at low temperatures. ρ_{xx} displays a linear dependence at high magnetic fields that increases with decreasing film thickness in good agreement with calculations for a linearly dispersing systems with overlapping Landau levels.. At lower fields the films display positive magneto-resistance, well-described by the weak anti-localization (WAL) theory of Hikami, Larkin and Nagaoka for strong spin orbit coupling, yielding phase breaking lengths 1μm at 300mK. Projects to investigate quantum interference in lithographically defined wires and to seek proximity-induced superconductivity are ongoing.

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