Abstract Submitted
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Molecular Beam Epitaxy of Ultra-Thin Sb Films for Surface Transport Studies[1] KAUSHINI WICKRAMASINGHE, CHOMANI GASPE, SHAYNE CAIRNS, NOLAN TEASDALE, TETSUYA MISHIMA, JOEL KEAY, MATTHEW JOHNSON, SHEENA MURPHY, MICHAEL SANTOS, University of Oklahoma, Homer L. Dodge Department of Physics and Astronomy — Our growth study of ultra-thin Sb films is motivated by theoretical studies that predict a topo-electronic phase transition as a function of Sb film thickness due to quantum confinement and surface coupling effects. In thick films, transport measurements will be dominated by bulk conduction because the band structure of bulk elemental Sb is semi-metallic. Our goal is to enable transport measurements of topological surface states by suppressing the bulk conductivity through quantum confinement in thin Sb layers. Good control over the growth conditions allowed us to vary the thickness of the Sb films ranges from 0.7 nm to 6 nm with good repeatability. Electrical transport measurements indicate that surface states are responsible for about 25% of the conductivity at 20K in a 3.7 nm thick Sb layer where the bulk conductivity is suppressed by about a factor of 2. We will discuss the structural properties of the Sb films using different electron microscopy techniques.

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