MBE growth and transport of the topologically tunable (Bi$_{1-x}$In$_x$)$_2$Se$_3$ system MATTHEW BRAHLEK, NAMRATA BANSAL, NIKESH KOIRALA, Rutgers University Physics and Astronomy, SUYANG XU, ZAHID HASAN, Princeton University Physics, SEONGSHIK OH, Rutgers University Physics and Astronomy — A current challenge in the field of topological insulators (TI) is identifying a clear transport signal of the surface conduction. The structural similarity between Bi$_2$Se$_3$ and In$_2$Se$_3$ allowed us to combine the two to obtain (Bi$_{1-x}$In$_x$)$_2$Se$_3$; Bi$_2$Se$_3$ has inverted bands, and thus is a non-trivial insulator. In$_2$Se$_3$ has no inverted bands and is therefore a trivial band insulator with energy gap 1.3-1.9 eV. The mixing ratio $x$ can be thought of as a knob to switch the system from a trivial to a non-trivial state. I will briefly discuss our scheme for producing atomically smooth molecular beam epitaxial grown thin films. I will also discuss our work on transport in the TI-to-non TI regime, and the metal to insulator regime, and compare these results with angle resolved photo emisson spectroscopy data.

Matthew Brahlek
mbrahlek@gmail.com
Rutgers University Physics and Astronomy

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