Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Transport Properties of InAs/GaSb Bilayers with a Tunneling Barrier RUIYUAN LIU, LINGJIE DU, RUI-RUI DU, Rice University, GERALD SULLIVAN, Teledyne Scientific — Inverted InAs/GaSb bilayers have been shown to support the quantum spin Hall effect, characterized by an insulating 2D bulk and a pair of counter - propagating helical edge states around the perimeter of the sample. Here we investigate the transport properties of InAs/GaSb bilayers in similarly inverted bands, but with an AlGaSb tunneling barrier placed between InAs and GaSb quantum wells. While the interlayer tunneling are essentially suppressed by increasing the barrier width, we found that the 2D bulk can still be turned into an insulating state that is characterized by a temperature-dependent resistance peak as a function of gate biases. On the other hand, we found no evidence for edge states in this regime. In this talk, we will present sample structures, transport data, as well as a brief discussion in connection to possible coherent exciton states in InAs/GaSb system proposed in Naveh and Laikhtman, Phys Rev. Lett. 77, 900 (1996). Work in Rice was supported by DOE DE-FG02-06ER46274.

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Date submitted: 14 Nov 2014 Electronic form version 1.4