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Growth and Characterization of Mn Doped InAs/GaSb Quantum Wells: Toward a 2D Quantum Anomalous Hall Insulator DI XIAO, SUSAN KEMPINGER, NITIN SAMARTH, Department of Physics, The Pennsylvania State University — The new discovery of a class of quantum spin Hall insulators (QSHIs), namely the type-II broken gap InAs/GaSb quantum wells (QWs), has drawn much attention in the condensed matter community. Counter-propagating helical states protected by time reversal symmetry exist at the edge, giving a quantized Hall conductance of $2e^2/h$, while the bulk remains insulating in this 2D topological insulator (TI). Compared to other TI systems, InAs/GaSb QW has a great advantage that the band structure, with a small hybridization gap, can be continuously tuned through electric fields, allowing the topological phase transition between trivial and topological phases. A recent theoretical proposal [PRL, 113.14(2014)] indicates that it is possible to keep only one chiral edge state without external magnetic field, i.e. the quantum anomalous Hall (QAH) state, by introducing long-range ferromagnetic order into this QW system. (In,Mn)As and (Ga,Mn)Sb have been well studied as diluted magnetic semiconductors, making Mn-doping a reasonable choice. Here, we present preliminary results on the MBE growth and characterization of electrically-gated Mn doped InAs /GaSb QWs. We will present a discussion of magnetization and magneto-transport measurements. Funded by ONR.

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