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Quantum transport in a single quantum wire fabricated on epitaxially grown InGaAs-InAs heterostructures[1] J. SHABANI, California NanoSystems Institute, UCSB, Y. KIM, Department of Physics, UCSB, R.M. LUTCHYN, C. NAYAK, Microsoft Research Station Q, C.J. PALMSTRØM, Department of Electrical Engineering, UCSB — One-dimensional semiconducting quantum wires with strong spin orbit interaction represent a unique platform for realization of exotic topological states of matter such as Majorana fermions and novel spintronic devices. Self-assembled nanowires have shown great promise in providing a testbed for one-dimensional experiments. However, controlled assembly of nanowires for scaling and building complex architectures will be challenging. Molecular beam epitaxy (MBE) growth of large area two-dimensional systems combined with semiconductor processing could provide a venue to overcome these issues. In this work, we have studied quantum transport in a single quantum wire fabricated on MBE grown InGaAs-InAs two dimensional electron systems. The magnetoconductance measurements show a clear weak anti localization (WAL) peak and conductance fluctuation at low magnetic field. Further we show that the spin orbit interaction in this quantum wire can be controlled by changing the confinement potential using an external top gate. Quantitative analysis of measured WAL peaks using one-dimensional theoretical model shows an excellent agreement between theory and experiment.

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