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Fabrication of quantum wire circuits from MBE-grown InAs CAROLYN KAN, CHI XUE, JAMES ECKSTEIN, University of Illinois Urbana-Champaign — If topological quantum computing using Majorana fermions evolves past tabletop experiments involving manipulation of a small number of qubits, scalability of quantum circuits will become an important consideration. At present, experiments have focused on vertically grown nanowires, which must be laid out on a substrate and electrically contacted ex situ. This severely limits the flexibility of the device geometry due to randomness in how the wires fall, and thus hinders the future scalability of the nanowire architecture. We are fabricating quantum wire circuits by lithographic methods out of thin films grown by MBE. We examine high quality MBE-grown InAs material grown GaAs and GaSb substrates, and consider its potential in building Majorana circuits. In particular, better epitaxy and transport is obtained in films grown on lattice matched GaSb, and substrate conductivity appears to freeze out at low temperatures.

Carolyn Kan
University of Illinois Urbana-Champaign

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