Abstract Submitted
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Proximity effect in a Nb-InAs-Nb nanowire junction[1] JONATHAN BAUGH, KAVEH GHARAVI, GREG HOLLOWAY, CHRIS HAAPAMAKI, Institute for Quantum Computing, University of Waterloo, RAY R. LAPIERRE, McMaster University — Proximity effect superconductivity in semiconductor-superconductor hybrid devices contains rich physics and could be key to the realization of topological quantum information processing. We have performed a series of low temperature electronic transport measurements on an InAs nanowire contacted with Niobium leads. The channel length ($\sim$ 4 times the nanowire diameter) is shorter than the electronic phase coherence length, but longer than the elastic mean free path, leading to behaviour that can be modelled by a superconductor-normal-superconductor junction in the diffusive transport regime. A supercurrent is observed below a critical current I_c of up to $\sim$50 nA. The critical current varies with local gate voltages and correlates with the normal state conductance, producing modulation of I_c related to universal conductance fluctuations. An applied magnetic field produces a Gaussian decay of I_c, consistent with known theory. Analysis of multiple Andreev reflection corrections to conductance indicates a contact transparency $\approx$0.6. The full results help to shed light on the nature of proximity effect superconductivity in a quasi-one-dimensional semiconductor in the quasi-diffusive regime.

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