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Coherent electron transport in InAs nanowires MARION J. L. SOURRIBES, IVAN ISAKOV, MARINA PANFILOVA, London Centre for Nanotechnology, University College London, DANIELE ERCOLANI, FRANCESCO GIAZOTTO, LUCIA SORBA, NEST, Istituto Nanoscienze-CNR and Scuola Normale Superiore, PAUL A. WARBURTON, London Centre for Nanotechnology, University College London — Indium arsenide nanowires are of special interest since they exhibit high mobility, strong spin-orbit coupling and form ohmic contacts with metals which make them good candidates for the observation of Majorana fermions in semiconductor/superconductor hybrid systems. InAs nanowires have already been used as Josephson elements in superconducting devices. Here we report our low-temperature experiments on InAs nanowires grown by two methods: (i) gold-catalyzed chemical beam epitaxy on InAs (111) substrates; (ii) catalyst-free molecular beam epitaxy on Si (111) substrates. Contacts to the nanowires are defined by e-beam lithography. Before metallization of the contacts, the nanowire surface is deoxidized by an in situ sputter-cleaning process leading to a specific contact resistance of $9.8 \times 10^{-9}\,\Omega.\mathrm{cm}^2$. These highly transparent contacts allowed the observation of proximity-induced superconductivity in InAs nanowires connected with Nb contacts. The critical current was tuned by changing the gate voltage. Both magnetic-field-dependent and gate-voltage-dependent measurements of universal conductance fluctuations were performed to extract information on the electron phase coherence.

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