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Andreev Interferometry of Proximitized Semiconductor Nanowires C. CHECKLEY, D. YUVARAJ, London Centre for Nanotechnology, University College London, H. LIU, Department of Electronic and Electrical Engineering, University College London, M. SOURRIBES, M. PANFILOVA, P.A. WARBURTON, E.J. ROMANS, London Centre for Nanotechnology, University College London — By using the proximity effect to combine the spin orbit coupling of a semiconducting nanowire with a conventional superconductor it is possible to create a p_x+ip_y superconductor capable of supporting Majorana fermions [1]. We have designed a circuit in which an Andreev Interferometer is connected via superconducting leads to a proximtized InSb nanowire to investigate the presence of Majorana fermions in the nanowire. An Andreev Interferometer is a mesoscopic device consisting of a normal metal cross. One branch of the cross is placed between two superconducting electrodes while the resistance of the other branch is monitored. Phase coherent transport causes the resistance to oscillate as a function of the phase difference between the two superconductors [2]. In this way it is possible to use the interferometer as a detector of superconducting phase. A magnetic flux perpendicular to the circuit will create an external phase. If Majorana fermions are present in the nanowire, the phase around loop is distributed differently and there is a change in the magneto-resistance oscillations of the interferometer. In this paper we explain how the presence of Majorana fermions will affect the behaviour of our junction, describe our fabrication process and discuss our preliminary results. [1] R.M. Lutchyn et al., Phys. Rev. Lett. 105, 077001 (2010). [2] V.T. Petrashov et al., Phys. Rev Lett. 95, 147001 (2005).

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