Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Superconducting quantum interference devices with graphene junctions. MICHAEL THOMPSON, JONATHAN PRANCE, RICHARD HALEY, YURI PASHKIN, Department of Physics, Lancaster University, Lancaster, UK, MOSHE BEN SHALOM, VLADIMIR FALKO, School of Physics Astronomy, University of Manchester, UK, ANTHONY MATTHEWS, JEREMY WHITE, ROMAN VIZNICHENKO, ZIAD MELHEM, Oxford Instruments Nanoscience, Oxon, UK — We present measurements of DC superconducting quantum interference devices based on Nb/graphene/Nb Josephson junctions. The superconducting proximity effect in graphene can be used to build Josephson junctions whose critical current can be controlled by field-effect gates. These junctions combine the tunability of semiconductor Josephson junctions with the high critical currents and low contact resistances of metal SNS junctions [1]. By using local gates, the SQUID junction critical currents can be modified individually and this allows the sensitivity and symmetry of the SQUID to be controlled in-situ. We compare the critical current of the SQUID with simulations that include a non-sinusoidal current phase relation in the junctions, as expected for ballistic graphene junctions. We also investigate the transfer function of the device in both symmetric and asymmetric configurations and find a highest transfer function of 300 $\mu V/\Phi_0$. Graphene Josephson junctions have the potential to add functionality to existing technologies; for example, to make SQUID magnetometers with tunable sensitivity or superconducting qubits with fast electrical control. [1] Ben Shalom et al., Nature Physics 2015, 12, 318–322

Michael Thompson
Department of Physics, Lancaster University, Lancaster, UK

Date submitted: 11 Nov 2016 Electronic form version 1.4