Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Large spin-orbit quantum interference effects in a dual-gated InSb nanowire device ILSE VAN WEPEREN, DEBBIE EELTINK, Kavli Institute of Nanoscience, Delft University of Technology, Delft, The Netherlands, BRIAN TARASINSKI, Instituut-Lorentz, Universiteit Leiden, Leiden, The Netherlands, MICHAEL WIMMER, Kavli Institute of Nanoscience, Delft University of Technology, Delft, The Netherlands, SEBASTIEN PLISSARD, ERIK BAKKERS, Department of Applied Physics, Eindhoven University of Technology, Eindhoven, The Netherlands, LEO KOUWENHOVEN, Kavli Institute of Nanoscience, Delft University of Technology, Delft, The Netherlands — InSb nanowires are the material of choice for one-dimensional topological superconducting systems. One of their favorable properties is their strong spin-orbit interaction (SOI). Measurements of the SOI strength in InSb nanowires in an open system, relevant to topology experiments, are however lacking. We therefore study the SOI in InSb nanowires in a dual-gated InSb nanowire device by means of low field magnetoconductance measurements. At a temperature of 4 K we observe a large amplitude ($\sim$0.2 e^2/h) SOI quantum interference effect. The large quantum correction to the conductance indicates a strong SOI and a long phase coherence length. We observe a crossover between positive magnetoconductance at low conductance and negative magnetoconductance at larger conductance. We examine the tunability of SOI quantum interference effects at constant conductance. Surprisingly, SOI quantum interference effects do not depend on the orientation of the magnetic field w.r.t. the nanowire. We employ simulations of the coherent backscattering trajectories in a nanowire to elucidate this isotropic response.

Ilse van Weperen
Kavli Institute of Nanoscience, Delft University of Technology,
Delft, The Netherlands

Date submitted: 15 Nov 2013 Electronic form version 1.4