Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Quantum point contact as a probe of a topological superconductor MICHAEL WIMMER, ANTON AKHMEROV, JAN DAHLHAUS, CARLO BEENAKKER, Instituut-Lorentz, Universiteit Leiden, The Netherlands — We calculate the conductance of a ballistic point contact to a superconducting wire, produced by the s-wave proximity effect in a semiconductor with spin-orbit coupling in a parallel magnetic field. The conductance G as a function of contact width or Fermi energy shows plateaus at half-integer multiples of $4e^2/h$ if the superconductor is in a topologically nontrivial phase, supporting Majorana fermions. In contrast, the plateaus are at the usual integer multiples in the topologically trivial phase without Majorana fermions. Disorder destroys all plateaus except the first, which remains precisely quantized in the case of a topological superconductor, consistent with previous results for a tunnel contact. The advantage of a ballistic contact over a tunnel contact as a probe of the topological phase is the strongly reduced sensitivity to finite voltage or temperature.

Michael Wimmer
Instituut-Lorentz, Universiteit Leiden, The Netherlands

Date submitted: 11 Nov 2011 Electronic form version 1.4