MAR10-2009-000289

Abstract for an Invited Paper
for the MAR10 Meeting of
the American Physical Society

Entanglement in a fermionic two-particle interferometer

PETER SAMUELSSON, Lund University

We discuss a theory for entanglement generation and detection in fermionic two-particle interferometers. The motivation for our work is provided by the recent experiment by the Heiblum group, Neder *et al*, Nature **448**, 333 (2007), realizing the two particle interferometer proposed in [1]. The experiment displayed a clear two-particle Aharonov-Bohm effect, however with an amplitude suppressed due to finite temperature and dephasing. This raised qualitative as well quantitative questions about entanglement production and detection in mesoscopic conductors at finite temperature. As a response to these questions, in our recent work [2] we present a general theory for finite temperature entanglement in mesoscopic conductors. Applied to the two-particle interferometer we show that the emitted two-particle state in the experiment is clearly entangled.

[1] Samuelsson, Sukhorukov, and Buttiker, Phys. Rev. Lett. **92**, 026805 (2004).
[2] Samuelsson, Neder, and Buttiker, Phys. Rev. Lett. **102**, 106804 (2009).