MAR07-2006-007012

Abstract for an Invited Paper
for the MAR07 Meeting of
the American Physical Society

Aharonov-Bohm effect in the spin-incoherent regime of strongly correlated 1D electrons

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Recently the spin-incoherent regime of the interacting one-dimensional electron gas has received much attention. In this regime the exchange coupling of nearest neighbor spins is so small that it is completely disrupted by the thermal motion. This regime is generic to low density 1D systems. It is not captured by the standard Luttinger liquid theory and it is expected to exhibit a number of anomalous properties. One of its unusual features is an anomalous conductance suppression reminiscent of conductance reductions observed in quantum wires and point contacts. Despite its great theoretical interest spin incoherence has not yet been demonstrated conclusively in experiments and specific probes of the regime are needed. In this talk I will discuss various tunneling and Aharonov-Bohm interference geometries [1] that can serve this purpose. Spin incoherence will be shown to have a number of distinctive signatures in such experiments such as magnetic field dependent tunneling exponents [2], a strong magnetic field dependence of the interference contrast, and an anomalous scaling of this contrast with the applied voltage [1]. In collaboration with P.W. Brouwer and A.J. Millis. [1] M. Kindermann, P. W. Brouwer, and A. J. Millis, Phys. Rev. Lett. **97**, 036809 (2006). [2] M. Kindermann and P. W. Brouwer, Phys. Rev. B **74**, 115121 (2006).