Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Local Density of States of a Quantum Point Contact Near Pinchoff LINDSAY MOORE, DAVID GOLDHABER-GORDON, Stanford University — Over the last decade, there has been great interest in how electrons flow through a quantum point contact (QPC) as it is just opened up, before a fully transmitting 1D conduction channel is available. Remarkably, there does not seem to be a smooth transition from tunneling to ballistic transport. Instead, a shoulder appears in the conductance versus channel width, at a conductance of roughly 0.7 times that of an open spin-degenerate channel. Experiments have built a consensus that this so-called "0.7 structure" is related to electron spin and electron-electron interaction, but the detailed description remains controversial. To study this system, we have made devices where one of the two QPC gates is actually a tunnel barrier to a third lead, fabricated on a GaAs/AlGaAs heterostructure. With this third lead, it is possible to probe the density of states in the QPC channel from the side as the QPC opens from pinchoff through the first channel. We acknowledge support from the ONR Young Investigator Program, Award No. N00014-01-1-0569 and a Research Corporation Research Innovation Award, No. RI1260.

Lindsay Moore
Stanford University

Date submitted: 04 Jan 2006 Electronic form version 1.4