Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Fabry Perot phenomena in nanowire cavities[1] MICHELLE TOMCZYK, GUANGLEI CHENG, SHICHENG LU, JOSHUA VEAZEY[2], MENGCHEN HUANG, PATRICK IRVIN, Univ of Pittsburgh, HYUNGWOO LEE, SANGWOO RYU, CHANG-BEOM EOM, Univ of Wisconsin-Madison, JEREMY LEVY, Univ of Pittsburgh — A solid-state geometry analogous to an optical Fabry-Perot cavity gives evidence for coherent transport on the order of microns through nanowires at the $LaAlO_3/SrTiO_3$ (LAO/STO) interface. Conductive AFM lithography is used to create both the nanowires and the two confining barriers which define the cavity. These two barriers act as the primary scattering centers so that as the chemical potential is tuned through the conducting state of the device, partial reflections from the barriers interfere in the cavity, resulting in quasi-periodic oscillations of the conductance at low temperatures. Full and extended single-mode periodicity is not observed in all devices; however, the conductance oscillations are only observed in cavity structures, suggesting that the effects of the two manufactured barriers dominate over any random scattering sites from disorder. The conductance oscillations from interference of coherently scattered electrons give evidence for ballistic transport on much longer length scales than implied by mobility measurements in two-dimensional LAO/STO.

[1]We gratefully acknowledge financial support from ARO (W911NF-08-1-0317), AFOSR (FA9550-10-1-0524 and FA9550-12-1-0342), and NSF (DMR-1104191, DMR-1124131, and DMR-1234096).
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Date submitted: 13 Nov 2014 Electronic form version 1.4