Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Weak Localization and Electron-Electron Interactions in Indium-Doped ZnO Nanowires RICHARD S. THOMPSON, University of Southern California, DONGDONG LI, University of Southern California and Shanghi Jiao Tong University, GERD BERGMANN, CHRISTOPHER M. WITTE, JIA G. LU, University of Southern California — Single crystal ZnO nanowires doped with indium are synthesized via the laser-assisted chemical vapor deposition method. The conductivity of the nanowires is measured at low temperatures in magnetic fields with directions both perpendicular and parallel to the wire axes. A quantitative fit of our data is obtained, consistent with the theory of a quasi-one-dimensional metallic system with quantum corrections due to weak localization and electron-electron interactions. The anisotropy of the magneto-conductivity agrees with theory. The two quantum corrections are of approximately equal magnitude with respective temperature dependences of $T^{-1/3}$ and $T^{-1/2}$. The alternative model of quasi-two-dimensional surface conductivity is excluded by the absence of oscillations in the magneto-conductivity in parallel magnetic fields.

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Date submitted: 19 Nov 2009 Electronic form version 1.4