Abstract Submitted
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Imaging the Wavefunction of a One-Electron Quantum Dot[1] ERIN E. BOYD, HALVAR J. TRODAHL, Dept of Physics, Harvard Univ, PARISA FALLAHI, Dept of Physics, ETH, R.M. WESTERVELT, Dept of Physics and Sch of Eng and App Sci, Harvard Univ, LINUS E. FROBERG, LARS SAMUELSON, Dept of Solid State Physics, Lund Univ — InAs quantum dots grown in InAs/InP nanowires are promising contenders for nanoelectronics. A fundamental understanding of the quantum behavior of the electron is important for the design of quantum devices. We have developed an imaging technique to image the electron wavefunction of a quantum state inside a long InAs dot (length>diameter) formed by InP barriers, using a liquid He-4 cooled scanning probe microscope [1]. The electrostatic potential of the tip dents the wavefunction and changes the energy of the quantum state by an amount proportional to the electron probability density at the tip position. Using Coulomb blockade conductance images of the dot, the energy change vs. tip position can be found. By deconvolving the measured energy shift with the tip potential, one can extract the electron probability density, using first-order perturbation theory. [1] P. Fallahi, PhD Thesis, Harvard Univ (2006).

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