Abstract Submitted
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Accumulation-Mode Quantum-Dot Devices[1] MATTHEW BORSELLI, EDWARD CROKE, MARK GYURE, ROBERT HAYES, IVAN MILOSAVLJEVIC, ADELE SCHMITZ, JEONG-SUN MOON, ANDREW HUNTER, HRL Laboratories, LLC — We have developed a quantum-dot device based on a double-well heterostructure in which electrons are localized in the top, mostly empty well by forward biasing a small circular gate. Charge occupancy changes in the dot are monitored by measuring current confined to a narrow channel in the bottom well. In this design, dot occupancy is primarily controlled by a single gate and interacting dots can be straightforwardly fabricated. We have successfully fabricated and characterized single-dot devices of this design in AlGaAs/InGaAs, and are extending the design to SiGe/Si heterostructures. We have measured charging spectra of III-V versions of the device down to zero electron occupancy. Charging spectra show enhanced stability for n=2, 6, 12, and 20 electrons. We have measured the tunneling times as a function of bias to map out excited states of a two-electron dot.

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