

Abstract Submitted
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Kondo and Superconducting Proximity Effect in Semiconductor Nanostructures ANDY VIDAN, MICHAEL STOPA, ROBERT WESTERVELT, Harvard University, MICAH HANSON, A.C. GOSSARD, UC Santa Barbara, JIE XIANG, CHARLES M. LIEBER, Harvard University — We have fabricated a unique device containing three quantum dots in a GaAs/AlGaAs heterostructure containing a two-dimensional electron gas using lithographically patterned gates and an etched trench in the center of the ring. By only energizing certain gates, this device allows us to study electron transport through a single dot, a double dot, or a triple dot ring. We can determine the absolute number of electrons in a quantum dot using a nearby charge sensor and find that we are able to tune a single dot to the one and two electron regime. We find several sharp peaks in the differential conductance, occurring at both zero and finite source-drain bias, for the one and two electron quantum dot. At zero source-drain bias, the temperature and magnetic field dependence of the conductance is consistent with a standard Kondo resonance. We attribute the peaks at finite-bias to a Kondo effect through excited states of the quantum dot. We also present recent observations of supercurrents in Ge/Si 1D nanowire heterostructures.

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