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Tunable double quantum dots in InAs nanowires defined by local gate electrodes. CARINA FASTH, ANDREAS FUHRER, LARS SAMUELSON, Lund University — We present low-temperature transport measurements on quantum dots induced in homogeneous InAs quantum wires 50 nm in diameter. Quantum dots are induced by electrical depletion of the wire using local gate electrodes with down to 30 nm electrode spacing. This scheme has permitted the realization of fully gate-defined multiple quantum dots along the nanowire [1]. Tunability in double quantum dots is a prerequisite for the system to be operated as a quantum gate. We demonstrate control over the lead tunnel barrier transparencies and, in the case of double quantum dots, the interdot coupling. Using the local gate electrodes also as plunger gates we measure double dot honeycomb stability diagrams which show the transition from a single large dot to two weakly coupled dots at 4.2K. The induced quantum dots can be tuned into the few-electron regime which is shown from Coulomb blockade measurements. We extract values of orbital energy-level spacings, capacitances and capacitive and tunnel interdot coupling for this system. [1] C. Fasth et al., NanoLett 5, 1487 (2005).

Carina Fasth
Lund University

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