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Pulsed-gate manipulation and real-time readout of one electron in Si/SiGe quantum dots C. B. SIMMONS, MADHU THALAKULAM, B. M. ROSEMEYER, B. J. VAN BAEL, D. E. SAVAGE, MARK FRIESEN, S. N. COPPERSMITH, M. A. ERIKSSON, University of Wisconsin - Madison — We present the results of recent charge-sensing measurements of electrons in a Si/SiGe double quantum dot, demonstrating controlled occupation of the (0,0), (1,0), (0,1), and (1,1) charge states. Pulsed gate voltages can be used to determine the tunnel rates on and off such dots. We present the results of recent pulsed-gate experiments on both single and double quantum dots. Electron tunneling at MHz rates in the one-electron state is observed. We observe energy-dependent tunneling in these quantum dots: we consistently find significant reductions in tunnel rates as the energy eigenstates on the quantum dot drop below the Fermi level of the leads, and we discuss the utility of this effect for readout and initialization. We also present real-time readout of the occupation of the quantum dot, enabling the single-shot measurement of electron tunneling events. This work was supported by ARO and LPS, DOD, and NSF.

Christine Simmons
University of Wisconsin - Madison

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