Abstract Submitted
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ESR Experiments on a Single Donor Electron in Isotopically Enriched Silicon[1] LISA TRACY, DWIGHT LUHMAN, STEPHEN CARR, JOHN BORCHARDT, NATHANIEL BISHOP, GREGORY TEN EYCK, TAMMY PLUYM, JOEL WENDT, WAYNE WITZEL, ROBIN BLUME-KOHOUT, ERIK NIELSEN, MICHAEL LILLY, MALCOLM CARROLL, Sandia National Labs — In this talk we will discuss electron spin resonance experiments in single donor silicon qubit devices fabricated at Sandia National Labs. A self-aligned device structure consisting of a polysilicon gate SET located adjacent to the donor is used for donor electron spin readout. Using a cryogenic HEMT amplifier next to the silicon device, we demonstrate spin readout at 100 kHz bandwidth and Rabi oscillations with 0.96 visibility. Electron spin resonance measurements on these devices show a linewidth of 30 kHz and coherence times T2* = 10 us and T2 = 0.3 ms. We also discuss estimates of the fidelity of our donor electron spin qubit measurements using gate set tomography. This work was performed, in part, at the Center for Integrated Nanotechnologies, a U.S. DOE Office of Basic Energy Sciences user facility. Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a Lockheed-Martin Company, for the U. S. Department of Energy under Contract No. DE-AC04-94AL85000.

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