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Electron Spin Resonance Experiments on a Single Electron in Silicon Implanted with Phosphorous DWIGHT R. LUHMAN, K. NGUYEN, L.A. TRACY, S. CARR, J. BORCHARDT, N. BISHOP, G. TEN EYCK, T. PLUYM, J. WENDT, M.P. LILLY, M.S. CARROLL, Sandia Natl Labs — In this talk we will discuss the results of our ongoing experiments involving electron spin resonance (ESR) on a single electron in a natural silicon sample. The sample consists of an SET, defined by lithographic polysilicon gates, coupled to nearby phosphorous donors. The SET is used to detect charge transitions and readout the spin of the electron being investigated with ESR. The measurements were done with the sample at dilution refrigerator temperatures in the presence of a 1.3 T magnetic field. We will present data demonstrating Rabi oscillations of a single electron in this system as well as measurements of the coherence time, T_2. We will also discuss our results using these and various other pulsing schemes in the context of a donor-SET system. 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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