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Electrical spin measurements of diffused phosphorous donors in crystalline silicon HEATHER SEIPEL, CHRISTOPH BOEHME, University of Utah, Physics Department — With recent experimental demonstration of the electrical detection of electron spins of phosphorous donors as well as their hyperfine coupling to the ^{31}P phosphorous nuclear spin [Stegner et al., Nature Physics, doi:10.1038/nphys465, (2006).], a potential mechanism for a ^{31}P in crystalline silicon (c-Si) nuclear spin readout based on spin-dependent ^{31}P -P_b recombination is available. To further investigate the properties of this mechanism, we present pulsed electrically detected magnetic resonance (pEDMR) measurements on diffusion doped silicon samples. For their preparation, c-Si (111) wafers are diffused with a profile whose concentration at the surface leads to a degenerately doped c-Si before it then drops off into the semiconducting region. Deep trenches are made with a plasma enhanced reactive ion etch where the choice of the trench depth determines the dopant concentration of the sample without changing any other sample preparation parameters. A study of the qualitative and quantitative nature of the observed pEDMR signals is presented for different etch depths.

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