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Detection of Spin Dependent Scattering at High Magnetic Fields[1]

C.C. LO, J. BOKOR, University of California, Berkeley, V. LANG, R.E. GEORGE, J.J.L. MORTON, University of Oxford, S. ZVYAGIN, Dresden High Magnetic Field Laboratory (HLD), FZ Dresden - Rossendorf, A.M. TYRYSHKIN, S.A. LYON, Princeton University, ARUN PERSAUD, T. SCHENKEL, Lawrence Berkeley National Laboratory — Neutral donor spin-dependent scattering of conduction electrons in silicon field-effect transistors can be used as a spin-state readout mechanism for donor qubits in silicon[1]. Experimentally, the effect is measured by electrically detected magnetic resonance, usually in a low magnetic field regime ($\approx 0.35T$)[2]. In such measurements, the resonance signal amplitude is limited by the conduction electron spin polarization, which is typically less than 5% at those fields. We report recent progress in the measurement of spin-dependent scattering at high magnetic fields ($3.5T - 11T$), where the conduction electron polarization is much higher and results in much stronger resonance signals.

[1] Sarovar et al, PRB, 78, 245302 (2008), de Sousa et al, PRB,80, 045320 (2009)
[2] Lo et al, APL, 91, 242106 (2007)

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