

## Spin-Dependent Scattering in a Phosphorus Doped Silicon MOSFET

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We report evidence for spin-dependent scattering of conduction electrons off neutral donors in a silicon transistor. The technique of electrically detected magnetic resonance is used to observe the hyperfine splitting of phosphorus donors present in the crystal. An on-chip transmission line is used to generate the oscillating magnetic field allowing broadband operation<sup>1</sup>. The donor spin resonance signal was studied as function of microwave power and the biasing conditions of the transistor. Power broadening of the hyperfine lines is observed in the high power regime, which allows us to relate the power to the magnetic field. The signal intensity scales with the square root of the microwave power, which agrees with spin-dependent scattering theory<sup>2</sup>. Fitting our data with this theory allows us to extract the electron spin relaxation time  $T_1$  of a donor a certain distance away from the Si/SiO<sub>2</sub> interface.

<sup>1</sup>L.H. Willems van Beveren, *et al.*, Appl. Phys. Lett. **93**, 072102 (2008).

<sup>2</sup>R. de Sousa, C.C. Lo, and J. Bokor, Phys. Rev. B. **80**, 045320 (2009).