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Spin incoherence of donor electrons near c-Si(111)/SiO₂ interface defects SEOYOUNG PAIK, SANG-YUN LEE, WILLIAM BAKER, DANE MCCAMEY, CHRISTOPH BOEHME, Department of Physics and Astronomy, University of Utah — Electron and nuclear spins of phosphorous (³¹P) donors in crystalline silicon have been investigated extensively in recent years as they both have extremely long quantum mechanical coherence times which makes them extremely interesting candidates for quantum information and spin-electronics applications [1]. Existing silicon quantum computer concepts [2] propose to use ³¹P qubits close to the silicon surface. We present here a study of how microscopic defects at the oxide layer of the silicon surface influence the spin coherence times (T_1 and T_2 times) of the ³¹P qubits. Using pulsed electrically detected magnetic resonance spectroscopy [3], we show that due to the interaction of the ³¹P qubits with the interface states, the previously known, extremely long bulk coherence times are drastically shortened [4].

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