

Abstract Submitted  
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**Zero field optical study of phosphorus donor spin resonance in enriched silicon** K J MORSE, J HUBER, P DLUHY, Simon Fraser University, J Z SALVAIL<sup>1</sup>, K SAEEDI<sup>2</sup>, Simon Fraser University\*, N V ABROSIMOV, Leibniz-Institut für Kristallzuchtung, S SIMMONS, M L W THEWALT, Simon Fraser University — Donor spins in silicon are some of the most promising qubits for upcoming solid-state quantum technologies. The nuclear spins of phosphorus donors in enriched silicon have among the longest coherence times of any solid-state system as well as simultaneous qubit initialization, manipulation and readout fidelities near 99.9%. Here we characterize the phosphorus in silicon system in the regime of zero magnetic field, close to a singlet-triplet spin clock transition, using laser spectroscopy and magnetic resonance. We show the system can be optically hyperpolarized and has 10 s Hahn echo coherence times.

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