

Abstract Submitted  
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**Quantum read-out and fast initialization of nuclear spin qubits with electric currents**<sup>1</sup> ROGERIO DE SOUSA, NOAH STEMEROFF, University of Victoria, BC — Nuclear spin qubits have the longest coherence times in the solid state, but their quantum read-out and initialization is a great challenge. We present a theory for the interaction of an electric current with the nuclear spins of donor impurities in semiconductors [1]. The theory yields a sensitivity criterion for quantum detection of nuclear spin states using electrically detected magnetic resonance, as well as an all electrical method for fast nuclear spin qubit initialization.

[1] N. Stemeroff and R. de Sousa, Phys. Rev. Lett. **107**, 197602 (2011).

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