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Title: Towards Optomechanical Readout of Donor Spins in Silicon

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Abstract:

Donor spins in silicon are an attractive candidate for qubits for applications in quantum sensing and building quantum networks. Quantum hybrid systems enable an interface be- tween silicon and photon, where dopant atoms feature excellent quantum properties. Yet, the potential donor spins hold is untapped due to their optical inactivity. Here we study the optomechanical spin readout scheme, which bridges spins and photons via phonon inter- mediate, building a 3-way hybrid system. It employs a mechanical resonator that interacts with spins via strain coupling and photons via an optomechanical cavity. Furthermore, this work also explores excitonic transitions for spin-readout mechanism. In addition, steps to-wards magnetic field gradient coupling are taken, enhancing the prospects of bringing the optomechanical readout scheme to reality.

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