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Coherent Coupling of a Nitrogen Vacancy Center in Diamond to Lattice Strain[1] KENNETH LEE, PREETI OVARTCHAIYAPONG, BRYAN MYERS, LAETITIA PASCAL, GINO GRAZIANO, ANIA BLESZYNSKI JAYICH, University of California Santa Barbara — Nitrogen-vacancy (NV) centers in diamond are a versatile resource in the development of hybrid quantum systems due to their excellent quantum properties and their ability to strongly couple to several external degrees of freedom. Recent theoretical studies indicate that a system composed of single-crystal diamond (SCD) mechanical resonators may be used to form a hybrid quantum network in which an embedded NV spin forms a quantum memory, and the strain-coupled extended phonon modes of the resonator serve as a quantum data bus. However, experimental investigations of the strain interaction with NV centers are prominently lacking. Here, we use high quality SCD cantilevers to quantitatively measure the NV ground state strain sensitivity in directions both parallel and perpendicular to the NV symmetry axis. Furthermore, we demonstrate strain-mediated coherent coupling of the NV spin evolution to the mechanical motion of the resonator.

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