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Coherent control of the silicon-vacancy spin in diamond BENJAMIN PINGAULT, DAVID JARAUSCH, CHRISTIAN HEPP, LINA KLINTBERG, University of Cambridge, JONAS BECKER, University of Saarland, MATTHEW MARKHAM, Element Six, CHRISTOPH BECHER, University of Saarland, METE ATATURE, University of Cambridge — Spin impurities in diamond have emerged as a promising building block in a wide range of solid-state-based quantum technologies. The negatively charged silicon-vacancy centre combines the advantages of the high quality of its photonic properties with a ground state spin which can be read out optically. However, for this spin to be usable in a quantum network, full quantum control is essential. Here, we report the measurement of optically detected magnetic resonance and coherent control of a single silicon-vacancy centre spin with microwave field. Using Ramsey interferometry, we directly measure a spin coherence time exceeding 100 ns at 4 K. Furthermore, we show that this coherence time is consistent with dephasing of the spin arising from phonon-mediated excitation to the upper orbital branch of the ground state. Our results make the spin a usable resource to establish the silicon-vacancy centre as a spin-photon interface.

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