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Electrically driven spin resonance in silicon carbide color centers[1]

PAUL KLIMOV, ABRAM FALK, University of Chicago - Institute for Molecular Engineering, BOB BUCKLEY, University of California, Santa Barbara - Center for Spintronics and Quantum Computation, DAVID AWSCHALOM, University of Chicago - Institute for Molecular Engineering — We demonstrate that the spin of optically addressable point defects can be coherently controlled with AC electric fields [1]. Based on magnetic-dipole forbidden spin transitions, this scheme enables spatially confined spin control, the imaging of GHz-frequency resonant electric fields, and the characterization of defect spin multiplicity. Our results are based on the QL1 defect in 6H-SiC, which is one of many newly appreciated paramagnetic defects in SiC that can be optically addressed and exhibit long spin coherence times. Our methods apply generally to optically addressable spin systems in many semiconductors, including the nitrogen-vacancy center in diamond. Since electric fields are readily confined on nanometer scales, electrically driven spin resonance offers a viable route towards scalable quantum control of electron spins in a dense network.

[1] P. V. Klimov et al., arXiv:1310.4844 (2013).

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