

Abstract Submitted
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Ultrafast coherent optical control of a single diamond spin¹ L.C. BASSETT, F.J. HEREMANS, D.D. AWSCHALOM, Center for Spintronics and Quantum Computation, University of California, Santa Barbara, California 93106, G. BURKARD, Department of Physics, University of Konstanz, D-78457 Konstanz, Germany — As an optically addressable solid-state electronic spin, the nitrogen-vacancy (NV) center in diamond has great promise for applications in quantum information science and metrology. At temperatures below ≈ 10 K, the NV center's optical fine structure facilitates coherent coupling between the electronic spin and light, providing the means for all-optical spin control and other applications in quantum optics. Here, using ultrafast optical pump-probe techniques, we investigate the interplay of orbital, vibrational, and spin dynamics on timescales ranging from femtoseconds to nanoseconds. These techniques provide a flexible and powerful probe of orbital dynamics in the NV center's optically excited state, and enable optical spin control with sub-picosecond resolution.

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