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Near-infrared induced charge dynamics of the nitrogen vacancy center in diamond DAVID A. HOPPER, RICHARD R. GROTE, ANNEMARIE L. EXARHOS, LEE C. BASSETT, University of Pennsylvania — The nitrogen-vacancy (NV) center in diamond is a key functional element in emerging quantum technologies such as nodes in quantum information processing and nanoscale sensors for condensed matter physics and biology. Recent efforts to optimize the NV's functionality lead to the discovery of photoinduced charge-state switching between the negative (NV^-) and neutral (NV^0) states which holds great potential to enhance the fidelity of spin readout. While the charge state dynamics under visible illumination have been studied, the effect of infrared light remains unexplored. Here, we use a tunable, pulsed infrared source to illuminate NV centers under various spin and optical states. Precise time-domain control of visible, microwave, and infrared pulses together with single-shot charge readout allows for the direct probing of spin and charge dynamics induced by the infrared light. This new understanding is relevant for the development of advanced protocols to leverage the NV's complete spin, charge, and optical dynamics for quantum control and sensing applications.

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