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Environment-assisted quantum sensing with entangled states of electronic spins in diamond ALEXANDRE COOPER, California Institute of Technology, WON KYU CALVIN SUN, JEAN-CHRISTOPHE JASKULA, PAOLA CAPPELLARO, Massachusetts Institute of Technology — Entangled states of spins in solid-state materials have been proposed to enhance the performance of quantum sensors, but their physical realization has been hindered by the difficulty of accessing ensembles of electronic spins that can be initialized, manipulated, and readout with high fidelity. Here we present experimental measurements of time-varying magnetic fields with entangled states of electronic spins associated with a single nitrogen-vacancy center and two paramagnetic centers in diamond. These measurements rely on a series of coherent control techniques to identify unknown quantum systems in the environment of a single quantum probe and convert them into quantum resources available for scaling up quantum systems and achieving improvements in sensitivity.

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