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Environment-assisted quantum sensing with entangled states of
electronic spins in diamond ALEXANDRE COOPER, California Institute of
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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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