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Coupling nanoscale spin ensembles to a SQUID embedded in superconducting circuits[1] C. EICHLER, J. R. PETTA, Department of Physics, Princeton University — Electron spin resonance is a ubiquitous phenomenon used for the characterization of paramagnetic materials and to coherently control electron spins as carriers of quantum information. The coupling strength between spins and RF magnetic fields can be increased by using microwave frequency resonators, realized either as 3D cavities or in planar geometries. Here, we study microwave resonators embedding a superconducting quantum interference device (SQUID), which couples to nearby electron spins of phosphorus donors in silicon. We compare different SQUID and resonator geometries aiming at enhanced spin sensitivity. We also study the coupled system in a sideband regime where the Zeeman energy is nonresonant with the cavity frequency, allowing for operation at lower DC magnetic fields.

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