

# Room Temperature Coherent Control of Spin Qudit Modes in SiC

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## Abstract

One of the challenges in the field of quantum sensing and information processing is to selectively address and coherently manipulate highly homogeneous qubits subject to external perturbations. Here, we present room-temperature coherent control of high-dimensional quantum bits, the so-called qudits, associated with vacancy-related spins in silicon carbide enriched with nuclear spin-free isotopes. In addition to the excitation of a spectrally narrow qudit mode at the pump frequency, several other modes are excited in the electron spin resonance spectra. We demonstrate selective quantum control of homogeneous spin packets with sub-MHz spectral resolution. Furthermore, we perform two-frequency Ramsey interferometry to demonstrate absolute DC magnetometry, which is immune to thermal noise and strain inhomogeneity.