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Coherence studies on silicon vacancies in SiC generated via proton irradiation PETER BRERETON, DON PUENT, US Naval Academy, EVAN GLASER, SAM CARTER, US Navy Research Laboratory — Single spins in defects in wide bandgap semiconductors are the canonical platform for scalable quantum technologies in the solid state. The silicon vacancy (VSi) in silicon carbide has very recently been shown to exhibit similar spin coherence to the diamond nitrogen vacancy center but in a material that has a mature technological base for fabrication and is an order of magnitude cheaper. Additionally, SiC has several polytypes, allowing the engineering of the spin behavior of the silicon vacancy. In this work, we generate ensembles of VSi via proton irradiation of 4H-SiC. We then measure the spin lifetimes and coherence times of ensembles of defect spins via optically detected magnetic resonance and Hahn pulse techniques. We show that the spin coherence time is strongly dependent on distance from the proton damage layer, therefore setting important parameters for the fabrication of long-lifetime single defect devices.

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