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Spin and Optical Properties of the V1 Silicon Vacancy Defect in Silicon Carbide at Low Temperature ROLAND NAGY, MATTHIAS WIDMANN, MATTHIAS NIETHAMMER, ILJA GERHARDT, 3rd Institute of Physics, University of Stuttgart, TAKESHI OSHIMA, National Institutes for Quantum and Radiological Science and Technology, NGUYEN TIEN SON, IVAN G. IVANOV, Department of Physics, Chemistry and Biology, Linkping University, SOPHIA ECONOMOU, Department of Physics, Virginia Tech, Blacksburg, Virginia, CRISTIAN BONATO, Institute of Photonics and Quantum Sciences, SUPA, Heriot-Watt University, SANG YUN LEE, Center for Quantum Information, Korea Institute of Science and Technology, JÖRG WRACHTRUP, 3rd Institute of Physics, University of Stuttgart — Silicon carbide (SiC), a technologically-relevant wide-bandgap semiconductor, offers spin-active color-centers and features very long electronic spin coherence times [1,2] which potentially can be applied for sensing [3]. According to Kramers theorem, the degeneracy of S=3/2 spin sublevels cannot be broken by strain and electric fields, thereby providing a robust spin-photon interface [4]. In this study, we will investigate the properties of the silicon vacancy in 4H-SiC. In particular, we will present optical spectroscopic study for the two zero phonon lines known as V1 and V1'. Additionally, we will show coherent optical and spin properties of the V1 and V1' line and discuss the possibility of the V1-defect as a qubit for quantum computing and communication. [1] Luke Gordon et al., MRS Bulletin, 38, 802 (2013) [2] M. Widmann et al., Nat. Mater. 14, 164 (2015) [3] B. Grotz et al., New J. Phys. 13, (2011) [4] O. O. Soykal et al., Phys. Rev. B 93, 081207(R) (2016))

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