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New Diamond Color Center for Quantum Communication DING HUANG, BRENDON ROSE, ALEXEI TYRYSHKIN, SORAWIS SANGTAWESIN, SRIKANTH SRINIVASAN, Department of Electrical Engineering, Princeton University, DANIEL TWITCHEN, MATTHEW MARKHAM, ANDREW EDMONDS, Element Six, UK, ADAM GALI, Department of Atomic Physics, Budapest University of Technology and Economics, ALASTAIR STACEY, Department of Physics, University of Melbourne , WUYI WANG, ULRIKA DHAENENS-JOHANSSON, Gemological Institute of America, NY, ALEXANDRE ZAITSEV, Department of Engineering Science and Physics, CUNY College of Staten Island, STEPHEN LYON, NATHALIE DE LEON, Department of Electrical Engineering, Princeton University — Color centers in diamond are attractive for quantum communication applications because of their long electron spin coherence times and efficient optical transitions. Previous demonstrations of color centers as solid-state spin qubits were primarily focused on centers that exhibit either long coherence times or highly efficient optical interfaces. Recently, we developed a method to stabilize the neutral charge state of silicon-vacancy center in diamond (SiV^0) with high conversion efficiency. We observe spin relaxation times exceeding 1 minute and spin coherence times of $1ms$ for SiV^0 centers. Additionally, the SiV^0 center also has $> 90\%$ of its emission into its zero-phonon line and a narrow inhomogeneous optical linewidth. The combination of a long spin coherence time and efficient optical interface make the SiV^0 center a promising candidate for applications in long distance quantum communication.

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