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Two-axis Control and Readout of an Exchange-Only Spin Qubit in a GaAs Triple Quantum Dot¹ J. MEDFORD, Harvard University, J.M. TAYLOR, Joint Quantum Institute, NIST, B.D. ARMSTRONG, Harvard University, D.P. DIVINCENZO, RWTH Aachen, C.M. MARCUS, Harvard University, Niels Bohr Institute, University of Copenhagen, H. LU, A.C. GOSSARD, Materials Department, University of California, Santa Barbara — The initialization, full control, and readout of a GaAs triple quantum dot exchange qubit is demonstrated. Appropriate depletion gate design has enabled control and single-shot readout along multiple Bloch sphere axes in a three electron device. Rotations around both non-orthogonal control axes are projected along three separate Bloch sphere axes, and quality factors ($Q \equiv \omega/T_2^*$) of 500 are observed. Finally, we analyze decoherence and dynamical decoupling schemes unique to this system.

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Prefer Oral Session
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