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Coherent Oscillations in Silicon Double Quantum Dots due to Meissner-screened Magnetic Field Gradients DEVIN UNDERWOOD, HRL Laboratories — We report on observation of coherent singlet-triplet oscillations of isotopically enhanced Si/SiGe quantum-dot qubits due to the screening of an applied magnetic field by superconducting aluminum gates. The qubits employ overlapping accumulation-mode gates [1] for which magnetostatic modeling indicates an expected dot-to-dot field gradient of order 1 mT per tesla of applied field. The observed oscillations are consistent with these estimates, correspondingly showing frequencies of a few MHz for applied magnetic fields less than about 50 mT. In the 10-100 mT field range, oscillation frequencies change dramatically as the magnetic field is changed, consistent with crossing critical fields for the various geometries of superconducting gates. At much higher magnetic fields, weaker paramagnetic gradients due to other sources are observed as previously reported [2]. Static Meissner gradients are superimposed over 1/f magnetic noise, which is likely due to residual 29-Si nuclear spins [2]. These superconducting gradients may be used to help evaluate sources of magnetic noise in spin qubits. [1] M.G. Borselli et al., Nanotechnology **26**, 375202 (2015) [2] K. Eng et al., Sci. Adv. **1**, e1500214 (2015)

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