These two talks should be given in the same session.

Abstract Submitted
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Coupling a single electron spin to a microwave resonator, Part II: mitigating dephasing and relaxation FÉLIX BEAUDOIN, McGill University, Montréal, Québec H3A 2T8, DANY LACHANCE-QUIRION, ALEXANDRE BLAIS, Institut quantique and Département de physique, Université de Sherbrooke, Sherbrooke, Québec J1K 2R1, WILLIAM A. COISH, McGill University, Montréal, Québec H3A 2T8, MICHEL PIORO-LADRIÈRE, Institut quantique and Département de physique, Université de Sherbrooke, Sherbrooke, Québec J1K 2R1 — Strong coupling between a single electron spin and a microwave resonator can be achieved by correlating spin and charge degrees of freedom. This correlation makes the spin susceptible to sources of orbital dephasing and relaxation, possibly leading to error in the transfer of a quantum state between a spin qubit and the low-lying Fock states ($n = 0, 1$) of a resonator. In this talk, we analytically evaluate this error and explain how it can be suppressed through a combination of dynamical decoupling [1] and careful optimization of device parameters [2]. This analysis gives a clear route toward the realization of coherent state transfer between a microwave resonator and a single electron spin in a GaAs double quantum dot with a fidelity above 90%. Improved dynamical decoupling sequences, low-noise environments, and longer-lived microwave cavity modes may lead to substantially higher fidelities in the near future. [1] F. Beaudoin, A. Blais, and W. A. Coish. arXiv:1602.05090. [2] F. Beaudoin, D. Lachance-Quirion, W. A. Coish, and M. Pioro Ladrière. Nanotechnology 27, 1 (2016)

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