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Coupling a single charge in a nanowire double quantum dot to a high-Q superconducting microwave resonator¹

K.D. PETERSSON, M.D. SCHROER, L.W. MCFAUL, M. JUNG, J.R. PETTA, Department of Physics, Princeton University, Princeton, New Jersey 08544 — In the field of circuit quantum electrodynamics (cQED), superconducting microwave cavities have provided an important tool with which to probe single superconducting qubits and mediate interactions between distant qubits [1,2]. In view of applying the cQED architecture to semiconductor qubits [3,4], we have integrated a tunable InAs nanowire double quantum dot (DQD) into a high-Q (> 2000), high frequency (~ 6 GHz) niobium microwave resonator. Our design enables a dipole coupling of ~ 40 MHz between the DQD and cavity. We will present experimental results demonstrating how the microwave cavity can be used to explore coherence in nanowire DQDs and discuss prospects for achieving the strong coupling regime.

[1] A. Wallraff et al., Nature 431, 162 (2004)

[2] L. DiCarlo et al., Nature 467, 574 (2010)

[3] J.R. Petta et al., Science 309, 2180 (2005)

[4] K.D. Petersson et al., Phys. Rev. Lett. 105, 246804 (2010)

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Prefer Oral Session

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