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Strong coupling in cavity QED with quantum dot circuits¹ MATTHIEU DARTIAILH, LAURE BRUHAT, TINO CUBAYNES, Ecole Normale Superieure, JEREMY VIENNOT, Boulder university, MATTHIEU DESJARDINS, AUDREY COTTET, TAKIS KONTOS, Ecole Normale Superieure — Cavity quantum electrodynamics techniques have turned out to be instrumental to probe or manipulate the electronic states of nanoscale circuits. Recently, cavity QED architectures have been extended to quantum dot circuits. These circuits are appealing since other degrees of freedom than the traditional ones (e.g. those of superconducting circuits) can be investigated. We will show how one can use carbon nanotube based quantum dots in that context. In particular, we demonstrate a superconductor-quantum dot circuit which realizes the strong coupling of an individual electronic excitation to microwave photons. The vacuum Rabi splitting 2g 10 MHz exceeds by a factor of 3 the linewidth of the hybridized light-matter states. Our findings open the path to ultra-long distance entanglement of quantum dot based qubits.

 $^{1}\mathrm{ERC}$

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