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Photon mediated interaction between distant quantum dot circuits TAKIS KONTOS, MATTHIEU DELBECQ, LAURE BRUHAT, JÉRÉMIE VIENNOT, SUBHADEEP DATTA, AUDREY COTTET, CNRS/ENS — Cavity QED allows one to study the interaction between light and matter at the most elementary level, by using for instance Rydberg atoms coupled to cavity photons. Recently, it has become possible to perform similar experiments on-chip, by using artificial two-level systems made from superconducting circuits instead of atoms. This circuit-QED offers unexplored potentialities, since other degrees of freedom than those of superconducting circuits could be used, and in particular, those of quantum dots. Such a hybrid circuit QED would allow one to study a large variety of situations not accessible with standard cavity QED, owing to the versatility of nanofabricated circuits. Here, we couple two quantum dot circuits to a single mode of the electromagnetic field in a microwave cavity. Our quantum dots are separated by 200 times their own size, with no direct tunnel and electrostatic couplings between them. We demonstrate their interaction mediated by the cavity photons. This could be used to scale up quantum bit architectures based on quantum dot circuits, and simulate on-chip phonon-mediated interactions between strongly correlated electrons.

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