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Atom-photon bound states in an array of high-impedance superconducting resonators

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Engineering the electromagnetic environment of a quantum emitter gives rise to a plethora of exotic lightmatter interactions. In particular, photonic lattices can seed long-lived atom-photon bound states inside photonic band gaps. We report on the implementation of a novel microwave architecture consisting of an array of high-impedance superconducting resonators forming a 1 GHz-wide pass band, in which we have embedded two frequency-tuneable artificial atoms. We study the atom-field interaction and access previously unexplored coupling regimes, in both the single- and double-excitation subspace. In addition, we demonstrate coherent interactions between two atom-photon bound states, in both resonant and dispersive regimes. The presented architecture holds promise for quantum simulation with tuneable-range interactions and experiments in nonlinear photon transport. Reference: arXiv:2107.06852

Primary author(s): GASPARINETTI, Simone (Chalmers University of Technology)
Presenter(s): GASPARINETTI, Simone (Chalmers University of Technology)
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