

Abstract Submitted
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Strong interaction of a transmon qubit with 1D band-gap medium¹ YANBING LIU, DARIUS SADRI, ANDREW HOUCK, Princeton University, NICHOLAS BRONN, JERRY CHOW, JAY GAMBETTA, IBM — The spontaneous emission of an atom will be enhanced or suppressed in a structured vacuum, commonly known as Purcell effect. Moreover, in a frequency gap medium, an atom-photon bound state is predicted to exist in the band gap, causing the localization of light. Here using the technology of circuit quantum electrodynamics, we experimentally explore this mechanism by fabricating a microwave step-impedance filter strongly coupled to a transmon qubit. Standard transmission and spectroscopy measurements support the existence of atom-photon bound states in the system. Correlation measurement shows that the atom-photon interaction induces strong correlation of the transmitted light through the system.

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