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Microwave Cavity Lattices for Simulating Condensed Matter Systems DEVIN UNDERWOOD, ARTHUR SAFIRA, SRIKANTH SRINIVASAN, ANTHONY HOFFMAN, Princeton University, JENS KOCH, Northwestern University, ANDREW HOUCK, Princeton University — Recently, quantum phase transitions of light have been the focus of much theoretical attention. One possible experimental realization relies upon the circuit quantum electrodynamics architecture (cQED); however, in order for this to be successful, coupled arrays of superconducting resonators must first be realized with low disorder. Here we fabricate and characterize an array with low disorder consisting of 12 niobium resonators on a sapphire substrate in a honeycomb pattern with the photonic lattice sites forming a Kagome star. The structure is characterized by measuring transmission through different input-output port pairs and by varying the hopping rate between resonators. A family of resonant peaks corresponding to the various modes of the coupled array is identifiable and agrees well with both a tight-binding Hamiltonian and simulations from a commercial microwave software package. These experiments are an important step in realizing strongly correlated interactions in cQED.

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