

Abstract Submitted
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Detecting elementary excitations of a quantum simulator with superconducting resonator¹ LIANGHUI DU, School of Natural Sciences, University of California, Merced, J.Q. YOU, Beijing Computational Science Research Center, China, LIN TIAN, School of Natural Sciences, University of California, Merced — Analog quantum simulators can emulate various many-body systems and can be used to study novel quantum correlations in such systems. One essential question in quantum simulation is how to detect the properties of the simulated many-body system, such as ground state property and spectrum of elementary excitations. Here we present a circuit QED approach for detecting the excitation spectrum of a quantum simulator by measuring the correlation spectrum of a superconducting resonator. For illustration, we apply this approach to a simulator for the transverse field Ising model coupling to a coplanar waveguide resonator. The simulator can be implemented with an array of superconducting flux qubits. We show that the resonance peaks in the correlation spectrum reveal exactly the frequencies of the excitations.

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Lin Tian
School of Natural Sciences, University of California, Merced

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