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Cavity-assisted cooling of Bose-Hubbard model simulator with superconducting circuits XIUHAO DENG, School of Natural Sciences, University of California Merced, CHUNJING JIA, Department of Applied Physics, Stanford University; Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator — Interesting progress have been made in using superconducting circuits to simulate Bose-Hubbard model (BHM). However, studying ground state feature of BHM calls for effective cooling process, where the cooling mechanism must preserve total number of simulated bosons and cooling rate has to be much stronger than decay rate. Here, we propose a cooling scheme that satisfies these two conditions by coupling an array of transmission line resonators with an assisted cavity. The quantum simulator we modelled here can be used to study generic BHM, which include both repulsive and attractive on-site interaction and hopping strength. We evaluate the cooling rate in all these regime analytically. And numerical simulation in time domain gives further supports. Our results present a promising cooling scheme for experiments.

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