

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Efficient generation of arbitrary Fock-state superpositions in a superconducting cavity WANG WEITING, HU LING, XU YUAN, LIU KE, MA YUWEI, Tsinghua Univ, ZHENG SHIBIAO, Fuzhou University, VIJAY R, Tata Institute of Fundamental Research, SONG YIPU, Tsinghua Univ, DUAN LUMING, Tsinghua Univ, University of Michigan, SUN LUYAN, Tsinghua Univ — In this talk, I will discuss our experimental demonstration of an efficient method to generate arbitrary Fock-state superpositions in a superconducting quantum circuit, where a qubit is dispersively coupled to a microwave cavity mode without the need of fine-frequency tuning. Compared with the previous multi-step state-synthesis schemes, our method requires only a single step of unitary evolution and measurement-based post-selection, and thus is more robust to noise and accumulation of experimental errors. Using the method, we experimentally generate high-fidelity phase eigenstates under various Hilbert-space dimensions and squeezed states, which are useful for quantum walk and high-precision measurements.

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Date submitted: 11 Nov 2016

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