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Nonclassical photon number distribution in a superconducting cavity under a squeezed drive SHINGO KONO, YUTA MASUYAMA, TOYOFUMI ISHIKAWA, YUTAKA TABUCHI, REKISHU YAMAZAKI, KOJI USAMI, The University of Tokyo, KAZUKI KOSHINO, Tokyo Medical and Dental University, YASUNOBU NAKAMURA, The University of Tokyo, RIKEN Center for Emergent Matter Science — A superconducting qubit in the strong dispersive regime of a circuit QED is known to be a powerful probe for photon states in a cavity. In this regime, a qubit spectrum is split into multiple peaks, with each peak corresponding to the individual photon number in a cavity. Here, we measure qubit spectra in the cavity that is driven externally and continuously with various microwave states. We use a thermal state, a coherent state, and a squeezed vacuum state as the cavity drive field and observe that the peak weights in the qubit spectra reflect the characteristics of each photon number distribution. By fitting the qubit spectra with a model which takes into account the finite probe power, the photon number distributions are determined dissimilarly from the apparent peak weights. When a squeezed vacuum state generated by a Josephson parametric amplifier is injected into the cavity, the photon number distribution fulfills Klyshko's criterion for the nonclassicality.

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