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Spectrum of a Resonator Coupled to a Driven Superconducting Qubit in the Strong Dispersive Regime of Circuit Quantum Electrodynamics YONUK CHONG, HYUN-GUE HONG, DONG-GWANG HA, Korea Research Institute of Standards and Science — The resonator spectrum in the strong dispersive coupling regime of circuit-QED has been a useful nondestructive indicator of a stationary qubit state. Here we present experimental observation of the further modification of the resonator spectrum as the qubit undergoes the dynamic transition by a resonant driving field. The quartet resonance associated with the polarized qubit is observed for the resonant driving at one-photon as well as the multi-photon transition in a 3D transmon qubit. The evolution of the resonance as a function of the driving power and the detuning of the driving field is well understood by a simple model which is based on the analytic diagonalization of Hamiltonian and described in terms of dressed states, Lamb shift, and AC Stark shift.

Yonuk Chong
Korea Research Institute of Standards and Science

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