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High quality superconducting resonators for QND Measurements of Qubits and Sensitive Photon Detections LIANFU WEI, Sun Yat-sen University — We proposed an approach to implement the QND measurements of qubits by probing the intensity and phase transmissions of driven signals through a dispersively-coupled cavity. With such a technique we foud that the states of the qubits can be high-effectively reconstructed tomographically and Bell's-, Mermin's- and Svetlichny's inequalities for confirming the existences of quantum nonlocal correlations can be tested numerically. We designed and fabricated the half-wavelength- and quarter-wavelength superconducting transmission line resonators with various coupling configurations by sputtering and photolithographic techniques. The measured quality factors of these resonators are 10^4 and 10^6, respectively, at low-temperature (20mK). We have experimentally demonstrated that the fabricated resonators could be served as the desired sensitive detectors of single photons. Applications of these resonators for experimental solid state quantum information processing are possible.

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