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Superconducting Tunnel Junctions as Submillimeter Direct Detectors JOHN TEUFEL, Yale University, MINGHAO SHEN, Yale Unviersity, LUIGI FRUNZIO, Yale Univeristy, DANIEL PROBER, Yale University, ROBERT SCHOELKOPF, Yale Univeristy, DEPTS. OF PHYSICS AND APPLIED PHYSICS COLLABORATION — We are developing superconducting tunnel junctions (STJ) as direct detectors for submillimeter astronomy. Photons with energy greater than the superconducting gap of the aluminum absorber break Cooper pairs and generate excess quasiparticles that are then measured as a tunneling current through the STJ. In order to monitor the response of the detector with large readout bandwidth and maximal sensitivity, we have implemented a novel readout which monitors the impedance of the detector via radio frequency (RF) reflectometry. For calibration of the detector, we have also developed a gold microbridge as an on-chip, submillimeter photon source. When biased, high frequency noise from the microbridge couples via a transmission line to the detector. This allows for a calibrated photon source with near unity coupling, fast chopping, and calculable response. We present results in which we measured the "optical" properties of the STJ using the microbridge source and RF-STJ readout at 300 mK, demonstrating good responsivity, high sensitivity, and fast response times.

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