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Antenna-Coupled Superconducting Bolometers for Studying Dynamics with Terahertz Spectroscopy[1] DANIEL SANTAVICCA, MATTHEW REESE, ALAN TRUE, CHARLIE SCHMUTTENMAER, DANIEL PROBER, Yale University — We report microwave and terahertz characterizations of antenna-coupled hot electron bolometers designed for laboratory-based terahertz spectroscopy. The active element is a superconducting niobium microbridge, and the incident signal is coupled to the microbridge by a planar double-dipole antenna. These devices combine sub-nanosecond response with high sensitivity and the ability to operate below saturation when viewing a room temperature background. The optimum small signal responsivity is 4.4 x 10^4 V/W, obtained at a bath temperature $T_b \approx 0.9T_c$. The corresponding saturation power is 7 nW. The saturation power increases and the responsivity decreases as the bath temperature is lowered. The measured noise equivalent power is 2.0 x 10^{-14} W/$(Hz)^{1/2}$, near the predicted thermal fluctuation limit. The unique combination of speed and sensitivity demonstrated by these detectors will enable new measurements of dynamic processes in the far-infrared on millisecond to nanosecond timescales.

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