Superconducting HEB for large direct detector arrays.

S. Cherednichenko, V. Drakinskiy, T. Berg
Microwave Electronic Laboratory, MC2
Chalmers University of Technology, SE-412 96, Gothenburg, Sweden

We present a new detection scheme for Superconducting Transition Edge Detectors. Microwave noise generated by a TED is a function of the electron temperature and therefore can be used to monitor the absorbed RF power instead of traditionally used DC bias current (or voltage) as has been discussed in [1]. We expect a significant improvement of the sensitivity comparing to the DC monitoring, since the thermal fluctuation noise and Johnson noise do not contribute to the detector noise anymore. A perspective for large array applications is possible due to a proposed simplified frequency (wavelength) multiplexing technique.

In the paper, we discuss noise response to both broadband noise signals as well as monochromatic signals from 0.6 THz to 2.6 THz. We present an experimental investigation of this detector performance for two thermal situations: when the detector is heated to the superconducting transition temperature by a heater; and when the bath temperature (4.2K) is well below Tc (about 9 K) and the detector is "heated" with a local oscillator source. For the last regime, both MM and THz heating sources are considered.

[1] A.Semenov, " Superconducting submillimeter direct detector using high-frequency current noise", PhysicaC 416 (2004) pp.85–89.