Abstracts

Josephson Effect Gain and Noise in SIS Mixers

M.J. Wengler, N.B. Dubash, G. Pance and R.E. Miller. "Josephson Effect Gain and Noise in SIS Mixers." 1992 Transactions on Microwave Theory and Techniques 40.5 (May 1992 [T-MTT]): 820-826.

Superconducting tunnel diode (SIS) mixers are used for radio astronomy from 100 to 500 GHz. They are being considered for NASA spaceborne astronomy at frequencies near 1000 GHz. We report measurements of gain and noise in SIS mixers at 230 and 492 GHz. We measure relatively high gain and noise associated with Josephson currents that have not been previously reported. These measurements show that Josephson currents are increasingly important as operating frequencies are raised. We discuss the techniques we use to make these measurements. Measurements made with hot and cold black-bodies are shown to be inaccurate at high frequencies. The problem is that SIS mixers do not always respond linearly to the signal power incident on them. This is particularly important when 1) very broad band mixers are used and 2) Josephson effect currents are important. Both of these circumstances are present in the quasioptical SIS mixers favored for 500 GHz and higher. We use monochromatic signals to measure gain and noise to get around these problems.

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