Abstracts

Quasi-Optical Slot Antenna SIS Mixers

J. Zmuidzinas and H.G. LeDuc. "Quasi-Optical Slot Antenna SIS Mixers." 1992 Transactions on Microwave Theory and Techniques 40.9 (Sep. 1992 [T-MTT]): 1797-1804.

We describe a new quasi-optical SIS mixer designed for efficient radiation coupling. The mixer uses a twin-slot antenna which has the advantages of a good beam pattern and a low impedance. The radiation and impedance characteristics of the antenna were obtained from a moment-method calculation. Tapered superconducting microstrip transmission lines are used to carry the radiation from the slot antennas to the tunnel junction. The effective impedance seen by the tunnel junction is quite low, about 4 Omega, which allows micron-size junctions to be used at 500 GHz. The mixers have been fabricated using Nb /Al-oxide/Nb tunnel junctions and a receiver noise temperature of 420 K (DSB) was measured at 490 GHz, which is the best yet obtained for a quasi-optical mixer at this frequency. The comparatively large junction area increases the saturation power and allows strong suppression of noise the Josephson effect by the application of a magnetic field of modest strength.

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