

Lawrence Berkeley National Laboratory

LBL Publications

Title

Progress in Superconducting Mixers and Detectors for Infrared and Millimeter Waves

Permalink

<https://escholarship.org/uc/item/2n87c4n7>

Authors

Richards, P L

Hu, Q

Publication Date

1989-05-01

Center for Advanced Materials

CAM

To be presented at the 1989 International Superconductivity
Electronics Conference (ISEC '89), Tokyo, Japan,
June 12-13, 1989

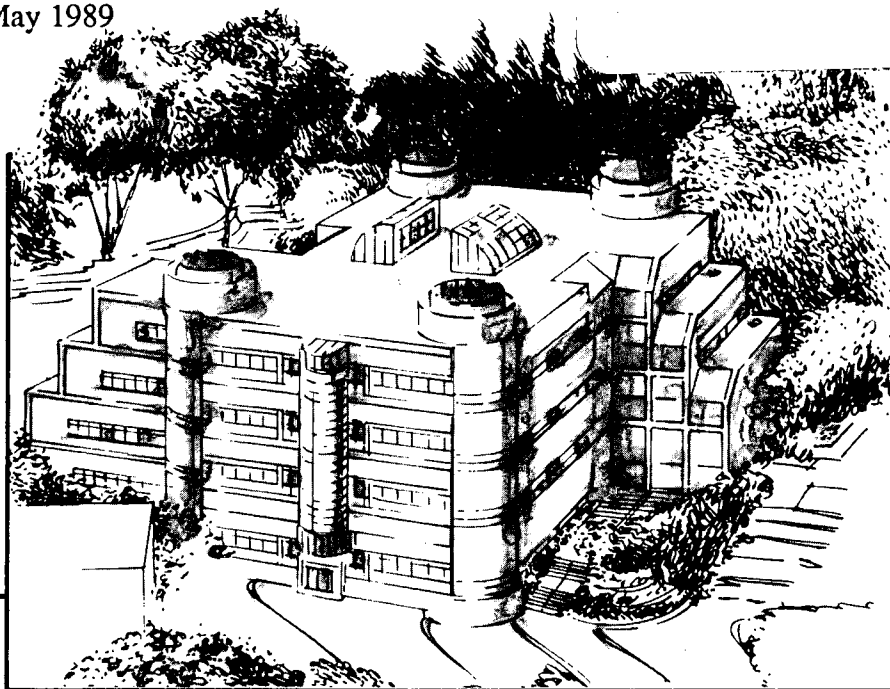
Progress in Superconducting Mixers and Detectors for Infrared and Millimeter Waves

P.L. Richards and Q. Hu

May 1989

For Reference

Not to be taken from this room



Materials and Chemical Sciences Division
Lawrence Berkeley Laboratory • University of California
ONE CYCLOTRON ROAD, BERKELEY, CA 94720 • (415) 486-4755

DISCLAIMER

This document was prepared as an account of work sponsored by the United States Government. While this document is believed to contain correct information, neither the United States Government nor any agency thereof, nor the Regents of the University of California, nor any of their employees, makes any warranty, express or implied, or assumes any legal responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by its trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof, or the Regents of the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof or the Regents of the University of California.

PROGRESS IN SUPERCONDUCTING MIXERS AND DETECTORS FOR INFRARED
AND MILLIMETER WAVES

P.L. Richards and Qing Hu

Department of Physics, University of California
and Center for Advanced Materials, Materials and Chemical Sciences Division
Lawrence Berkeley Laboratory, One Cyclotron Road,
Berkeley, California 94720, U.S.A.

ABSTRACT

A review is given of the superconducting components that have been developed for infrared and millimeter wave receivers. A brief description is given of the scientific principles on which each device is based, followed by a discussion of the performance that has been achieved in terms of the appropriate figures of merit. Finally, comments are made about the possibility that useful device performance can be achieved by using the new high T_c oxide superconductors. This review emphasizes photon-assisted quasiparticle tunneling and the SIS quasiparticle mixer, which is the only superconducting component to find substantial applications at infrared or millimeter wavelengths. Descriptions are given of the SIS quasiparticle direct detector, and the various superconducting bolometers for which practical applications appear possible. The less promising Josephson effect detector and mixer and also the various ideas for superconducting photon detectors are described because of the current interest in possible high T_c versions of these devices.

ACKNOWLEDGMENT

Work supported by the Director, Office of Energy Research, Office of Basic Energy Sciences, Materials Sciences Division of the U.S. Department of Energy under Contract No. DE-AC03-76SF00098.

*LAWRENCE BERKELEY LABORATORY
CENTER FOR ADVANCED MATERIALS
1 CYCLOTRON ROAD
BERKELEY, CALIFORNIA 94720*