

II. MICROWAVE SPECTROSCOPY*

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RESEARCH OBJECTIVES

This group has broad general interest in the study of metals and dielectric crystals by means of UHF and microwave frequency experiments with electromagnetic and acoustic radiation used. We have expanded our experimental techniques to include heat pulses (incoherent phonons), as well as the coherent acoustic signals. The frequency range is thus extended into the "submillimeter" region, but with additional experimental difficulties including loss of frequency resolution. In the past year, the fermi surface of gallium has been investigated by using geometrical resonance or the scattering of electrons from cyclotron orbits by the surfaces of thin single crystals. The line shapes of these resonances have also been studied and appear to be understood to a satisfactory degree. Heat pulses in dielectric crystals have been used to study the propagation and dispersion of acoustic waves in these crystals. The superconducting bolometers used in these experiments appear to give promise of serving as fast ($<10^{-7}$ sec), sensitive (-40 dbm with a 2-Mc output bandwidth) radiometers for use in the millimeter and far infrared regions. Work on electron paramagnetic resonance continues, mainly on interdisciplinary problems in cooperation with members of the Departments of Metallurgy and Chemical Engineering, M. I. T.

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