

Submillimeter-Wave Radiometer Technology for Earth Remote Sensing Applications

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Recent innovations in ultra-high frequency semiconductor device/component technology have enabled both traditional and new applications for space-borne millimeter- and submillimeter-wave heterodyne radiometer instruments. For Earth and planetary remote sensing applications, where system sensitivity is not as much of a driver as it is for astrophysics observations, room-temperature semiconductor diode technology can satisfy most of the receiver front-end noise and bandwidth requirements. Current NASA sponsored millimeter-wave remote sensing instruments being developed at the Jet Propulsion Laboratory include Earth Observing System Microwave Limb Sounder, Microwave Imager for Rosetta Orbiter, Cloud Ice and Array Microwave Limb Sounder spanning frequencies from 100 GHz to 2.5 THz. These instruments encompass a variety of new front-end technologies from 200 GHz MMIC amplifiers to novel monolithic membrane diode (MOMED) mixers operating at 2.5 THz. This talk will focus on the specific device, circuit and antenna technology enhancements that are being deployed to meet the needs of the aforementioned NASA programs and highlight potential future technology directions including THz heterodyne imaging.