DEVELOPMENT OF HIGH-T_c DETECTORS FOR SUB-MM RADIATION

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We investigate heterodyne detectors based on high-T_c superconducting materials, for the frequency range of 500-2500 GHz. Our current research includes detectors based on the Josephson effect and on the hot-electron bolometric effect. These devices are predicted to outperform Schottky-diode type mixers, with respect to sensitivity and LO-requirements. This, together with a required operating temperature which can be easily reached by space-qualified cryo-coolers, makes the high-T_c detector a promising candidate for long lasting space missions for atmospheric research.

Hot-electron bolometer devices made of 1x1x0.2 um YBCO on sapphire have been fabricated. 30 nm thick ceriumoxide buffer layers and YBCO films were grown by using pulsed laser deposition technique and optical lithography was used to define the microbridge and gold electrodes. These detectors are mounted in a 500 GHz waveguide system. We will present data on the RF and IF behavior of these devices. For higher frequencies, we designed a quasi-optical RF-coupling scheme consisting of a double-slot antenna mounted on a Si-lens. Devices for this set-up are currently fabricated.