Development of the Terahertz Superconducting Imaging Array (TeSIA)

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Abstract—Dome A, the highest point of the cold and dry Antarctic ice sheet, offers the best access to atmospheric windows at THz/FIR wavelengths on Earth. The astronomical facilities China is planning to build there include a 5-m THz telescope named DATE5. An instrument proposed for the DATE5 telescope is the THz superconducting imaging array (TeSIA) operating at the 350-μm window, with a pixel number of 32×32 and a background-limited sensitivity (NEP) of $1x10^{-16}$ W/Hz$^{0.5}$. For the development of TeSIA, microwave kinetic inductance detectors (MKIDs) based on Al superconducting films are chosen as the detectors of the system operating at 0.3 K. In this paper, we will firstly introduce the design and performance of the system, and then present some results of video-rate imaging and testing observations on a submillimeter-wave telescope.