SENSOR TECHNOLOGY AT SUBMILLIMETER WAVELENGTHS FOR SPACE APPLICATIONS

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Abstract- Our universe is most luminous at far-infrared and submillimeter wavelengths (100 GHz – 10 THz) after the Cosmic Microwave Background (CMB) radiation. This region of the electromagnetic spectrum provides critical tracers for the study of a wide range of astrophysical and planetary phenomena. This spectral range contains information on the origin of the planets, stars, galaxies, and clusters; the geometry and matter/energy content of the Universe, atmospheric constituents and dynamics of the planets and comets and tracers for global monitoring and the ultimate health of the Earth. Sensors at far-infrared and submillimeter wavelengths provide unprecedented sensitivity for astrophysical, planetary, and earth observing instruments. Very often, for a spaced based platform where the instruments are not limited by atmospheric losses and absorption, the overall instrument sensitivity is dictated by the sensitivity of the sensors themselves. Moreover, some of the cryogenic sensors at submillimeter wavelengths provide almost quantum-limited sensitivity. This paper provides an overview of the submillimeter-wave sensors and their performance and capabilities for space applications.