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Radiation Fields, Effects and Risks in Human Space Missions (4)

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QUANTUM IMAGING DOSIMETRY AND DIRECTIONAL VISUALIZATION OF SPACE
RADIATION IN LEO ORBIT BY THE SATRAM/TIMEPIX PAYLOAD ON-BOARD THE ESA
PROBA-V SATELLITE

Abstract

The compact SATRAM radiation monitor is operating in open space in LEO orbit since 2013 on board ESA's Proba-V satellite. Equipped with the Timepix detector the payload provides the composition and spectral characterization of the mixed-radiation field (X-ray, light and heavy charged particles) in the satellite environment. Single quantum counting capability and per-pixel energy sensitivity enable quantum-counting detection, high resolution tracking, energy loss and LET sensitivity over a wide dynamic range in terms of particle fluxes, energy loss and dose rate. For energetic charged particles directional sensitivity is also provided with limited angular resolution but wide field of view without the need of collimators or shielding. With a polar orbit (sun synchronous, 98 inclination) the payload samples the space radiation field at LEO (820 km altitude) of the inner Earth radiation belt over basically the whole planet. Comprehensive and systematic evaluation of long-period data monitoring in the form of time- and spatially-correlated maps of data products such as particle-type count rates and dose rates will be presented.