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A COTS BASED SPACE ENVIRONMENT INSTRUMENT FOR CUBESATS

Abstract

New space projects rely on the employment of commercial of-the-shelf (COTS) components, which are not space-graded but provide state-of-the-art performance. This especially applies for CubeSat space crafts, which in the last decade transformed form an educational tool to a powerful platform to host professional scientific and commercial payloads. One approach to improve the reliability of COTS based systems is to consider the in-situ space environment within the operation of the nano-satellites, e.g. by adapting operation modes. For this purpose, we developed a low-cost instrument to record the characterize the radiation exposure and magnetic field.

The dosimeter applies radiation sensing field effect transistors (RADFET and FGDOS) to assess the total ionizing dose, while an SRAM device and an attachable LET spectrometer are addressed to single event effects. The magnetometer consists of an PCB boom structure with anisotropic magnetoresistance AMR sensors, one primary with space heritage and three highly integrated secondary sensors, all operated by a processor unit.

We will present the instrument, a performance characterization and results from environmental. It is foreseen to be launched on-board of the next CubeSat mission of the university of applied science Wiener Neustadt, CLIMB. CLIMB employs a FEEP nano R^3 propulsion system in order to increase the altitude of its orbit during operation. The expected environment of these the dynamic orbits has been simulated with specific software tools. The resultss served as input for environmental testing, including thermal vacuum, irradiation campaigns and helmholz cage facilities to assess the magnetic cleanliness. The instrument is expected to significantly extend the capabilities of future CubeSat missions.