

SPACE LIFE SCIENCES SYMPOSIUM (A1)
Radiation Fields, Effects and Risks in Human Space Missions (5)

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TRITEL SATELLITE VERSION SILICON DETECTOR TELESCOPE DEVELOPMENT FOR THE
ESEO SPACECRAFT

Abstract

One of the many risks of long-duration space flights (e.g. International Space Station expeditions, satellite flights, future lunar or Mars-missions, etc.) is the excessive exposure to cosmic radiation. The dose equivalent in orbit may be two orders of magnitude higher than that under the shield of Earth's atmosphere. Due to significant spatial and temporal changes in the cosmic radiation field, radiation measurements with advanced dosimetric instruments on board space vehicles and satellites are extremely important. Since dose equivalent, which characterizes the stochastic biological effects of the radiation, was defined in terms of a LET (linear energy transfer)-dependent quality factor, determining the LET spectrum and the quality factor of cosmic radiation is necessary. For this reason, the development of a three dimensional silicon detector telescope (TRITEL) with almost uniform sensitivity got underway in Centre for Energy Research, Hungarian Academy of Sciences. The instrument comprising three mutually orthogonal, fully depleted PIPS detector pairs is capable of providing the LET spectrum and the average quality factor of the radiation as well as the absorbed dose and dose equivalent. Due to the three orthogonal telescopes an assessment of the anisotropy of the radiation field might be also possible. Since the spectrum of the trapped radiation inside the South Atlantic Anomaly (SAA) is significantly softer, it is worth collecting the SAA and non-SAA spectra separately. ESEO (European Student Earth Orbiter) is an education satellite project of the ESA Education Office. Its aim is to place a spacecraft in sun-synchronous, polar orbit, to provide measurements of the radiation environment in Earth orbit and to test technologies for future education satellite missions. One of the scientific payloads will be a modified, satellite version of the TRITEL. This paper will present the main scientific objectives, the current development phase, the main design aspects, the expected operational and measurement plan for the ESEO mission.