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Radiation testing of Solid State Detectors flying on the JUICE mission

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ESA are planning an L-class mission to Jupiter called JUICE (JUpiter Icy Moons Explorer) in June 2022. Its objective is to explore in detail Jupiter and the Jovian magnetosphere as it currently represents an archetype of gas giant planetary systems. 11 scientific instruments have been selected to fly on JUICE, of which PEP (Particle Environment Package) is one. PEP will deliver a 3D view of the Jovian plasma system by measuring ions, electrons, energetic neutral atoms and neutral gas simultaneously over nine decades of energy with full angular coverage. To achieve this PEP incorporates six different types of sensor, two of which are JoEE (Jovian Energetic Electrons instrument) and JENI (Jupiter Energetic Neutrals and Ions instrument). At their core, both JoEE and JENI employ position sensitive Solid State Detectors (SSD) to sense the electrons, ions and energetic neutral atoms. The Jupiter radiation environment is very severe; it has the strongest radiation belts in the solar system. This necessitates a robust radiation mitigation strategy and also requires that the SSDs are tested for their tolerance to the expected Jovian radiation environment. This paper will address the radiation testing of the SSDs used in JoEE and JENI.

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