

The Orbital Synchrotron Detector of High-Energy Electrons and Positrons

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The project is dedicated to the method of high-energy electrons and positrons registration based on coordinate detection of synchrotron photons born in the Earth magnetosphere. The possibility of the creation of the electrons and positrons synchrotron detector was substantiated, the device's characteristics and the optimum spatial arrangement on the spacecraft were evaluated, for example, on board the International Space Station (ISS). The instrument in the 1 m² areas is able to detect up to 100 electrons and about 10 positrons per year with energies above ~ 3 TeV. Nowadays the separate measurements of electrons and positrons in such energy range are inaccessible using the other methods. The method allows to achieve unique proton rejection coefficient at the level of 10⁶, about 10 times greater than modern magnetic spectrometers have. The main source of background is the secondary photons which might be produced in cosmic rays interaction with the ISS construction. According to the estimations, the using of coordinate detectors with a spatial resolution of ~ 1 mm reduces background up to about 1% by analysis of topological characteristics of the events.

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