

STABILIZED 0.3 – 2000 MEV GAMMA-RAY SPECTROMETER FOR SATELLITE MISSION “CORONAS-PHOTON”

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Described gamma-ray spectrometer for 0.3 – 2000MeV energy region is the main instrument of the Russian space mission CORONAS - PHOTON. The short description of the mission status is given in the report of Kotov et al, that will be presented at SH-session of this conference. The spectrometer is based on sixteen CsI(Tl) crystals with size 32x8x4.5cm each. Total area of spectrometer is 32x36cm², the thickness -18cm. Plastic scintillators are used to eliminate charge particle background. Pulse shape discrimination is used for separation of events produced by gamma-ray and neutrons. A modular structure of the spectrometer allows for logical optimization of the selection of “good” events, effective background suppression, and extension of the counting rate operation.

To stabilize the system during long space operation, two systems of energy scale calibration are employed: a fast system with light-diode and slow one with “tagged” ²²Na gamma-source. Reaction time of the fast system is 3sec, accuracy energy-scale stabilization is ~0.1%. The long-time stability of used light-emitting diode is better 1% for 4000 hour test time. The reaction time of slow stabilization system is about 300sec and stabilization accuracy better than 1% for temperature range -5 to +45 °C. An installed alpha-source allows to control temporary the neutron/gamma-ray separation by pulse shape discrimination.

The main characteristics of the spectrometer, such as energy resolution, uniformity, and etc., are given in the report.