

Development of a Low-Energy Electron Instrument LEP-e for the ERG Mission

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Plasma and Space Science Center (PSSC) at National Cheng Kung University in Taiwan is now developing a low-energy electron instrument for Japan's radiation belts observation mission ERG (Energization and Radiation in Geospace). The instrument consists of an electrostatic energy analyzer with multi-channel plates (MCP) and electronics. The energy analyzer is of the top-hat type, and measures radiation belt electrons from approximately 10 eV to 20 keV. The analyzer's design was studied by numerical particle tracing simulations to achieve good electron measurement performance. The challenge in this development is how to suppress effects due to harsh background radiations in the inner magnetosphere. As a measure against radiation, the analyzer employs 6-mm aluminum shields to reduce radiation penetration to the MCP. Based on GEANT4 radiation simulations with the AE-8/AP-8 radiation model, ~1000 counts/sec of the radiation noise can be received by the MCP. To reduce the radiation effects, a channel is placed for measuring the background noise counts. In the presentation, the electron observation performance and the radiation effects will be discussed.

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