

SPRINT-B(ERG) 衛星に搭載する中間エネルギーイオン質量分析器の性能試験 Performance tests of medium-energy ion mass spectrometer developed for SPRINT-B (ERG)

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We have been developing a medium-energy ion analyser for the radiation belt mission SPRINT-B (ERG). This instrument is comprised of an electrostatic analyser, time-of-flight (TOF) mass spectrometer, and solid state detectors, hence it can measure energy, mass and charge state of 10-180 keV/q ions. It provides the significant information of flux and pitch angle distribution of ring current core components, which is essential for the understanding of the radiation belt dynamics. One of the important issues for particle measurements in the inner magnetosphere is the mitigation of the background noise caused by the radiation belt particles. When the penetrating high-energy electrons (greater than MeV) and protons (greater than 10 MeV) hit detectors in the TOF unit, they produce spurious signals. Secondary particles (electrons and gamma rays) also cause a significant background. Therefore we have designed a TOF unit that is especially suitable for the radiation belt observations in terms of the small detection areas (note that the background count rate is less for the smaller detector areas). Through experiments in a laboratory we have confirmed expected performance on TOF profiles expected from numerical simulations.