

Development of a high time resolution electron spectrum analyzer

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In-situ space plasma measurement has discovered a number of phenomena that occur in the Earth's magnetosphere. Most of those phenomena have been investigated under the assumption of Magneto Hydro Dynamics (MHD). However, the microscopic motion of ions and electrons is very important especially in the diffusion region of magnetic reconnection regions. A formation flight satellite mission SCOPE (cross Scale COupling in Plasma universE) is planned in order to understand the cross scale coupling between macroscopic MHD scale phenomena and microscopic ion and electron scale phenomena. For the SCOPE mission, it is required to develop an electron energy spectrum analyzer that has time resolution as high as 10msec. We have newly developed a spherical Top-Hat electrostatic analyzer with three nested spherical deflectors which can realize the required high time resolution. This analyzer can also be used as ion analyzer that has large dynamic range by changing the gap between the two nested spherical analyzers and putting a low transmission grid at the top part of the middle sphere. We will report the results of numerical simulation and laboratory experiment on the characteristics of a test model of this new analyzer.