Investigation of the response of an all-sky electrostatic analyzer

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Electrostatic analyzers are often used in spinning satellites to achieve the purpose of three-dimensional plasma measurement. Top hat electrostatic analyzers have been widely used to measure ion and electron fluxes variation in space. It has been widely used in satellite missions for space plasma measurement in the past two decades, and the observational data are of good quality. In recent years, more satellites are designed for multi-task observations, so satellites need to be designed for three-axis stabilization. Therefore, this study will design a set of all-sky electrostatic analyzers to achieve the same purpose of three-dimensional plasma measurement. The measurement energy range is ~20 eV - 20 keV, and the total volume is within 3U, so as to be able to be carried on various scientific satellites as much as possible. In the study, we use Geant4 to investigate the response function of all-sky electrostatic analyzers, and the results will show the best design presented under different specifications.

Keywords: all-sky, electrostatic analyzer, Geant4, plasma

