[EE] Evening Poster | P (Space and Planetary Sciences) | P-CG Complex & General

[P-CG21]Future missions and instrumentation for space and planetary science

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Not only national space agencies but some universities and even companies in the world are now leading a number of space science and exploration missions and also energetically initiating new research activities for satellite and rocket developments and international collaborations in these days because the Earth observations from the space and the space explorations could be achieved much easier than a few decades ago. The deployment to the space, which itself is not purely a scientific purpose but one of methods for better sciences, is vigorously motivating the technical innovation and the educational development. For successful space missions, it is also crucial to research and develop aim-oriented on-board instruments, and the fundamental research and development of observational instrumentation with future perspectives could totally lead space missions in some case. Detailed investigation and evaluation on various on-board instruments are needed during their proposals, selections, and fabrications in order to promote the missions, and inevitably we have to make multi-sided arrangements and evolution at every process and aspect of any type of space missions, independently of their mission sizes. In this session, we focus on these comprehensive research activities in the space missions, including the mission integrations and the individual instrumental developments, and we also call many presentations showing the uniqueness and renovation regarding the mission strategy and methodology, and the status and latest results in the related state-of-the-art researches and developments, which would provide all of researchers and developers with invaluable opportunities for active discussion, information sharing, and collaboration toward the realization of more missions for more fruitful space sciences and explorations in nearer future.

[PCG21-P02]Development of the beamline monitoring system for calibration of particle analyzers in the future space explorations

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In the space explorations, particularly observations of the upper atmosphere of the Earth, technologies related to particle analyzers are very important in order to carry out quantitative in-situ observations of space plasmas and neutral particles. As one of the systems necessary for the developments of those particle analyzers, a beamline calibration system is crucial for performing the calibrations of the particle analyzers by emitting electron or ion beams simulating the space and upper atmospheric particles in the vacuum chamber. The characteristics of the beamline system affect the calibration results of the particle analyzers so that the homogeneities of the two-dimensional (2D) cross sections and energy/angular distributions of the beam fluxes are very important in the developments of the particle analyzers.

Since we are constructing the beamline calibration systems in our institute of Nagoya University, we should also develop a beamline monitoring system as an important subsystem in the beamline calibration system in order to obtain the various data of the beamline characteristics. Our beamline monitoring system consists of two components: one is for monitoring the 2D cross sections and another for monitoring the energy/angular distributions.

The component monitoring the 2D cross sections of the beam fluxes is almost completed by combining horizontal and vertical linear motion stages and a multi-anode Micro Channel Plate assembly (MCP), and we also have been developing a C#-language program package that controls two linear stages, obtains count data from MCP, compensates time variations of the beam fluxes, and finally displays contour maps of the 2D cross sections of the beam fluxes. The component monitoring the energy/angular distributions consists of azimuthal/elevational turntables and a compact cylindrical electrostatic analyzer with a pin hole and a single-anode MCP, and we have nearly built a program using LabVIEW, which controls the turntables and the voltages applied to the electrostatic analyzer, adjusts the parameters of the beamline, and obtains count data from MCP. The comparisons between SIMION simulation results on the electrostatic analyzer and experimental results using the energetic ion beams with energies of 3 to 10keV have verified the validity of the energy/angular distribution monitoring system. The control of these devices and data processing could be done by a single laptop Windows computer. In this presentation, we will give the overview of our beamline monitoring system and discuss the data showing the beamline characteristics in order to consider the application toward future developments of the particle analyzers.