

PARM-HEP Observation of Precipitating High Energy Electrons over Pulsating Aurora

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The phenomenon called microbursts that radiation belt particles precipitate to the Earth's atmosphere is thought to be largely related to the dissipation of high energy electrons in radiation belt. It is suggested that this phenomenon is caused by pitch angle scattering of the magnetospheric particles by plasma waves, which is a mechanism similar to the cause of the pulsating aurora observed in the Earth's polar region. There is a possibility that the origin of microburst can be clarified by proving simultaneous occurrence of microburst and pulsating aurora, but observational verification has not been made yet. For that purpose, we have developed a high-energy electron detector (HEP) for the observation of sub-relativistic - relativistic energy electrons that make up the microburst. HEP is designed to measure electrons between 300 keV and 2 MeV with energy resolution of 20% or less and with signal processing time of $\sim 5 \mu\text{s}$. Energy analysis is performed by the detection part of this instrument using SSD (Solid State Detector). Performance tests of this instrument are carried out using a sealed radiation source and a high energy electron beam line. This instrument is installed as one of the core instruments of the PARM instrument package developed for the simultaneous observation of the pulsating aurora and microburst by an international student sounding rocket experiment RockSat-XN and LAMP (Loss through Auroral Microburst Pulsation) sounding rocket experiment. We have succeeded in obtaining the flight data on 13 January 2019 from RockSat-XN sounding rocket experiment. In parallel, we are now preparing HEP analyzer for LAMP sounding rocket experiment. In this presentation, we will show the outline and observation results of RockSat-XN-HEP as well as the LAMP-HEP development status.

Keywords: Microburst, PARM, RockSat-XN, LAMP, Sounding rocket, Pulsating aurora