

PARM-HEP Observation of Microburst Precipitation over Pulsating Aurora

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The phenomenon called microburst 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. 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 the 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. Since the rocket was unfortunately launched on the dayside under quiet condition, simultaneous observation with pulsating aurora was impossible and the significant microbursts cannot be detected, but we detect quasi-relativistic energy electrons that can be explained by pitch angle scattering by weak chorus waves in the quiet dayside magnetosphere. On the other hand, LAMP rocket experiments are prepared for launch in winter 2020. We load an anti-coincidence counter on HEP mounted on LAMP to eliminate the effects of penetrating particles such as galactic cosmic rays. In this presentation, we will show the outline and observation results of HEP as well as the current status of the preparation for the launch of LAMP.

Keywords: microburst, sounding rocket, PARM, pitch angle scattering, pulsating aurora