RockSat-XN Observation of Precipitating High Energy Electrons over Pulsating Aurora

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The Pulsating Aurora (PsA) is one of auroral phenomena whose emission intensities are modulated quasiperiodically in a few to tens of seconds.
This quasiperiodicity is accounted for periodically precipitation of a few to tens of keV electrons which is thought to be generated by pitch angle scatterings due to whistler mode chorus waves in the magnetosphere.
The PsA also has fine internal modulations, which is thought to be related to the repetitive appearance of rising tone elements of the lower band chorus waves in a short interval (a few Hz).
On the other hand, microburst precipitation of relativistic electrons are often observed by low-altitude satellites.
Recent numerical simulations successfully reproduce these microburst precipitations with a few Hz modulations by taking into account the pitch angle scattering with the whistler chorus elements at high latitudes.
However, relationship between the PsA internal modulations and the microbursts are still unknown.

We are currently developing a high-energy electron detector (HEP) in order to understand the relationship between PsA and the electron microburst precipitations.
HEP is designed to measure electrons with energies ranging from hundreds of keV to 2 MeV with high-time resolution.
Energy resolution of the detector (SSD; Solid State Detector) used in HEP is approximately 4 keV based on the laboratory experiments.

HEP is a part of PARM (Pulsating AuroRa and Microburst) package to be onboard the RockSat-XN sounding rocket which will be launched from Andøya, Norway in winter season of early 2019.
PARM consists of four instruments, High Energy Particle detector: HEP, which is above-mentioned, Medium Energy particle Detector: MED, Auroral Imaging Camera: AIC, and ASIC FluxGate magnetometer: AFG.
Energy range of electron measurement provided by PARM is extended by MED down to 20 keV.

In this presentation, we will show the outline and test results of HEP as well as the current status of the instrument development.

Keywords: Pulsating aurora, Sounding rocket, Wave particle interaction, Electron microburst precipitations, RockSat-XN, G-Chaser

