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Development of High energy electron analyzer onboard the LAMP-2 sounding rocket

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The LAMP-2 (Loss through Auroral Microburst Pulsations – 2) project is planned to elucidate the effects of energetic electrons from the Earth's magnetosphere on mesospheric neutral atmospheric modulations and atmospheric outflows.

We are designing and developing high-energy electron detectors (HEP) for LAMP-2. The LAMP-2 HEP is designed to achieve higher sensitivity and temporal resolution, while following the design of HEP instrument onboard the RockSat-XN (launched in January 2019) and LAMP (launched in March 2022) rocket experiments. The previous HEP had the total thickness of the silicon about 5 mm by stacking silicon semiconductor detectors (SSDs), while in LAMP-2, the thickness is about 8 mm to improve the detection efficiency at higher energies, 3 MeV. To increase the effective area, 28 mm square (upper layer) and 48 mm square (lower layer) SSDs are used. In addition, the speed of data processing will be increased. It takes 5 microseconds for the LAMP HEP to determine the energy of one incident electron. For LAMP-2 HEP, we are considering a design that would complete the process in 1 microsecond.

In this presentation, we will report the results of the SSD evaluation using radioisotopes and the sensitivity calculation using the Geant4 simulator.