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A stratospheric and satellite CubeSat format probe capable of detecting relativistic runaway electron avalanches

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In planetary atmospheres, runaway electron avalanches could happen due to large scale electric fields, which accelerate electrons to energies about 0,1 - 10 MeV. This phenomenon is not fully understood. Nowadays, most of the data is obtaining using satellites on low orbits. However, breakdown can also occur at altitudes of less than 30 km. In this case, most of the radiation is scattered without reaching the satellites on high orbits. The formation of charged particles in the atmosphere can affect the results of other experiments. It is important to have the most proper model of this phenomenon. Project goal is to create a stratospheric CubeSat format probe capable of collecting data about these events at an altitude of ~ 30 km and above. The purpose of experiment is to observe changes in the fluxes of both high - energy electrons and radiation, as well as an analysis of possible correlations of the measured parameters. We developed a concept of the probe, performed structural analysis of CubeSat CAD model and created a detector prototype, consisting of a thick polystyrene scintillation counter, wrapped with a mylar, and connected to two SiPM SensL MicroSB-30035-X13 to collect statistics.

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