

Cosmic rays and gamma ray emissions during thunderstorms

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During thunderstorm activities ground based particle detectors register enhancements in fluxes of secondary cosmic ray fluxes - Thunderstorm Ground Enhancements (TGE's). These events are particularly explained by Runaway Breakdown model of initiation of lightnings. The model gives a threshold, minimal value of atmospheric electric fields strengths, in case of which multiplication of secondary cosmic ray electron fluxes occurs. The simulations of secondary cosmic ray propagation in atmospheric electric fields with strengths higher than critical value performed. The conditions of 2 biggest TGE's registered by Aragats Space Environmental Centre detectors are defined.

The simulations of secondary cosmic ray electrons propagation in weak electric fields (with the strengths smaller than the critical value, so called RB threshold) were performed to give an insight in the new physical process of gamma ray generation, not accompanied with electron multiplication in the RREA process. Comparing the results of simulations with the experimental data, we suggest, that the majority of small TGEs detected on Aragats during which ground based detectors register only gamma ray enhancements are of this type.

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