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Source region characteristics of Terrestrial Gamma-ray Flashes

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X-ray and Terrestrial Gamma-ray Flashes (TGFs) are emissions from the upper atmosphere associated with thunderstorms.
The mechanism of these brief emissions is not fully known, although it is understood that the radiation comes from bremsstrahlung. We have developed and used a relativistic Monte Carlo model to study the source of TGFs. In the model, electrons gain energy from a background electric field and interact with air molecules in elastic, inelastic, ionization, and bremsstrahlung processes. We investigate the properties of the runaway electron production by looking at avalanche rates and TGFs photon growths as a function of the background electrical field and the seed electron energy at the source region. The results tell us about the likely characteristics required for the source of TGFs.