

## **Relativistic Feedback Discharges Driven by Positive Leaders**

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Relativistic feedback discharges occur when the production of runaway electron avalanches becomes self-sustained due to a positive feedback effect caused by backward propagating positrons and backscattered x-rays. When positive leaders propagate through a region with a large potential difference, the electric field in the streamer zone ahead of the leader may become large enough to initiate a relativistic feedback discharge, with the runaway electrons converging towards the positive leader tip and feeding the discharge current into the leader channel. Because the leader channel carries away negative charge, the relativistic feedback discharge will continue for longer than if no channel were present. The result of the converging electric field and the leader channel current is a very large fluence of runaway electrons and energetic photons, concentrated in a small region near the leader tip. In this talk, new simulation results will be presented and compared with ground-level terrestrial gamma-ray flash (TGF) observations. It will be shown that a relativistic feedback discharge produced by a positive leader can produce a powerful TGF, with a large current pulse injected into the leader channel and a dangerously large radiation dose occurring in the source region.