Streamer inception imaged at 80 million frames per second

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The lightning initiation problem
Production of runaway electrons during the streamer inception phase

Production of runaway electrons during the streamer inception phase

Negative discharge dynamics : Long exposure

Shot #0000 Exps: 120.0 ns Pk V: 81.82 kV

Exposure time

Distance (cm)

Langmuir Lab for Atmospheric Research
Negative discharge dynamics: Timelapse

Shot #0000 Exps: 120.0 ns Pk V: 81.82 kV

- HV electrode

Ground electrode
Negative discharge dynamics: Timelapse
Negative discharge dynamics: Timelapse
Negative discharge dynamics : Timelapse
Negative discharge dynamics: Timelapse
Negative discharge dynamics: Long vs short exposure
Positive vs negative discharge dynamics:

Positive

Negative
Summary and conclusions

❖ Runaway electrons are produced early on during the streamer inception phase. Therefore:
  ➢ Runaway electrons may influence the discharge development; &
  ➢ No complex mechanisms are necessary to explain their production.

❖ Positive discharges do not produce X-rays and have different morphological features.

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References


