

High energy emissions from pulsed discharges and from lightning leaders

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At the poster, I will review our latest understanding of high energy emissions from pulsed discharges, both in the lab from long sparks generated by a 2.4 MV Marx generator, and in nature from stepped negative lightning leaders.

1. Topic of the poster

Pulsed discharges can create very high electric fields locally and they have the potential to accelerate electrons into the run-away regime. When these fast electrons collide with air molecules, they can create X- and gamma-rays, and also positrons, neutrons etc. – of course, only above the necessary threshold for the electron energies.

This happens in thunderstorms where high energy emissions can be measured from satellites, air planes and from ground. High energy emissions from long sparks, though at lower voltages, have also been measured in the lab.

I will present the laboratory measurements by Kochkin and van Deursen that are documented in [2-4] and in a further manuscript in preparation, and I will be ready to discuss thunderstorm observations.

The focus of the poster is on our state of understanding which depends on cross sections ranging from thermal to nuclear, and on appropriate models of the pulsed discharges for which we will present our latest results based on [1,5-7] and on further manuscripts in preparation. For the documentation of our codes, we refer to [8].

As all results will be presented in refereed journal articles, and as self-plagiarism is currently a critical issue for scientists in The Netherlands, this text serves as an invitation for a discussion of the state of the art at the poster.

2. References

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