

Abstract Submitted  
for the GEC15 Meeting of  
The American Physical Society

**Streamer discharge inception from a dielectric body with a frequency dependent dielectric permittivity**<sup>1</sup> ANNA DUBINOVA, CASPER RUTJES, UTE EBERT, Centrum Wiskunde en Informatica (CWI), Amsterdam, Netherlands — Dielectric bodies are polarized by an external electric field; this polarization is characterized by their dielectric permittivity. However, if the electric field changes fast enough, the dipoles inside the dielectrics cannot follow these changes and their dielectric permittivity drops, eventually to 1 for an electric field that changes infinitely fast. Now the characteristic time scale of streamer discharge development at atmospheric pressure is order of nanoseconds. On this time scale many dielectrics respond to a changing electric field with a smaller dielectric permittivity than to a time independent field. Here we study positive streamer inception from a dielectric tip made of ice. The dielectric permittivity of ice drops from 93 to 3 already on the timescale of milliseconds. We demonstrate that this effect is important and that it can make a streamer propagate with only half of the speed as for a constant dielectric permittivity.

<sup>1</sup>AD acknowledges support by STW project 12119 and CR by FOM-project 12PR3041.

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Date submitted: 17 Jun 2015

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