



Beads and glows in sprite discharges resulting from a dynamical instability of streamer channels.

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High-speed video recordings of sprite discharges show patches of luminosity appearing some milliseconds after a streamer channel is formed [1]. Called beads or glows depending on their size, these luminous patches have decay times of tens of milliseconds and they are responsible for most of the light emitted by the sprite [2].

A possible mechanism explaining the frequent formation of beads and glows is called "attachment instability". This is a dynamical instability inherent in streamer channels that results when a locally higher electric field enhances the effective attachment rate and reduces the electron density. In turn, a depleted electron density enhances the electric field, thus feeding the instability. The instability can be triggered by small perturbations to the streamer channel, such as those arising from a pre-existing inhomogeneity in the electron density [3].

We present observations of the formation of beads and glows and measurements of their decay times. Then we compare with numerical simulations of a streamer channel where the attachment instability generates bright patches with a high electric field. Most of the observed properties of beads and glows are present in the simulation, which leads us to believe that these features are indeed manifestations of the attachment instability.

[1] H. C. Stenbaek-Nielsen and M. G. McHarg, *J. Phys. D* 41, 234009 (2008).

[2] H. C. Stenbaek-Nielsen, T. Kanmae, M. G. McHarg and R. K. Haaland, *Surv. Geophys.* 34:769-795 (2013).

[3] A. Luque and F. J. Gordillo-Vázquez, *Geophys. Res. Lett.* 38, L04808 (2011).