

HIGH-SPEED TELESCOPIC IMAGING OF SPRITES

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Telescopic images of sprite streamers and beads at high frame rates reveal evolution and propagation of these structures on decameter scale at millisecond resolution and higher. In July and August 2004, sprites were observed from Langmuir Laboratory using a 1000+ frames-per-second CCD imager mounted on a Dobsonian telescope. This data is presented along with photometric data of sprites and sprite halos, taken with the Wide-angle Array for Sprite Photometry (WASP), and ELF and VLF observations at nearby sites. Results show a variety of structure, including bead formation and propagation and streamer evolution. As an example, one captured sprite shows a series of seven 1-ms resolution images, in the first of which four bead-like structures are seen to appear. In the second frame, two of these beads have evolved into streamers propagating upwards and downwards as far as the beads below, but do not coalesce with those beads. The streamer structures fade in 1-2 ms, while the beads persist for 7 ms. In another example, a tapered streamer-like structure appears in the first frame, with a 300 m width at the edge of the frame and a 10 m width at the tip, constrained by the resolution of the imager. In subsequent frames more streamers appear on either side of the first structure. All of these structures fade in 5-6 ms. In most cases, structures do not appear to propagate, meaning they either appear as stationary structures or propagate at speeds which cover the field-of-view in under 1 ms. The latter possibility does not require velocities far beyond those predicted for streamers at this altitude.

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2. H - Waves in Plasma
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4. I - Invited Paper, Program
chair: Steven Cummer and
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5. Submission to Special Session
G/H: Lightning and Sprites