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Identification of the Corona Point in Point-to-Plane Geometries in Atmospheric Air

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In highly non-uniform electric fields, corona appears when a geometry-dependent threshold voltage is reached. A further increase in voltage results in circuit-limited breakdown. As the electric field becomes more uniform, the difference between the corona-onset voltage and the breakdown voltage becomes smaller until finally breakdown commences directly. The gap distance and voltage where the corona onset curve meets the breakdown curve is known as the Corona Point.

The Corona Point is associated with the sustaining field –the minimum electric field which supports streamer propagation. This is of interest as it forms the basis for an additional requirement on streamer propagation to supplement the Meek-Raether avalanche-to-streamer criterion for electrical breakdown. The Corona Point is determined using a point-to-plane experimental setup that allows precise changes in electric field uniformity by moving the point closer to the plane. The potential on the electrode is ramped slowly to ensure that the threshold electric field for corona-onset is measured by triggering the digitizer with a photomultiplier sensitive in the 300-600nm range.

Authors: ROSSETTI, Leonardo (University of New Mexico); LEHR, jane (University of New Mexico)

Presenter: ROSSETTI, Leonardo (University of New Mexico)

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