Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Runaway Generation in Tokamak Plasmas for Large Disruption Relevant Electric Fields[1] CHRIS MCDEVITT, XIANZHU TANG, Los Alamos National Laboratory — The generation of relativistic electrons in tokamak plasmas has been the subject of extensive research due to their intrinsic interest as well as the threat they pose to reactor-scale tokamak devices. Runaway electron generation becomes particularly robust for the very large inductive electric fields that are often present during tokamak disruptions. In this work we show that when such large inductive electric fields are present, the physics of how tokamak geometry impacts runaway generation processes is qualitatively modified compared to the more commonly studied limit of weak inductive electric field strengths. In particular, for the large electric fields which may be present during a disruption, the efficiency of Dreicer production is found to increase as a function of minor radius, rather than undergo a sharp decrease, as is characteristic of the weak inductive electric field limit. In addition, the rate of avalanche amplification of a runaway population is found to be largely insensitive to the minor radius for the large electric fields characteristic of a disrupting tokamak plasma. Ongoing work is devoted toward applying these results to the self-consistent description of a disrupting plasma.

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Date submitted: 27 Jun 2019 Electronic form version 1.4