Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

A conservative, relativistic Fokker-Planck solver for runaway electrons LUIS CHACON, W. TAITANO, X. TANG, Z. GUO, C. MCDEVITT, LANL — Relativistic runaway electrons develop when electric fields surpass a critical electric field,[1] $E_c = E_D \left(\frac{v_{th}}{c}\right)^2$, with E_D the Dreicer field (which is the electric field at which the whole thermal electron population runs away). Above this critical field, electron tails accelerate relativistically until they are arrested by radiative processes.[2] In regimes above this critical electric field (but below the Dreicer field), correctly capturing the interplay between the electron thermal population and the runaway tail is key, and demands a full nonlinear relativistic Fokker-Planck treatment. In this presentation, we report on progress towards a fully conservative, implicit, adaptive implementation of the relativistic electron Fokker-Planck equation. Strict conservation properties, as well as positivity preservation, are a must to avoid spurious numerical effects, and to be able to capture tenuous electron runaway tails for fields just above E_c.

[1]J. W. Connor and R. J. Hastie, *Nuc. Fusion*, **15** (1975)
[2]Z. Guo et al., Plasma Phys. Control Fusion, **59** (2017)

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Date submitted: 07 Jul 2017 Electronic form version 1.4