Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Klein-Nishina: A Qualitatively New Regime of Radiative Relativistic Magnetic Reconnection (PhD Oral-24)[1] JOHN MEHLHAFF, GREGORY WERNER, DMITRI UZDENSKY, MITCHELL BEGELMAN, University of Colorado, Boulder — Astrophysical plasmas commonly exhibit a number of exotic characteristics as fascinating as the environments that host them. In many systems, magnetic field lines snap through relativistic reconnection, powering spectacular flares. Sometimes, such as in blazar jets and accretion disk coronae, the reconnection region is bathed in low-energy photons from an external source. Through the inverse Compton (IC) process, reconnection-energized particles upscatter these seed photons to the observed (e.g. X- and gamma-ray) flaring energies, simultaneously cooling down. When the energies of the scattering particles and seed photons are high enough, IC cooling transitions to the discrete Klein-Nishina (KN) regime, with particles delivering an order-unity fraction of their energies to single photons. In this limit, Comptonized photons may pair-produce with their seed photon population, providing another channel for feedback on the evolving plasma (besides the IC cooling itself). Using a new module for the particle-in-cell code Zeltron, we ran a series of relativistic magnetic reconnection simulations in this qualitatively distinct IC regime. We report initial results from these simulations, studying radiative feedback on reconnection in the previously unexplored KN limit.

[1]Work supported by DOE grant DE-SC0008409, NASA ATP grants NNX16AB28G and NNX17AK57G, and NSF grant AST-1903335.

John Mehlhaff
University of Colorado, Boulder

Date submitted: 24 Aug 2020 Electronic form version 1.4