Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Kinetic Plasma Simulations of Black-Hole Jet Launching and Pair Discharges KYLE PARFREY, Princeton University — Black holes drive powerful relativistic jets, using magnetic fields dragged in by their accretion flows. The jets' plasma should be so diffuse as to be effectively collisionless, and self-consistently supplied by pair creation near the horizon. I will present the first general-relativistic kinetic plasma simulations of the collisionless magnetospheres of rotating black holes, showing the launching of electromagnetic jets by the Blandford-Znajek mechanism. Simulations with Monte-Carlo inverse-Compton scattering and two-photon pair creation show that the plasma-supplying discharge is tied to the inner light surface, near the horizon, and that no simple MHD stagnation surface forms. The kinetic approach will be useful for studying the accretion flows of the Event Horizon Telescope targets, Sgr A* and M87, where the plasma is likewise of low density and collisionless, and for probing black holes nonthermal X-ray and gamma-ray emission from first principles.

Kyle Parfrey
Princeton University

Date submitted: 07 Jan 2020 Electronic form version 1.4