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Numerical studies of SMBH magnetospheres and observational predictions for AGNs and inner jets[1] ALEX FORD, MIKHAIL V. MEDVEDEV, University of Kansas — Electrodynamic, radiative and plasma processes around SMBHs in AGNs determine how relativistic jets are launched and how the black hole energy is extracted. The cornerstone process here is plasma production via the electron-position cascade in the so-called "gap" region of a SMBH force-free magnetosphere. This multi-stage process, involving particle acceleration, photon Compton up-scattering and production of $e^{\pm}$ secondaries, is explored numerically by computing the radial development of the entire cascade and accompanying plasma physical and radiative processes. Here we show how the $e^{\pm}$ plasma production depends on the black hole mass and spin, the amount and spectrum of the ambient photons and magnetic fields, and other parameters and provide empirical scaling relations. We also present the full structure of the gap region and make solid observational predictions for X-ray and gamma-ray fluxes and spectra, which can readily be compared with observations of AGNs and inner regions of their jets.

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