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General Relativistic Particle-In-Cell Simulations of Pair Producing Gaps in Black Hole Magnetospheres[1] YAJIE YUAN, YURAN CHEN, Princeton University — In some low-luminosity accreting supermassive black hole systems, the supply of plasma in the jet funnel region can be a problem. It is believed that a local region with unscreened electric field can exist in the black hole magnetosphere, accelerating particles and producing high energy gamma-rays that can create $e^{\pm}$ pairs. We carry out time-dependent, self-consistent, 1D general relativistic PIC simulations of this process, including inverse Compton scattering, photon tracking, and $\gamma\gamma$ pair production. We find a highly time-dependent solution where a macroscopic gap opens quasi-periodically to create $e^{\pm}$ pairs and high energy radiation. We discuss possible implications for sources like M87 and Sgr A*, in particular the variable high energy emission from particles accelerated in the gap.

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