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Radiative Signatures of Relativistic Reconnection in Blazar Jets

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Relativistic magnetic reconnection is a strong candidate for the acceleration of particles to high-energies and is a proposed mechanism for the multi-wavelength spectral and temporal variability observed in blazar jets. By coupling recent two-dimensional particle-in-cell simulations of relativistic reconnection with a time-dependent radiative transfer model, we compute the non-thermal emission from a chain of plasmoids, namely quasi-spherical blobs of plasma containing relativistic particles and magnetic fields formed during a reconnection event. Here, I will show that our derived photon spectra display characteristic features observed in blazar subclasses, with a differentiation achieved by varying the strength of the photon fields external to the jet, the jet magnetization, and the number of electron-positron pairs per proton contained within. For our modeling of BL Lac sources, we find an extended synchrotron component, with peak energies reaching a few keV, along with frequent gamma-ray flares with energies exceeding 1 TeV, with potential applications to extreme blazars. Finally, I will present several observational signatures of our model including the statistical properties of plasmoid-powered flares, the correlation of flaring events in multi-wavelength bands, and the power-spectral density of our reconnection driven light curves.

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