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A Radiative Transport Model for Blazars TIFFANY LEWIS, George Mason Univ, JUSTIN FINKE, Naval Research Laboratory, PETER BECKER, George Mason Univ — Blazars are observed across the electromagnetic spectrum, often with strong variability throughout. We start from first-principles to build up a transport model, whose solution is the electron distribution, rather than assuming a convenient functional form. Our analytical transport model considers shock acceleration, adiabatic expansion, stochastic acceleration, Bohm diffusion, and synchrotron radiation. We use this solution to give predictions for the X-ray spectrum and time lags, comparing the results with BeppoSAX observations of X-ray flares from Mrk 421. This new self-consistent model provides an unprecedented view into the jet physics at play in this source, especially the strength of the shock and stochastic acceleration components and the size of the acceleration region. More recently, we augmented the transport model to incorporate Compton scattering, including Klein-Nishina effects. Here, an analytical solution cannot be derived. Therefore we obtain the steady-state electron distribution computationally. We compare the resulting radiation spectrum with multi-wavelength data for 3C 279. We show that our new Compton + synchrotron blazar model is the first to successfully fit the FermiLAT gamma-ray data for this source based on a first-principles physical calculation.

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