Contribution ID: **300** Type: **Contributed talk**

A shock-in-jet synchrotron mirror model

Tuesday, 5 July 2022 17:45 (15 minutes)

Previous work on time-dependent shock-acceleration and radiation transfer in relativistic jets has successfully reproduced many spectral variability features of blazars if flaring activity is mediated by increasingly efficient diffusive shock acceleration. However, flaring events exhibiting a significant increase of the Compton dominance, or even "orphan" gamma-ray flares, are very difficult to reproduce in this manner, suggesting that an enhancement of an external radiation field for Compton scattering may be responsible for the gamma-ray flaring. This work therefore investigates the signatures of a synchrotron mirror model in which the synchrotron emission of electrons accelerated by a mildly relativistic shock traveling along the jet, is reflected by a cloud, and the reflected synchrotron radiation acts as target photon field for enhanced Compton scattering further down the jet. The model is applied to recent flaring events exhibiting a significant enhancement of the Compton dominance in 3C279, and the expected spectral variability features are investigated in detail.

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Session Classification: Contributed Talks