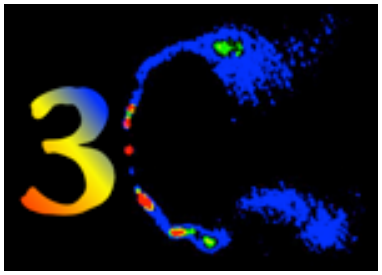

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Analysis of 3C 279 Orphan Gamma-Ray Flare

Friday, 20 September 2019 11:00 (20 minutes)

Consistent multiwavelength observations of the blazar 3C 279 can be attributed at least in part to the legacy of the Third Cambridge Catalogue. The monitoring campaign during Dec 2013 discovered a very bright, 12-hour, orphan gamma-ray flare with a uniquely hard FermiLAT spectrum and high Compton dominance. We apply a novel theoretical model in the one-zone, leptonic tradition, which now reproduces this unique flaring behavior. We develop a simplified analytic electron energy distribution of the primary radiative cooling region in the relativistic jet to provide intuition about how individual acceleration processes shape blazar emission spectra. Understanding contributions of individual physical processes in relativistic, astrophysical jets is fundamental to elucidating the energy budget near supermassive black holes and the that involved in AGN feedback as the jet impacts the surrounding environment. We rule out the possibility that significant acceleration occurs via magnetic reconnection due to the very low magnetization parameter, and constraints on the maximum Larmor radius for the jet geometry. Our analysis suggests that the flare is initiated by an increase in the particle energies due to shock acceleration, which also increases the stochastic acceleration. The higher energy particle preferentially occupy the outer jet, along the sheath, which decreases the apparent magnetic field and synchrotron radiation, while increasing electron exposure to the BLR photon fields, driving up the external Compton emission.

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