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Flares on minute time-scale in Blazars by mirroring plasmoids

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Bright and fast gamma-ray flares have been recently detected from the Blazar 3C 279, with GeV luminosities up to 10⁴9 erg/s. The source is observed to flicker on timescales of minutes with no comparable optical-UV counterparts. Such observations challenge current models of high-energy emissions from Blazar sources that are dominated by relativistic jets along our line of sight with bulk Lorentz factors up to Gamma \sim 20\$. We discuss a model based on a jet structure comprising strings of plasmoids as indicated by many radio observations. We follow the path of the Synchrotron radiations emitted in the optical - UV bands by relativistic electrons accelerated around the plasmoids to isotropic Lorentz factors gamma \sim 10^3. These primary emissions are partly reflected back by a leading member in the string that acts as a moving mirror for the approaching companions. In the inter-plasmoid, shrinking gaps transient overdensities of seed photons build up. The electrons then proceed to upscatter these seeds into the GeV range by the inverse Compton interactions. We show that such a combined process produces bright gamma-ray flares with little or none optical to X-ray enhancements. Main features of our model include: gamma-ray flares produced beyond the broad line region; Compton dominance at GeV energies by factors up to some 10²; bright flares with risetimes as short as a few minutes, occurring at distances of order 10¹⁸ cm from the central black hole; little reabsorption from local photon-photon interactions.

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