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Flare States Modeling and Spectral Study of S5 1044+71

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Blazars are a special kind of active galactic nuclei (AGNs) with jets oriented at small angles to our line of sight. Due to the relativistic motion of plasma along the jet, it constitutes one of the most rapidly varying classes of objects over a broad energy band (radio to γ-ray). S5 1044+71 (z = 1.15) is a known distant blazar observed in the GeV energy band. In the latest *Fermi*-LAT source catalog, 4FGL 1048.4+7143 is associated with S5 1044+71. Based on 12.5 years of good quality *Fermi*-LAT data, we have detected three long-term flaring activities of S5 1044+71. In this work, we report a detailed temporal and spectral study of all three long-term flares of S5 1044+71 which provides some insight into acceleration and emission mechanisms inside the jet. For the temporal study, we have decomposed Fermi data into two energy bands (0.1-0.4 and 0.4-300 GeV) and produced corresponding weekly binned Fermi light curves for all flares. The modelling of weekly binned light curves includes the rise and decay time analysis and study of flux-index correlation for each flare. We have also performed the correlation study and hardness ratio test between two energy bands. The temporal analysis provides a detailed evolutionary picture of flares over different energy bands. The multi-wavelength data were taken from different publicly available telescopes like SPOL-CCD of Steward Observatory, *Swift*-XRT and *Swift*-UVOT. As a part of the spectral study, broadband SEDs of three flares are modelled using a leptonic scenario with two emission zones where the second zone is only responsible for high energy emission. The modelling of broadband SED provides some insight into the intrinsic jet parameters which help us to understand the nature of different emission mechanisms inside the jet.

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