

Multiwavelength variability and correlation studies of Mrk421 during historically low X-ray and γ -ray activity in 2015–2016

Friday 16 July 2021 19:18 (12 minutes)

In this work, we report multi-band flux variability and correlations of the nearby ($z=0.031$) blazar Markarian 421 (Mrk421) using multi-wavelength (MWL) data from November 2014 until June 2016. In this period, Mrk421 exhibited historically low activity in X-rays and very-high-energy gamma rays (VHE; $E>0.1$ TeV). During this period, an additional spectral component was observed by Swift-BAT. The highest flux variability occurs in X-rays and VHE which, despite the low activity, show a significant positive correlation with no time lag. The hardness ratios in the X-rays and VHE gamma rays show the “harder-when-brighter” trend observed in many blazars. Interestingly, the trend flattens at the highest fluxes, which suggests different processes dominating the brightest states. Enlarging our data set with data from the years 2007 to 2014, we measured a positive correlation between the optical and GeV emission centered at zero time lag, and a positive correlation between the optical/GeV and the radio emission over a range of about 60 days centered at a time lag of $43+9/-6$ days. This observation is consistent with the radio-bright zone being located about 0.2 parsec downstream from the optical/GeV emission regions. In most of the energy bands, the flux distribution follows the Lognormal, rather than the Normal function, indicating that the variability may be dominated by a multiplicative process.

Keywords

galaxies: active –BL Lacertae objects: individual: Mrk 421 –methods: data analysis –methods: observational –radiation mechanisms: non-thermal

Collaboration

MAGIC

other Collaboration

FACT, Fermi-LAT Collaboration and MWL partners

Subcategory

Experimental Results

Primary authors: Dr BANERJEE, Biswajit (Gran Sasso Science Institute); Prof. MAJUMDAR, Pratik (Saha Institute of Nuclear Physics, HBNI); Prof. PANEQUE, David (Max-Planck-Institut für Physik); Dr TERZIĆ, Tomislav (University of Rijeka, Department of Physics); FOR THE MAGIC, FACT, FERMI-LAT COLLABORATION AND MWL PARTNERS.

Presenter: Dr BANERJEE, Biswajit (Gran Sasso Science Institute)

Session Classification: Discussion

Track Classification: Scientific Field: GAI | Gamma Ray Indirect