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Long-term multi-band photometric monitoring of Mrk 501

We present a long-term multi-wavelength observation campaign of the bright blazar Mrk 501, performed between December 2012 and April 2018, from the radio to the TeV. These data are used to study the emission mechanisms in the jet. We examined the variability and the correlations of the light curves obtained by eight different instruments across the electromagnetic spectrum. Individual TeV and X-rays flares were identified. A response profile function was found which when convolved with the GeV light curve resembles the radio variability. The source was found to be variable on different timescales over broad energy ranges. We found three significant results. Simultaneous TeV and X-rays variations with close to zero lag indicates that the emission process is consistent with leptonic scenario, where TeV photons are produced through inverse Compton mechanism. The characteristic time interval between the TeV flares hints that Lense-Thirring precession of the accretion disk may drive the variability in X-rays and TeV. A lack of GeV and radio correlation prior to MJD 56800 and a good correlation afterwards indicates that the source probably experienced a transition which results in GeV and radio becoming apparently more dependent.

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