

15 Years of Fermi LAT and Multi-wavelength Observations of a Long-term Periodic Flux Modulation in the Blazar PG 1553+113 - [REMOTE]

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We present the results of more than 15 years (August 2008 - November 2023) of Fermi Large Area Telescope (LAT) monitor observations of the high-energy peaked BL Lac object PG 1553+113 at $E > 100$ MeV and $E > 1$ GeV gamma-ray bands, in comparison with optical, radio and X-ray multifrequency monitoring data. A 2.1-year periodic modulation of the gamma-ray flux is continuing to be significant at a 4 sigma level against stochastic red noise, with about seven cycles. This doubling the total time range of data with respect to the previous work by the LAT Collaboration based on 6.9 years of data (Ackermann et al. 2015), where this periodicity was tentatively identified.

Independent determinations of oscillation period and phase based on data published in the earlier work and the new data are in agreement (chance probability < 0.01). This cyclic behavior modulates the rapid-term and intermediate-term irregular variability and the flares of PG 1553+113. The discovery allows prospects for investigating pulsational accretion flow in a sub-parsec binary supermassive black hole system, or accretion flow instabilities, disk and jet precession, rotation or nutation and also perturbations by massive stars or compact objects in polar orbit.

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