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Multiwavelength view of OJ 287 during 2017-2020

The blazar OJ 287 has been proposed as a binary black hole system based on its periodic optical outburst. Black hole binary systems are scarce among blazars with parsec scale jets, and hence this source is exciting to study. The BL Lac OJ 287 is an interesting object for multiwavelength study due to its periodic outbursts. We analyzed the optical, X-ray, and γ-ray data of OJ 287 for the period 2017–2020. There are several high states in optical–UV and X-ray frequencies during this period. Based on the observed variability in optical and X-ray frequencies, the entire period 2017–2020 is divided into five segments, referred as A, B, C, D, and E. A detailed temporal and spectral analysis is performed to understand the nature of the flaring activities of OJ 287. To understand the temporal variability in this source we studied the intraday and fractional variability for all the various
states. In addition, fast variability time was also estimated in order to understand the nature of variability. Furthermore, the multiwavelength spectral energy distribution (SED) modeling was performed to know more about the physical processes responsible for the simultaneous broadband emission and the fast variability. The Fermi-LAT observations show a moderate flux level of this source in γ-ray frequency throughout this period, though flux variability has been observed. The source has shown a strong flux variability in X-ray, optical, and UV during early 2017 and mid-2020 when the source was in a very high state. A single-zone synchrotron self-Compton emission model is considered to model the SED, and this helps us to explore the nature of this BL Lac with binary supermassive black holes.

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