Contribution ID: **96** Contribution code: **EGAL** Type: **Poster**

Modeling multiband SED and light curves of BL Lacertae using a time-dependent shock-in-jet model

Monday 2 September 2024 09:51 (1 minute)

The origin of fast flux variability in blazars is a long-standing problem, with many theoretical models proposed to explain it. In this study, we focus on BL Lacertae to model its spectral energy distribution (SED) and broadband light curves using a diffusive shock acceleration process involving multiple mildly relativistic shocks, coupled with a time-dependent radiation transfer code. BL Lacertae was the target of a comprehensive multiwavelength monitoring campaign in early July 2021. We present a detailed investigation of the source's broadband spectral and light curve features using simultaneous observations at optical-UV frequencies with Swift-UVOT, in X-rays with Swift-XRT and AstroSat-SXT/LAXPC, and in gamma-rays with Fermi-LAT, covering the period from July to August 2021 (MJD 59400 to 59450). A fractional variability analysis shows that the source is most variable in gamma-rays, followed by X-rays, UV, and optical. This allowed us to determine the fastest variability time in gamma-rays to be on the order of a few hours. The AstroSat-SXT and LAXPC light curves indicate X-ray variability on the order of a few kiloseconds. Modeling simultaneously the SEDs of low and high flux states of the source and the multiband light curves provided insights into the particle acceleration mechanisms at play. This is the first instance of a physical model that accurately captures the multi-band temporal variability of BL Lacertae, including the hour-scale fluctuations observed during the flare.

Primary author: Dr KHATOON, Rukaiya (North-West University)

Co-author: Prof. B¨OTTCHER, Markus (North-West University)

Presenter: Dr KHATOON, Rukaiya (North-West University)

Session Classification: Poster hang