Title:	Exploring γ-Ray Flares in the Long-term Light Curves of CTA 102 at GeV Energies
Authors:	Kushwaha, Pankaj (/jspui/browse?type=author&value=Kushwaha%2C+Pankaj)
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Abstract:	Blazar CTA 102 experienced an intense multiwavelength activity phase from 2015 to 2018; in particular, an unprecedented outburst was observed from 2016 October to 2017 February. In this work, we extract a 7 day binned γ-ray light curve from 2008 August to 2018 March in the energy range 0.1–300 GeV and identify three main outbursts. We study in detail the short-timescale variability of these three outbursts via an exponential function with parameterized rise and decay timescales. The obtained shortest rise and decay timescales are 0.70 ± 0.05 hr and 0.79 ± 0.27 hr, respectively. Based on these variability timescales, the physical parameters of the flaring region (e.g., the minimum Doppler factor and the emission region size) are constrained. The short-timescale flares exhibit a symmetric temporal profile within the error bars, implying that the rise and decay timescales are dominated by the light-crossing timescale or by disturbances caused by dense plasma blobs passing through the standing shock front in the jet region. We also find that the best-fitting form of the γ-ray spectra during the flare period is a power law with an exponential cutoff. The derived jet parameters from the spectral behavior and the temporal characteristics of the individual flares suggest that the γ-ray emission region is located upstream of the radio core. The extreme γ-ray flare of CTA 102 is likely to have been caused by magnetic reconnection.
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