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Characterizing optical and gamma-ray variability properties of blazars

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Blazars, a subset of powerful active galactic nuclei, feature relativistic jet which shine in a broadband electromagnetic radiation, e. g. from radio to TeV emission. Here we present the results of the studies that explore gamma-ray and optical variability properties of a sample of gamma-ray bright sources Several methods of time-series analyses are performed on the decade-long optical and Fermi/LAT observations. The main results are as follows: The sources are found highly variable in both the bands, and the gamma-ray power spectral density is found to be consistent with flicker noise suggesting long-memory processes at work. While comparing two emission, not only the overall optical and the γ-ray emission are highly correlated but also both the observation distributions exhibit heavy tailed log-normal distribution and linear RMS-flux relation. Similarly, non-linear time series analysis suggested the presence of deterministic nature of the underlying dynamical processes. In addition, in some of the sources indications of quasi-periodic oscillation were revealed with similar characteristic timescales in the both the bands. We discuss the results in light of current blazar models with relativistic shocks propagating down the jet viewed close to the line of sight.

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