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Searching for signatures of chaos in gamma-ray light curves of selected Fermi-LAT blazars (12+3)

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Blazar variability appears to be stochastic in nature. However, a possibility of low-dimensional chaos was considered in the past, but with no unambiguous detection so far. If present, it would constrain the emission mechanism by suggesting an underlying dynamical system. We rigorously searched for signatures of chaos in \textit{Fermi}-Large Area Telescope light curves of 11 blazars. The data were comprehensively investigated using the methods of nonlinear time series analysis: phase-space reconstruction, fractal dimension, maximal Lyapunov exponent (mLE). We tested several possible parameters affecting the outcomes, in particular the mLE, in order to verify the spuriousness of the outcomes. We found no signs of chaos in any of the analyzed blazars. Blazar variability is either truly stochastic in nature, or governed by high-dimensional chaos that can often resemble randomness.

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