Search for binary black holes in 10 years of Fermi LAT data with information field theory

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Abstract. Blazars are powered by super-massive black holes at their centers and are known for extreme variability on timescales from minutes to years. In case of a binary black hole system, this duality is traceable as periodic modulation of their MeV to GeV emission. So far, no high-significance periodicity has been found with standard approaches. We developed a method to search for periodic patterns in Fermi/LAT light curves, using information field theory (IFT). IFT is a formulation of Bayesian statistics in terms of fields. Bayesian statistics is ideal for the problem at hand since the data is incomplete, irregularly sampled and obeys non-Gaussian statistics such that common least-squares methods do not apply. We present a proof of principle of this method, analyzing a sample of promising binary black hole candidates like PG $1553 + 113$ and Mrk 501.

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