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# Decade-long Periodicity Study of 2FHL Blazars with Historical Optical Data

by S. Adhikari, P. Peñil, A. Domínguez, M. Ajello,  
S. Buson, , and A. Rico

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Plaza de las Ciencias, 1 28040 Madrid, Spain

[www.ucm.es/iparcos/](http://www.ucm.es/iparcos/)



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# Abstract

In our recent investigation, we utilized a century's worth of archival optical data to search for a decade-long periodicity from the blazar PG 1553+113, finding a hint of a 22-year period. Building on this foundation, the current study extends our analysis to include 10 blazars from the Fermi Large Area Telescope 2FHL catalog to uncover similar long-term periodic behavior. To ensure the reliability of our findings, we consider the impact of observational limitations, such as temporal gaps and uneven sampling, which could potentially introduce artifacts or false periodic signals. Our analysis reveals that 4 of these blazars (AP Librae, MKN 421, MKN 501, PG 1246+586) exhibit decade-long periods in their optical light curves, albeit 3 of them may be influenced by noise. However, a likely genuine period of approximately  $51 \pm 9$  yr is identified for MKN 421.

