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Search for Periodic Signals in the Galactic Background Region with LHAASO-KM2A Data

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Motivation

Periodic gamma ray source

Diffuse emission

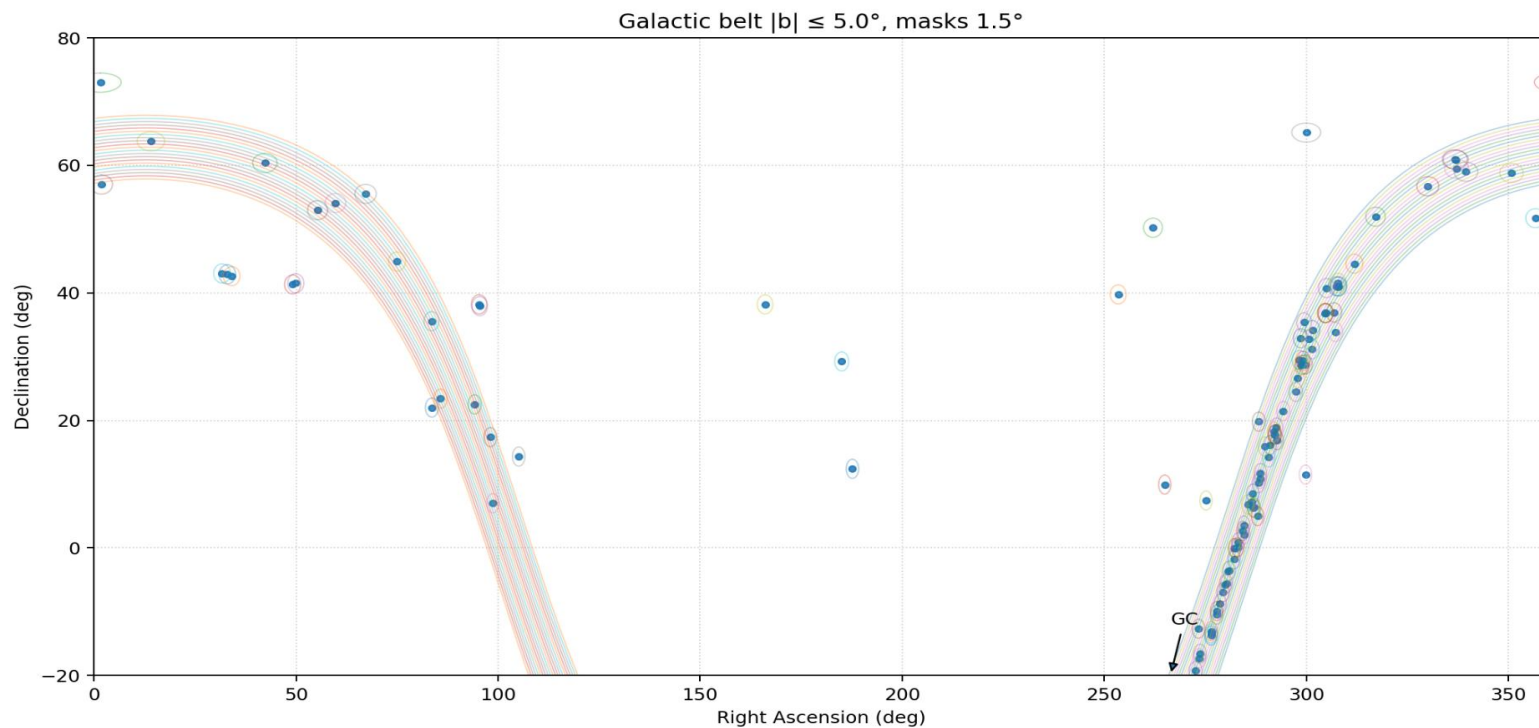
Galactic background



Do unknown periodic signatures exist in the Galactic plane?

What physical phenomena could they imply?

Method



Search region

Galactic latitude cut: $|b| < 5^\circ$

Source exclusion: circular masks of 1.5° around known LHAASO sources

Longitude binning: divided into 10° bins

Data set

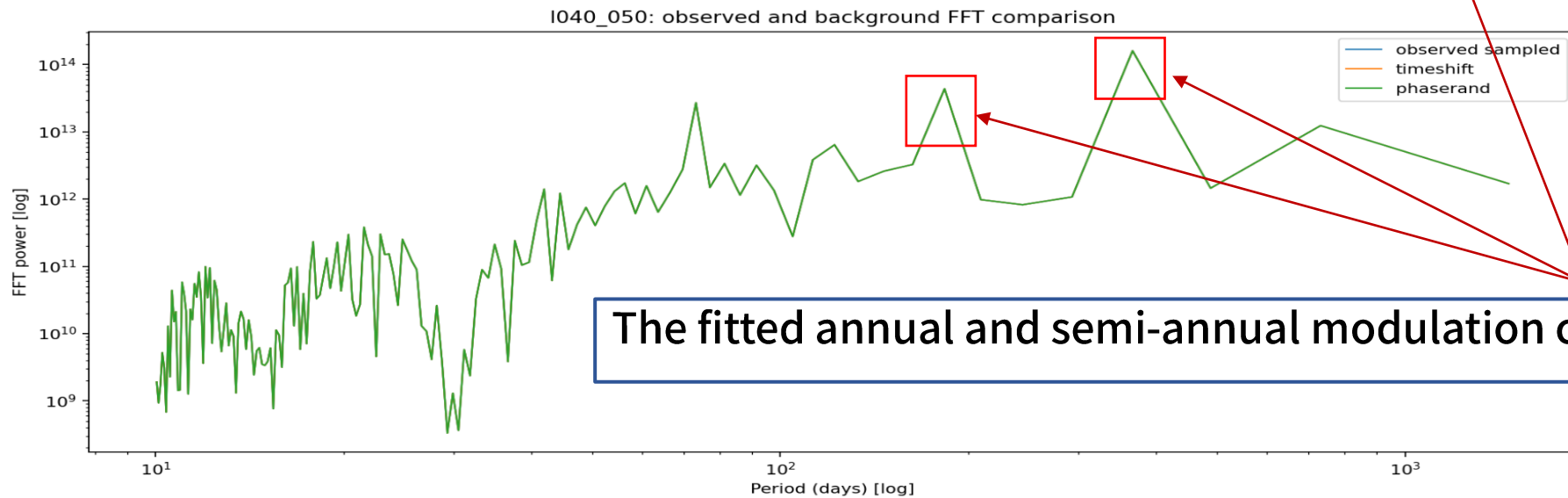
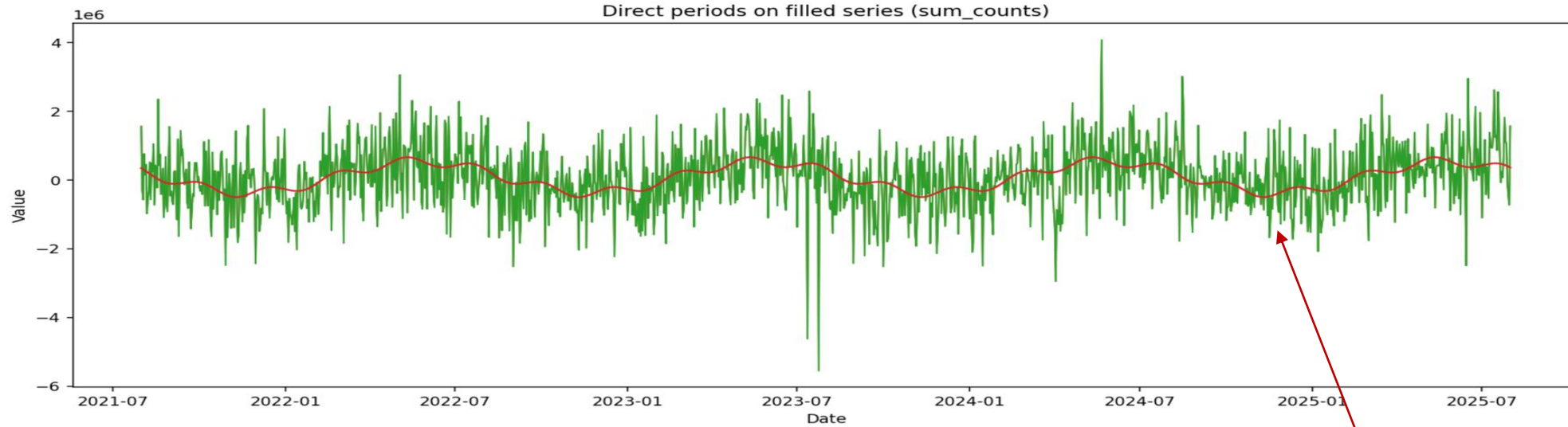
Data period: 2021/07/31 – 2025/07/31

Energy range: $E > 6.3$ TeV

Zenith angle cut: $< 50^\circ$

Result

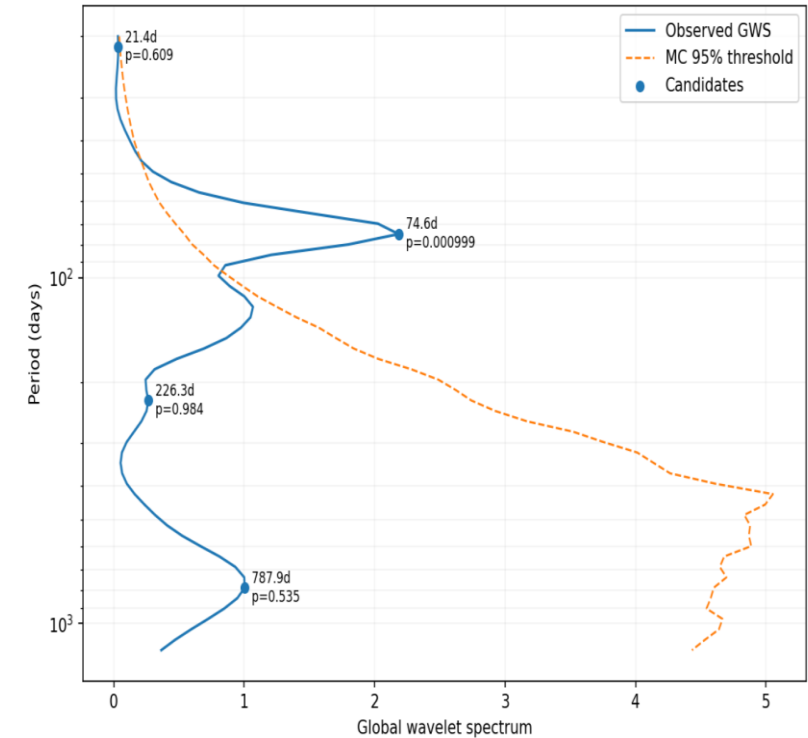
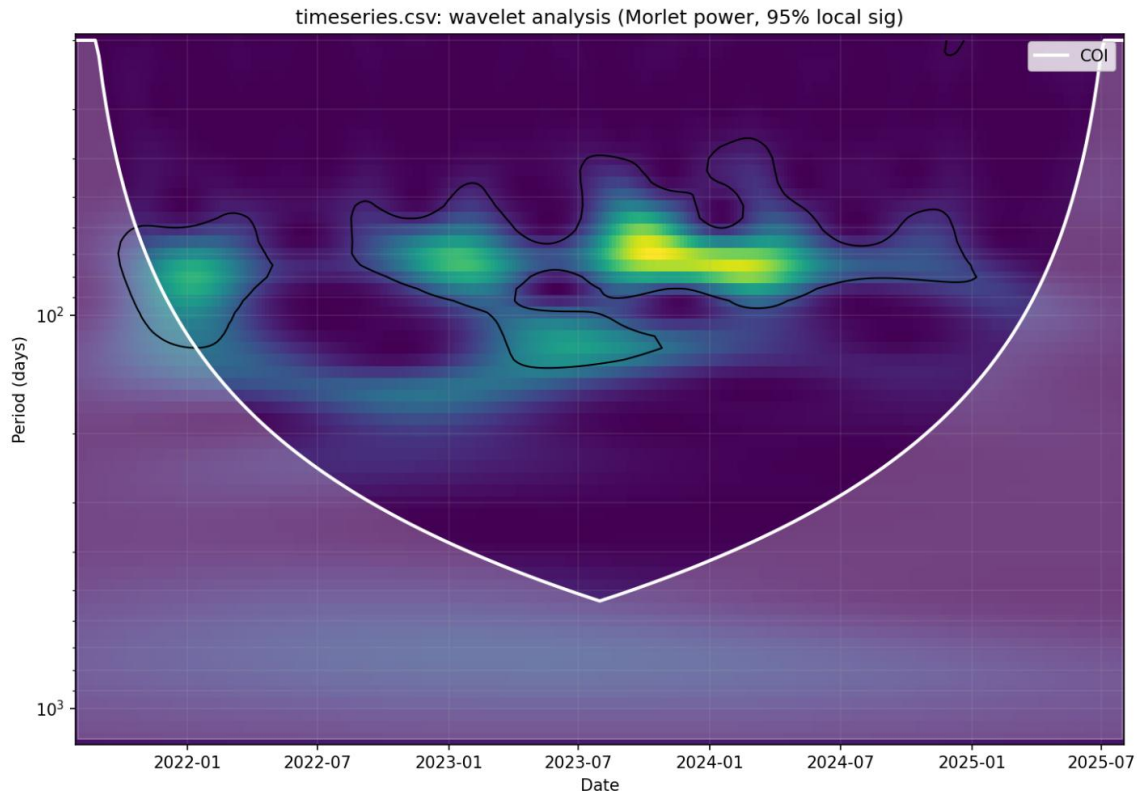
Removal of Annual Modulation



The fitted annual and semi-annual modulation components identified by **FFT**

Result

Wavelet Transform Search Results



the corresponding wavelet power is enhanced over an extended time interval, mainly during 2023–2024. As shown in figure right, the most significant candidate is detected in the 40° - 50° Galactic longitude bin at 74.6 days

Summary

- A systematic search for periodic signals in the Galactic background region has been carried out with LHAASO-KM2A data.
- Several significant periodic or quasi-periodic candidates are identified, especially on timescales of 70~90 days.
- Further studies will investigate their stability, source association, and possible astrophysical origin.

Thank you!