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Periodicity Analysis of Mrk 501 and Mrk 421 in Gamma-Rays

R. Iotov, P. Arras, M. Boettcher, T. Bretz, D. Dorner, V. Eberle, T. Enßlin, A.Kostic, M. Kreter, V. Marchenko, B. Schleicher, M. Tarnopolski, F. Theissen, N. Żywucka, for the FACT collaboration

Motivation:

- For the blazars Mrk 421 and Mrk 501, different and sometimes conflicting results regarding Quasi periodic oscillations have been reported

Goal:

- Analyse FACT, and in the future Fermi-LAT data, with a variety of methods to detect Quasi periodic oscillations

Lomb-Scargle periodogram:

- affected by red noise in the light curves
- we determine the red noise from the periodograms
- produce artificial LCs with same red noise and flux distribution
- determine significance numerically from artificial light curves

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Further methods:

- **Wavelet Scalogram:** Similar to Lomb-Scargle periodogram but it can also show at which times QPOs are present in the data
- **CARMA:** Continuous-time Auto Regressive Moving Average, used to model the light curves
- **Nifty:** Numerical information-field theory, new method to detect periodic signals
- **A-T plane:** A new tool for classifying time series, can differentiate between coloured noise

Conclusion:

- We present our methodology and preliminary results from our search for QPOs in Mrk 501 and Mrk 421

Results from all methods - paper in preparation!