Compact Binaries MSc NASSP 2025 Practical

Outline

The objective of this practical is to analyze a photometric light curve of a magnetic Cataclysmic Variable (mCV). Each of you is allocated a dataset from a different mCV. The datasets are already reduced so that you can focus on data analysis. The mCV may be a polar, an intermediate polar or an eclipsing system. Therefore the data sets may have some combination of orbital, spin and beat frequencies or eclipses. You will present the significance of your results in a comprehensive report.

Report:

The final report counts 50% towards your mark. The report should include:

- A general introduction of the target
- A description of the observations; create appropriate figures of the photometry to aid your description
- A description of the Fourier analysis with appropriate figures. Identify the expected frequencies of the mCV and explain e.g. aliases, harmonics etc.
- A discussion of the significance of the results. In the context of what is already known of your target.
- Summary and/or Conclusions
- The report should include appropriate referencing or scientific journals.

The Data Sets

The project datasets can be downloaded from here:
https://www.saao.ac.za/~sbp/NASSP2025_MSc/projects/

Each project directory consists of a README file which gives details of the observations, target name, the file format and an explanation of the data columns.

Each project dataset consists of 2 sets of observations from 2 different dates. You should combine the 2 sets of observations to perform the Fourier analysis. Be careful that some data sets show significant differences in brightness between the 2 dates and it may be beneficial to subtract the average from each set before combining for Fourier analysis.

See below for the target allocated to your name:

Kirsten Elliott: ARSco
Makofane Comfort: ctcvj1928
Isaac Chitete: Gaia22ayj
Nkateko Baloi: J1912-44
Thobile Ngwenya: NovaSco
Aidan Martin: NYLup

Others: eRASStJ192932
Others: MLS1525

Fourier analysis of time series data:

I recommend that you use Period04. You can find the software package and a user manual here: http://period04.net/
You are welcome to use any other software, or develop your own using python libraries.

Submission deadline:

The hand-in date for the report is: Friday 16 May 2025.
You are welcome to hand-in earlier.

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