

Investigating young variable stars in Orion with NGTS

- You will use NGTS data to explore stars in young clusters
- Understanding how young stars interact with the cluster in which they formed
- Modelling lightcurves to understand accretion in young stars

Level	PhD
First Supervisor	Dr Sarah Casewell slc25@le.ac.uk
Second Supervisor	Prof Richard Alexander
Application Closing Date	20 th January 2023
PhD Start date	September 2023

Project Details:

The Next Generation Transit Survey (NGTS: Wheatley et al., 2018, MNRAS, 475, 4476) is an STFC supported facility consisting of 12 20cm mirror telescopes fitted with wide field optical CCDs optimised for operation in the 520-890 nm wavelength range. NGTS has conducted wide field exoplanet surveys, and targeted observations of single transit events from NASA's TESS mission, star clusters and bright stars. NGTS has been hugely successful with over 30 exoplanets discovered to date and data used to confirm many others, as well as supplementary science including stellar flares, cataclysmic variables and stellar clusters.

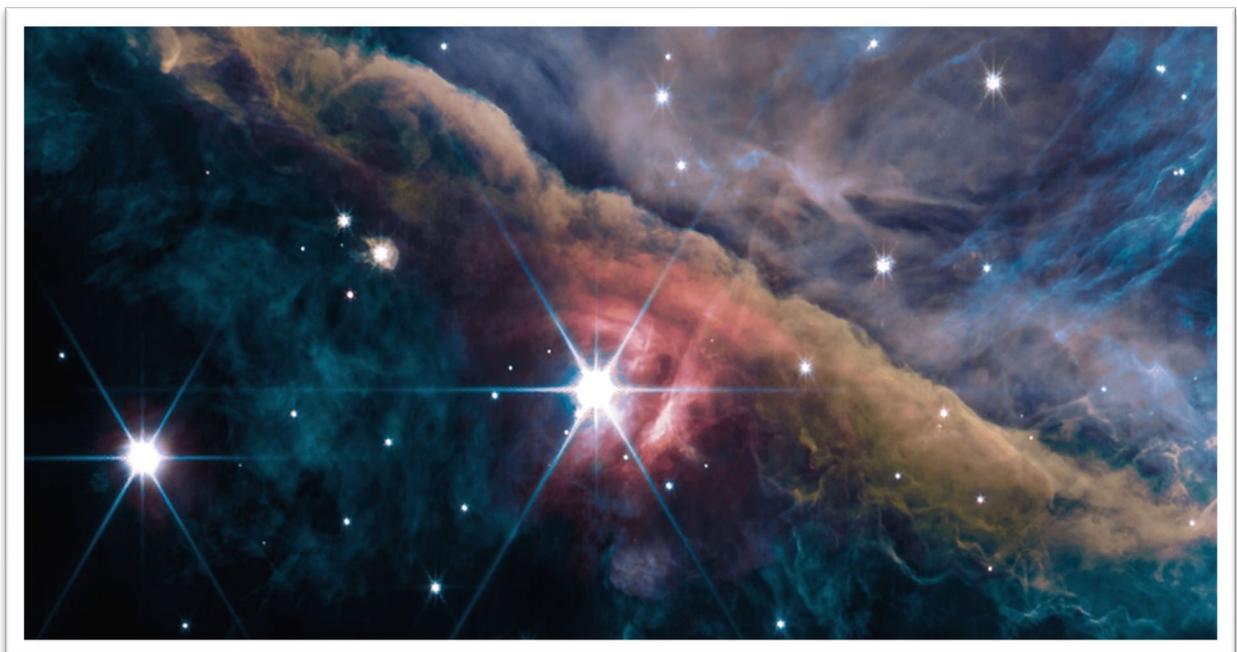
This PhD project will exploit NGTS data in open star clusters, in particular those that are ~10 million years old or younger, such as the well known Orion region. These star forming regions are full of newly formed stars, many of which are themselves suspected to be forming planets and hosting protoplanetary discs. These stars are often very dynamic, accreting gas and dust from their environment and showing flares and outbursting behaviour. Understanding these young stars and how they interact with their environment is important for understanding how planets form.

We have been monitoring the well known 1-10 Million year old Orion Nebula Cluster and its vicinity for around 200 days with NGTS, and have extracted lightcurves for over 2000 stars. The Orion Nebula Cluster has been observed by JWST early in its mission, and our data, monitoring many stars with a long baseline will add insights into these deep, snapshot observations in the infrared.

You will investigate these lightcurves, using and developing codes to explore the variability of these stars. We anticipate this being a joint observational and theory project involving not only investigating the lightcurves but also modelling some of the accretion processes present. We have already developed a custom pipeline for faint objects, and detailed background subtraction at the University of Leicester which can be used on these data, and so knowledge of python and C would be useful.



An edge on protoplanetary disc in the Orion Nebula Cluster imaged by JWST. Credit: McCaughrean & Pearson.



JWST image of the Orion Nebula Credit: NASA, ESA, CSA, PDRs4All ERS Team

References:

- Gillen et al., 2020: <https://arxiv.org/pdf/1911.09705.pdf>
- Wheatley et al., 2018: <https://arxiv.org/pdf/1710.11100.pdf>

How to apply:

Include with your application:-

- CV
- Degree Certificates and Transcripts
- Details of any study currently being undertaken
- Personal statement
- Enter the supervisor's name and project title in the Proposal Section (no proposal required)
- Enter contact details of two academic referees in the boxes provided or upload reference letters if already obtained.
- Evidence of English language if applicable.
- In the funding section include: Ref: Casewell- UKRI (STFC)

The University of Leicester School of Physics and Astronomy has advertised a number of PhD opportunities. If you are applying for more than one University of Leicester project, please indicate if this is your first, second or third choice, in your application.

Further information on how to apply and funding can be found [here](#)