

# Niamh Mallaghan

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## Research Interests

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Final year PhD student studying exoplanetary systems with a specific interest in finding giant exorings. My research focuses both on finding systems on a larger scale as well as their photometric and spectroscopic characterisation. I am also generally interested in any unique and unusual light curves that push the boundaries of our current understanding of exoplanets and require unconventional modelling and analysis.

## Affiliation & Education

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<b>PhD</b>	<b>Queen's University Belfast</b> , PhD (Physics) Supervisor: Dr Ernst de Mooij Thesis: <i>Searching for Giant Exorings</i>	Oct. 2023 – Sep. 2026
<b>MPhys</b>	<b>Queen's University Belfast</b> , Masters in Physics (Physics) <i>Upper Second-Class Honours</i> Dissertation: <i>Probing the Spectroscopic Signatures of Stellar Activity</i>	Sep. 2019 - Jul. 2023

## Publications

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- **Mallaghan, N.**, de Mooij, E. J., Watson, C. A., et al., *An Enigmatic Short-Period Circumsecondary Disk Candidate in Orion*, (in prep)  
*This paper focuses on an enigmatic transiting object in Orion which shows a deep and asymmetric light curve. I investigated a number of hypotheses to aid in the characterisation of it, including modelling, MCMC fitting and analysing the results. I led the simulations, analysis, and writing up of this work*
- **Mallaghan, N.**, de Mooij, E. J., Watson, C. A., et al., *Spectroscopic Analysis of a Multi-Year Transiting Ring Candidate ASASSN-21js*, (in prep)  
*This paper focuses on the spectroscopic analysis of ASASSN-21js, a giant exoring candidate. Analysis of this object will help to determine the composition and orientation of the potential rings. I am leading on the observations, analysis, and writing up of this work*
- Rodel, T., et al. (including **Mallaghan, N.**), *TIC 65910228 b, a 180 d transiting warm super-Jupiter*, (in prep)  
*For this work I provided a simplified analysis of the object as a potential exoring candidate, including modelling and MCMC fitting a ring model to the transit light curve.*

## Technical Skills

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<b>Coding Languages:</b>	Extensive knowledge in Python (numpy, pandas, astropy, batman, numba, etc.) for data analysis, manipulation, modelling, and visualisation
<b>Other Software:</b>	Experience using DS9, hipercam pipeline, and DRAGONS pipeline for data reduction and analysis
<b>Languages:</b>	English (native), intermediate proficiency in French

## Observing Programs

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- **GHOST Spectrograph (1.5hrs)** Gemini 2025A  
One epoch of observations using the GHOST spectrograph for the object ASASSN-21js that was accepted as a Fast Turnaround Proposal. I led on the proposal writing, as well as the Phase II set up. This analysis gave us the basis for a further proposal to study the proposed rings over the course of a number of epochs.
- **GHOST Spectrograph (4.5hrs)** Gemini 2025B  
Three further epochs of observations using the GHOST spectrograph for the ASASSN-21js that was accepted and have been scheduled for later this year. I led on the proposal writing, as well as the Phase II set up. These spectra will lead on from the analysis already completed on data taken earlier this year. We hope to investigate how the proposed rings are changing over time.

## Selected Presentations and Talks

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- **Seminar** : Queen's University Belfast, Belfast, UK Nov. 2025  
*The Search for Giant Exorings; Objects of Interest*
- **Conference Talk** : UK & Ireland Disks Meeting 2025, London, UK Sep. 2025  
*The Search for Exorings and a Short-Period Circumsecondary Disk Candidate*
- **Conference Talk** : DDE 2025, Coimbra, Portugal Jul. 2025  
*The Search for Exorings and a Short-Period Circumsecondary Disk Candidate*
- **Conference Talk** : EAS 2025, Cork, Ireland Jun. 2025  
*The Search for Exorings and a Short-Period Circumsecondary Disk Candidate*
- **Seminar** : Queen's University Belfast, Belfast, UK Apr. 2025  
*The Dusty Object in Orion and the Search for Giant Exorings*
- **Conference Talk** : UKExoM 2025, Leeds, UK Mar. 2025  
*The Dusty Object in Orion and the search for Giant Exorings*
- **Poster Presentation** : INAM 2024, Galway, Ireland Aug. 2024  
*The Dusty Object in Orion and the search for Giant Exorings*

## Teaching and Supervision

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- **GCSE and A-Level Tutor** Sep. 2019 - present  
Tutoring GCSE and A-level students in Physics, Mathematics and Further Mathematics, including both one-on-one and group classes, as well as creating questions and resources for students to use in their studies
- **Physics Level 2 Labs** Sep. 2023 - Jan. 2025  
Supervising for second year undergraduate lab experiments, including teaching students the theoretical background to experiments, instructing students on how to complete experiments over a range of areas in physics, and fixing experimental equipment for students
- **Undergraduate Mathematics Teaching** Sep. 2025 - present  
Marking weekly mathematics assignments for first year undergraduates, leading tutorial classes, and creating worked examples

## Outreach and Service

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- **QUB Women in STEM Society** // Co-founder / President / Secretary Nov. 2022 - Jul. 2025  
Co-founded and served, in different terms, as President and Secretary. I helped to organise bi-weekly events, some of the largest of which include a Networking Night with over 25 companies and 300 attendees, and the first NI Women in STEM conference, as well as applying for and attaining over £3000 in grants/sponsorship to run these events and more
- **QUB SU Council** // Maths & Physics School PGR Representative Oct. 2023 - Sep. 2024  
Representative of all postgraduate research students in the school of Maths & Physics. Attending meetings on their behalf at a school, faculty and university level, as well as being a voting member of the student's union council
- **ARC contribution to the Northern Ireland Science Festival** // Organiser Feb. 2024/25  
Co-organiser for annual research centre outreach day, planned and ran hands-on kid-friendly activities, and presented exoplanetary science in talks for Astronomy on Tap
- **School Postgraduate Research Committee (SPRC)** // ARC Representative Mar. 2024 - present  
Representative to the School's PGR committee for students in the Astrophysics Research Centre. Attending meetings every couple of months, raising issues faced by ARC students and organising events such as the School's 3-minute thesis competition and PGR coffee mornings
- **ARC Equitea Committee** // Chair / Member Jul. 2024 - present  
Current chair and member of graduate student-led DEI (Diversity, Equity and Inclusion) committee. Hosted, chaired, and presented several seminars on DEI topics such as imposter syndrome, unconscious bias, and relocation. Secured university funding (£350) for future external speakers

## Outreach and DEI talks

- **DEI Seminar** : Queen’s University Belfast, Belfast, UK Oct. 2025  
*Equitea: Ethics of AI in Academia (presenter and discussion chair) – approx. 20 attendees*
- **Seminar** : Queen’s University Belfast, Belfast, UK Jun. 2025  
*Academic Publishing Discussion (presenter and discussion chair) – approx. 30 attendees*
- **Outreach Talk** : U3a Group, Bangor, UK Mar. 2025  
*Searching for Giant Exorings – approx. 30 attendees*
- **DEI Seminar** : Queen’s University Belfast, Belfast, UK Mar. 2025  
*Equitea: Unconscious Bias in Academia (presenter and discussion chair) – approx. 30 attendees*
- **Outreach Talk** : Astronomy on Tap, Belfast, UK Feb. 2025  
*Why You Should Care About Rings – approx. 50 attendees*
- **Outreach Talk** : Irish Astronomical Association Lecture, Belfast, UK Dec. 2024  
*Searching for Giant Exorings – approx. 30 attendees*
- **Outreach Talk** : Three Minute Thesis Competition, Queen’s University Belfast, UK Oct. 2024  
*Searching for Giant Exorings – approx. 50 attendees – second place prize*
- **Outreach Talk** : Northern Ireland Amateur Astronomy Society, Ballyclare, UK Oct. 2024  
*Searching for Giant Exorings – approx. 40 attendees*
- **DEI Seminar** : Queen’s University Belfast, Belfast, UK Oct. 2024  
*Equitea: ‘Survival Guide’ to Academia (co-presenter and discussion chair) – approx. 30 attendees*
- **Outreach Talk** : Astronomy on Tap, Belfast, UK Feb. 2024  
*Why The Sun Is In My Way – approx. 40 attendees*

## Affiliations

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Member of the Institute of Physics (**IOP**); Fellow of the Royal Astronomical Society (**RAS**); member of the NGTS Consortium (**NGTS**)

## References

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**Dr. Ernst de Mooij**  
*PhD Supervisor*  
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**Prof. Christopher Watson**  
*PhD Second Supervisor*  
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**Dr. Matthew Kenworthy**  
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