

Dr Joshua Mark Pollin

Thermonuclear Supernovae: From 3D Explosion Models to Nebular Observables

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Education & Affiliations

Oregon State University, USA — Postdoctoral Researcher in Astrophysics	Jan 2026 – Present
Queen's University Belfast, UK — PhD Astrophysics	Oct 2022 – Sep 2025
<ul style="list-style-type: none"> • Thesis: <i>Exploring the Origins of Type Ia Supernovae with Monte Carlo Radiative Transfer</i> • Supervisors: Prof. S. Sim (QUB); Dr M. Nicholl (QUB) 	
Queen's University Belfast, UK — Integrated MSci Physics (First Class Honours)	Sep 2018 – Jun 2022

Skills & Expertise

Simulation & Modelling: 3D time-dependent NLTE Monte Carlo radiative transfer (ARTIS); hydrodynamic core-collapse supernova modelling (PUSH); nucleosynthesis post-processing (CFNET).

HPC & Computing: C/C++, Python, Fortran, Bash, MPI, OpenMP; ~7M CPU hrs/yr personal allocation; Git, CI/CD.

Publications

First Author	Citations	Year
J. M. Pollin et al.	[9]	2025
J. M. Pollin et al. <i>Multidimensional Nebular-Phase Calculations of Dynamically-Driven Double-Degenerate Double-Detonation Models for Type Ia Supernovae</i> . MNRAS, Accepted.		
J. M. Pollin et al. <i>On the Fate of the Secondary White Dwarf in Double-Degenerate Double-Detonation Type Ia Supernovae — II. 3D Synthetic Observables</i> . MNRAS 533, 3036–3052.	[21]	2024
Co-authored		
A. Holas et al. (incl. J. M. Pollin) <i>Observational Signatures of Thermonuclear Electron-Capture Supernovae</i> . A&A, Accepted.	[-]	2026
R. Pakmor et al. (incl. J. M. Pollin) <i>Violent Mergers Revisited: The Origin of the Fastest Stars in the Galaxy</i> . A&A 706, A239.	[6]	2026
A. Holas et al. (incl. J. M. Pollin) <i>The Asymmetry of White Dwarf Double Detonations and the Observed Scatter around the Phillips Relation</i> . A&A 698, A269.	[1]	2025
F. P. Callan et al. (incl. J. M. Pollin) <i>NLTE Spectral Modelling for a Carbon-Oxygen and Helium White Dwarf Merger as a Ca-Rich Transient Candidate</i> . A&A 702, A29.	[1]	2025
F. P. Callan et al. (incl. J. M. Pollin) <i>Exploring the Range of Impacts of Helium in the Spectra of Double Detonation Models for Type Ia Supernovae</i> . MNRAS 539, 1404–1413.	[10]	2025
S. Srivastav et al. (incl. J. M. Pollin) <i>Unprecedented Early Flux Excess in the Hybrid 02es-like Type Ia Supernova 2022ywc Indicates Interaction with Circumstellar Material</i> . ApJ Lett. 956, L34. <i>Featured in Astrobites</i> .	[19]	2023
Software: ARTIS Collaboration (incl. J. M. Pollin), <i>artistools</i> / <i>artis</i> (Zenodo, 2024–2026).		

Grants & HPC Proposals

ESO VLT FORS2 — 4h service-mode time (P117)	2026
Co-Investigator on successful ESO VLT proposal P117 “Nebular Spectroscopy of Long-Duration Stripped-Envelope Supernovae” (PI: Thomas Moore). Awarded 4 hours of FORS2 service-mode observations.	
<i>Total HPC allocation across 4 national/international facilities: ~95M CPU hours; led science case on all proposals.</i>	
SuperMUC-NG (LRZ), Germany — 35M CPU hours	2025–2027
Co-authored proposal; led ~10% of science case. Delivered 1 first-author and 1 co-authored publication.	
DiRAC HPC Facility, UK — ~36M CPU hours	2024–2027
Co-authored proposal; led ~50% of science case. Delivered 1 first-author (9 citations), 1 first-author in prepara-	

tion, and 2 co-authored publications.

JUWELS (JSC/HITS), Germany — 21M CPU hours 2023–2025
Co-authored 2 successive proposals with HITS; led ~30% of science case. Delivered **2 co-authored** publications.

DiRAC HPC Facility, UK — 3M CPU hours 2023–2024
Sole science-case lead (100%). Delivered **1 first-author** publication (21 citations).

Scholarships & Awards

O’Sullivan Masterclass, Royal Irish Academy — One of ~20 selected from ~8,000 nationwide applicants; led by Nobel Laureate Prof. R. Genzel. Apr 2025

Student Research Grant, Queen’s University Belfast — Led successful application to fund a summer research assistant; £2,000 awarded. 2024–2025

Emily S. Montgomery Travel Scholarship — £400 competitive travel award.

Conference Talks & Organisation

[INVITED] Leiden, Netherlands Jan 2027

[INVITED] Trinity College Dublin Mar 2025

Contributed & Organised

[ORGANISED] National Astronomy Meeting, Durham — proposed, organised & co-chaired session on explosive transients (~50–60 attendees) Jul 2025

Rise Time Meeting, Purdue Aug 2026

19th Würzburg Winter Workshop Dec 2025

RAS Specialist Discussion Meeting, London Nov 2024

18th Würzburg Winter Workshop Dec 2024

Oxford Transients Meeting Jul 2024

European Workshop on White Dwarfs, Barcelona Jul 2024

National Astronomy Meeting, Cardiff Jul 2023

17th Würzburg Winter Workshop Dec 2023

16th Würzburg Winter Workshop Dec 2022

Teaching, Mentorship & Outreach

Aurora Outreach Video — Co-produced viral outreach video (~150,000 views) May 2024

DiRAC Science Highlight — Late-time supernova simulations Mar 2026

DiRAC Science Highlight — Photospheric-phase simulations Mar 2024

Supervision of Summer Research Project, QUB — Microphysics in Type Ia simulations; 2 of 3 students progressed to PhD programmes 2024

Work Experience Mentoring, QUB — Mentored secondary school students; delivered seminars Jul 2025

Graduate Teaching Assistant, QUB — Mathematics tutor; Teaching Fellowship Scheme 2023–2025

Support of Masters Students, QUB — Scientific guidance for 2 MSc projects 2023–2024

Girls in Maths & Physics, QUB — Annual talks and exoplanet workshops 2023–2025

EquiTea Committee, QUB — PhD-led equity & inclusion initiative 2023–2025

NI Science Festival — Public lecture on using light to probe the Universe Feb 2024

Irish Astronomical Society — Invited public talk on Type Ia supernovae Jan 2024

Pathway Opportunity Programme, QUB — Computational workshops on cosmic expansion 2023–2024

Undergraduate Peer Mentor, QUB — Mentored incoming undergraduates 2019–2020

References

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Prof. Friedrich Röpke
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