

CONTACT	104 High Street Earith Huntingdonshire Cambridgeshire PE28 3PN	Telephone: (+44) 77167 13341 Email: mjgreenastro@gmail.com <i>H-Index</i> : 21
PROFILE	I research stellar binary systems, with a focus on short-period and compact binary systems. My research has touched on a variety of topics, including: binary and triple tidal interactions, mass transfer processes, compact objects (white dwarfs and black holes), and magnetic braking of solar-type binary systems.	
CURRENT	Postdoctoral Research Fellow , <i>University of Oklahoma</i> Supervisor: Prof Mukremin Kilic	2025 –
	I study the formation of accreting, ultracompact binary systems (UCBs). I manage the only catalogue of known UCBs, and am leading programmes to track the orbital-period evolution of eclipsing UCBs (driven by gravitational-waves). I also model the formation of UCBs using population synthesis techniques in order to compare population-level predictions against observed statistics of the population. Alongside this, I am preparing for the launch of ULTRASAT by predicting the compact binaries that are expected to be found.	
PREVIOUS RESEARCH EXPERIENCE	Postdoctoral Research Fellow , <i>Max Planck Institute for Astronomy</i> 2023 – 2024 Supervisor: Prof Hans-Walter Rix	
	I worked to constrain the space density of binary systems containing black holes, in particular by searching for ellipsoidal variables with unseen companions. Alongside this, I worked towards a better understanding of binary and higher-order systems of main sequence binaries by combining datasets from large surveys.	
	Postdoctoral Research Fellow , <i>Tel Aviv University</i> Supervisor: Prof Dan Maoz	2020 – 2023
	I built a catalogue of 15 000 ellipsoidal binary stars in <i>TESS</i> , which I used to establish in detail the statistics of binary populations at very short orbital periods. Outputs include observational evidence for the impact of magnetic braking on short-period binary systems and constraints on the impact of tidal triple-system interactions.	
	Postdoctoral Research Fellow , <i>University of Warwick</i> Supervisor: Prof Tom Marsh	2019 – 2020
	This project focused on UCBs, with a particular interest in constraining the prior evolution of these binaries. To this end, I studied known but poorly-characterised systems using time-domain photometry and spectroscopy in order to measure the properties of the component stars.	
	PhD in Astrophysics , <i>University of Warwick</i> Supervisors: Prof Tom Marsh and Prof Danny Steeghs	2015 – 2019
	Thesis Title: The Evolution of AM CVn Binary Systems A key result of the project was a challenge to the canonical formation model of UCBs, through an eclipse-based measurement of the stellar masses of the UCB system Gaia14aae. Other results included characterising a 16 minute orbital period binary using its <i>K2</i> lightcurve, analysing phase-resolved spectroscopy of a number of AM CVn binaries in order to determine orbital periods and component stellar masses, and exploring the UCB population using their <i>Gaia</i> parallaxes.	

TECHNICAL SKILLS	<ul style="list-style-type: none"> • Over 100 nights of observing experience on a range of telescopes and instruments • Reduction of photometric and spectroscopic time-domain optical data • Lightcurve model fitting for eclipses and ellipsoidal modulation • Spectroscopic analysis, including Doppler map production • Spectral disentangling using two-dimensional cross-correlation • Handling and cross-matching large datasets with <i>ADQL</i>, <i>TOPCAT</i> and <i>STILTS</i> • Modelling and correcting for selection effects of an observational sample of stars • Working collaboratively on large coding projects with <i>git</i>, <i>Python</i> and <i>Matlab</i> • Installation and provision of technical support for a visitor instrument 	
EDUCATION	PhD in Astrophysics , <i>University of Warwick</i> 2015 – 2019 Physics BScMPhys (hons) , 1 st class, <i>University of Warwick</i> 2011 – 2015 St Ivo School , <i>St Ives, Cambridgeshire, UK</i> 2004 – 2011	
TEACHING EXPERIENCE	Supervisor: MPIA Summer Internship 2024 I supervised an overseas summer intern at MPIA for a project related to black hole binary systems. MPIA summer internship positions are very competitive, with over 200 applicants to my project. Supervisor: Undergraduate Projects 2022–2023 I supervised two undergraduate students at TAU (second and third years) as they worked on a final-year research project and a summer research project related to black hole binary systems. Both of these students have gone on to Masters degrees and their work contributed significantly to an academic paper. Supervisor: High School Project 2022 I supervised a high school student via the <i>Traektorie</i> Astrophysical School, on a research project related to AM CVn binary systems. Demonstrator: First Year Physics Laboratory 2015 – 2018 I demonstrated in the first-year undergraduate teaching labs for three years, guiding eight students per session through lab experiments and explaining key concepts.	
OUTREACH	Writer for <i>Astrobites</i> 2015 – 2019 I wrote monthly articles for the outreach website <i>Astrobites</i> , each piece summarising a recently published journal article for a general audience in around 800 words. Planetarium Assistant 2015 – 2019 I volunteered for the <i>portable planetarium</i> run by the University of Warwick, for which I conducted shows and fielded audience questions at local primary schools.	
OTHER ROLES	Peer Reviewer Journal reviews for Nature, ApJL, ApJ, A&A, MNRAS, PASA. Funding reviews for NSCP (Poland). Telescope reviews for LCO, ESO. Astronomy Seminar Co-ordinator 2019 – 2020 I organised weekly seminars for our group, including reaching out to potential speakers, overseeing transport arrangements, and chairing the seminar sessions.	
TELESCOPE APPLICATIONS	Successful Telescope Applications as PI: <ul style="list-style-type: none"> • GTC + HiPERCAM (23 hours, 2023-24), <i>Revolutionizing Our Understanding of the Evolution of Accreting Ultracompact Binaries</i> • ESO 2.2m + FEROS (100 hours, 2024), <i>Searching for stellar-mass black hole binaries in the Milky Way</i> 	

- NTT + EFOSC2 (3 nights, 2022), *Revealing the Hidden Population of Detached Black Hole and Neutron Star Binaries from TESS*
- INT + IDS (6 nights, 2022), *Revealing the Hidden Population of Detached Black Hole and Neutron Star Binaries from TESS*
- LCOGT + NRES (360 hours, 2020-2022), *Spectroscopic follow-up of TESS ellipsoidal binary systems*
- GTC + HiPERCAM (3 hours, 2019), *Timing of the Eclipsing AM CVn Binary Gaia14aae*
- NTT + ULTRACAM (3 nights, 2019), *Constraining Ultracompact Binary Evolution Using the Eclipsing Binary CRTS J2333-1557*
- INT + IDS (25 nights, 2018-19), *Identifying AM CVn binaries using Gaia absolute magnitudes*
- NTT + ULTRACAM (4 nights, 2018), *Photometric Variability of Quiescent AM CVn binaries*
- NTT + ULTRACAM (3 nights, 2018), *SDSS J1351-0643: a new LISA calibration binary?*
- NTT + ULTRACAM (3 nights, 2017), *Variability and Colour Dependence of Cataclysmic Variable Boundary Layers*

PRESENTATIONS

Seminars:

- *University of Turku*, 2024 February, *Turku*
- *University of Amsterdam*, 2023 November, *Amsterdam*
- *Massachusetts Institute of Technology*, 2023 April, *virtual*
- *Contact and Close Binary Meeting*, 2023 April, *virtual*
- *Technion University*, 2023 January, *Haifa*
- *Ben Gurion University*, 2022 December, *Be'er Sheva*
- *Tel Aviv University*, 2022 May, *Tel Aviv*
- *University of Potsdam*, 2019 November, *Potsdam*
- *University of Cambridge*, 2019 July, *Cambridge*
- *ESO headquarters*, 2018 November, *Santiago*

Conference Oral Presentations:

- *The Scientific Legacy of Tom Marsh*, 2024 September, *Warwick*
- *Binaries in the Era of Big Sky Surveys*, 2024 September, *Litomysl*
- *AM CVn Workshop*, 2023 September, *Armagh*
- *European Astronomical Society Conference*, 2023 July, *Krakow*
- *50th Anniversary of the Wise Observatory*, 2023 March, *Mitzpe Ramon*
- *Accretion and Magnetism Conference*, 2023 January, *Cape Town*
- *European White Dwarf Workshop*, 2022 August, *Tübingen*
- *UK National Astronomy Meeting*, 2022 July, *Warwick*
- *European Astronomical Society Conference*, 2022 June, *Valencia*
- *SDSS Collaboration Workshop*, 2021 August, *virtual*
- *Compact White Dwarf Binaries Conference*, 2019 September, *Yerevan*
- *Double White Dwarf Conference*, 2019 July, *Copenhagen*
- *Hydrogen Deficient Stars Conference*, 2018 September, *Armagh*
- *European White Dwarf Workshop*, 2018 July, *Austin*
- *Golden Age of Cataclysmic Variables Conference*, 2017 September, *Palermo*
- *UK National Astronomy Meeting*, 2017 July, *Hull*

VISITING POSITIONS

University of Colorado, 2024–present
Kavli Institute of Theoretical Physics, Dec 2023
University of Warwick, 2020–2022

REFERENCES

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Please note that Prof Tom Marsh recently passed away.

All publications are also listed online at ADS

FIRST AUTHOR **Published** (three key publications are marked with *):

- **Green** M. J., Ziv Y., Rix, H.-W., et al., submitted to A&A – “*An upper limit on the frequency of short-period black hole companions to Sun-like stars*”
I planned and led the project, including target selection, observations, and statistical analysis in later sections. Data analysis in sections 3 and 4 was done by students under my supervision (Ziv and Hamoudy).
- **Green** M. J., Hermes J. J., Barlow B. N., et al., 2024, MNRAS, 527, 3445 – “*Discovery of a Bright, Short-Period AM CVn Binary in TESS*”
I led the project, collected follow-up observations, and led the interpretation.
- * **Green** M. J., Maoz D., Mazeh T., et al., 2023, MNRAS, 522, 29 – “*15000 Ellipsoidal Binary Candidates in TESS: Orbital Periods, Binary Fraction, and Tertiary Companions*”
I planned and led the project, including all analysis, follow-up observations and interpretation of results.
- * **Green** M. J., Marsh T. R., Carter P. J., et al., 2020, MNRAS, 496, 1243 – “*Spectroscopic and photometric periods of six ultracompact accreting binaries*”
I led the project, including all analysis and interpretation of results.
- **Green** M. J., Marsh T. R., Steeghs D., et al., 2019, MNRAS, 485, 1947 – “*Phase-resolved spectroscopy of Gaia14aae: line emission from near the white dwarf surface*”
I planned and led the project, including all analysis and interpretation.
- **Green** M. J., Hermes J. J., Marsh T. R., et al., 2018, MNRAS, 477, 5646 – “*A 15.7-min AM CVn binary discovered in K2*”
I led the project, including all interpretation of results.
- * **Green** M. J., Marsh T. R., Steeghs D. T. H., et al., 2018, MNRAS, 476, 1663 – “*High-speed photometry of Gaia14aae: an eclipsing AM CVn that challenges formation models*”
I led the project, including all analysis and interpretation of results.

In preparation:

- **Green** M. J., Marsh T., van Roestel J., et al., in prep – “*No Evidence of Period Evolution in Eclipsing AM CVn Binaries*”
I planned and led the project, including all analysis and interpretations.
- **Green** M. J., van Roestel J., & Wong S., submitted – “*A Catalogue of Ultra-compact Accreting White Dwarf Binaries*”
This paper will present a catalogue of UCBs that I have maintained for several years as well as a literature review. I planned and implemented almost all aspects of the project.

2ND/3RD
AUTHOR

Published:

- Gao Y., van Roestel J., **Green** M. J., et al., 2023, MNRAS, 521, 2114 – *“Observable tertiary tides in TIC242132789”*
I contributed the estimation of the measurable timescale in later sections.
- van Roestel J., Kupfer T., **Green** M. J., et al., 2022, MNRAS, 512, 5440 – *“Discovery and characterization of five new eclipsing AM CVn systems”*
I instructed the lead author in the eclipse modelling procedure and provided help throughout the modelling and interpretation.
- Lam M. C., Yuen K. W., **Green** M. J., et al., 2022, RASTI, 1, 81 – *“WDPhot-Tools - a white dwarf photometric toolkit in Python”*
I provided data and contributed to the testing of the software.
- Ramsay G., **Green** M. J., Marsh T. R., et al., 2018, A&A, 620, A141 – *“Physical properties of AM CVn stars: New insights from Gaia DR2”*
I provided a central part of the analysis: the study and interpretation of absolute magnitudes (sections 6 and 7).

OTHER
CO-AUTHOR

Published:

In most cases my contribution involved observations, data reduction, and/or some part of the analysis.

- Pelisoli I., Chomiuk L., Strader J., et al., 2024, MNRAS, 531, 1805 – *“A survey for radio emission from white dwarfs in the VLA Sky Survey”*
- Levan A. J., Gompertz B. P., Salafia O. S., et al., 2024, Natur, 626, 737 – *“Heavy-element production in a compact object merger observed by JWST”*
- Inight K., Gänsicke B. T., Schwöpe A., et al., 2023, MNRAS, 525, 3597 – *“Cataclysmic Variables from Sloan Digital Sky Survey - V. The search for period bouncers continues”*
- Munday J., Tremblay P.-E., Hermes J. J., et al., 2023, MNRAS, 525, 1814 – *“An eclipsing 47 min double white dwarf binary at 400 pc”*
- Jayaraman R., Fausnaugh M., Ricker G. R., et al., 2023, arXiv, arXiv:2308.05148 – *“Gamma-Ray Bursts Observed by the Transiting Exoplanet Survey Satellite: Prompt Optical Counterparts and Afterglows of Swift-XRT Localized GRBs”*
- Caiazzo I., Burdge K. B., Tremblay P.-E., et al., 2023, Natur, 620, 61 – *“A rotating white dwarf shows different compositions on its opposite faces”*
- Pelisoli I., Marsh T. R., Buckley D. A. H., et al., 2023, NatAs, 7, 931 – *“A 5.3-min-period pulsing white dwarf in a binary detected from radio to X-rays”*
- Brown A. J., Parsons S. G., van Roestel J., et al., 2023, MNRAS, 521, 1880 – *“Photometric follow-up of 43 new eclipsing white dwarf plus main-sequence binaries from the ZTF survey”*
- Toloza O., Rebassa-Mansergas A., Raddi R., et al., 2023, Msngr, 190, 4 – *“The White Dwarf Binary Survey (WDB)”*
- Munday J., Marsh T. R., Hollands M., et al., 2023, MNRAS, 518, 5123 – *“Two decades of optical timing of the shortest-period binary star system HM Cancri”*
- Mazeh T., Faigler S., Bashi D., et al., 2022, MNRAS, 517, 4005 – *“Probable dormant neutron star in a short-period binary system”*

- Pelisoli I., Marsh T. R., Parsons S. G., et al., 2022, MNRAS, 516, 5052 – “*Long-term photometric monitoring and spectroscopy of the white dwarf pulsar AR Scorpii*”
- Dhillon V. S., Kennedy M. R., Breton R. P., et al., 2022, MNRAS, 516, 2792 – “*Multicolour optical light curves of the companion star to the millisecond pulsar PSR J2051-0827*”
- Brown A. J., Parsons S. G., Littlefair S. P., et al., 2022, MNRAS, 513, 3050 – “*Characterizing eclipsing white dwarf M dwarf binaries from multiband eclipse photometry*”
- Kupfer T., Bauer E. B., van Roestel J., et al., 2022, ApJL, 925, L12 – “*Discovery of a Double-detonation Thermonuclear Supernova Progenitor*”
- Wild J. F., Littlefair S. P., Ashley R. P., et al., 2022, MNRAS, 509, 5086 – “*System parameters of three short-period cataclysmic variable stars*”
- Pelisoli I., Marsh T. R., Dhillon V. S., et al., 2022, MNRAS, 509, L31 – “*Found: a rapidly spinning white dwarf in LAMOST J024048.51+195226.9.*”
- Pelisoli I., Marsh T. R., Ashley R. P., et al., 2021, MNRAS, 507, 6132 – “*Optical detection of the rapidly spinning white dwarf in V1460 Her*”
- Dhillon V. S., Bezawada N., Black M., et al., 2021, MNRAS, 507, 350 – “*HiPERCAM: a quintuple-beam, high-speed optical imager on the 10.4-m Gran Telescopio Canarias*”
- van Roestel J., Creter L., Kupfer T., et al., 2021, AJ, 162, 113 – “*A Systematic Search for Outbursting AM CVn Systems with the Zwicky Transient Facility*”
- Parsons S. G., Brown A. J., Littlefair S. P., et al., 2020, NatAs, 4, 690 – “*A pulsating white dwarf in an eclipsing binary*”
- McAllister M., Littlefair S. P., Parsons S. G., et al., 2019, MNRAS, 486, 5535 – “*The evolutionary status of Cataclysmic Variables: eclipse modelling of 15 systems*”
- Toloza O., Breedt E., De Martino D., et al., 2019, BAAS, 51, 168 – “*Understanding the evolution of close white dwarf binaries*”
- Parsons S. G., Gänsicke B. T., Marsh T. R., et al., 2018, MNRAS, 481, 1083 – “*The scatter of the M dwarf mass-radius relationship*”
- Kilic M., Hermes J. J., Córscico A. H., et al., 2018, MNRAS, 479, 1267 – “*A refined search for pulsations in white dwarf companions to millisecond pulsars*”
- Kupfer T., Ramsay G., van Roestel J., et al., 2017, ApJ, 851, 28 – “*The OmegaWhite Survey for Short-period Variable Stars. V. Discovery of an Ultracompact Hot Subdwarf Binary with a Compact Companion in a 44-minute Orbit*”
- Hardy L. K., Dhillon V. S., Spitler L. G., et al., 2017, MNRAS, 472, 2800 – “*A search for optical bursts from the repeating fast radio burst FRB 121102*”
- Parsons S. G., Hermes J. J., Marsh T. R., et al., 2017, MNRAS, 471, 976 – “*Two white dwarfs in ultrashort binaries with detached, eclipsing, likely sub-stellar companions detected by K2*”
- Parsons S. G., Gänsicke B. T., Marsh T. R., et al., 2017, MNRAS, 470, 4473 – “*Testing the white dwarf mass-radius relationship with eclipsing binaries*”
- Breedt E., Steeghs D., Marsh T. R., et al., 2017, MNRAS, 468, 2910 – “*Using large spectroscopic surveys to test the double degenerate model for Type Ia supernovae*”

- Kupfer T., van Roestel J., Brooks J., et al., 2017, ApJ, 835, 131 – “*PTF1 J082340.04+081936.5: A Hot Subdwarf B Star with a Low-mass White Dwarf Companion in an 87-minute Orbit*”

Not Refereed:

- Ramsay G., **Green** M., Woudt P., et al., 2020, ATel, 13980, 1 – “*Optical outburst detected from the AM CVn binary ASASSN-14mv*”
- Paice J. A., Gandhi P., Dhillon V. S., et al., 2018, ATel, 12197, 1 – “*Blue Oscillations and Rapid Red Flares in Swift J1858.6-0814 Observed with UL-TRACAM/NTT*”
- Gandhi P., Dhillon V. S., Marsh T. R., et al., 2017, ATel, 10118, 1 – “*Optical timing observations of Swift J1753.5-0127 during its Feb 2017 rejuvenation*”