

EMPLOYMENT / EDUCATION

- 2025-. STFC Ernest Rutherford Research Fellow
 2025 Postdoctoral Researcher
 2022-25 Herchel Smith Research Fellow
 2018-22 Ph.D.: *Eccentricity in Gravitational-Wave Transients.*
 2013-18 B.A. and M.Sc. Physics with Honours, Class I

Cardiff University
 University of Bristol
 University of Cambridge
 Monash University
 University of Birmingham

SELECTED INVITED TALKS

- 2025 University of Oxford
 - University of Bristol
 - University of Nottingham
 - IIT Madras
 2024 University of Sussex
 - Southampton University
 - University of Birmingham
 - University of Cambridge
 2023 Madrid Instituto de Física Teórica
 - Albert Einstein Institute, Max Planck Institute, Potsdam
 - Northwestern University
 - Queen Mary University of London
 - University of Cambridge (Data Intensive Science, Cosmology, KICC Frontiers) Seminars
 - University of Amsterdam Anton Pannekoek Institute Colloquium
 2021 Niels Bohr Institute Conference on Dynamical Binary Black Hole Formation
 - CSIRO Australia Telescope National Facility Seminar
 - OzGrav Centre of Excellence for Gravitational-Wave Discovery Seminar
 - Massachusetts Institute of Technology Seminar
 - California Institute of Technology TAPIR Seminar
 - University of Queensland Seminar
 2020 OzGrav Centre of Excellence for Gravitational-Wave Discovery Seminar
 - University of Santiago de Compostela Colloquium
 - Monash University School of Physics and Astronomy Colloquium

PRIZES, AWARDS & SCHOLARSHIPS

- 2025 Ernest Rutherford Fellowship (accepted) Science and Technology Facilities Council
 2023 Honourable Mention: Charlene Heisler Prize Astronomical Society of Australia
 - Rising Star Award OzGrav Centre of Excellence for Gravitational Wave Discovery
 2022 Honourable Mention: GWIC-Braccini Prize Gravitational Wave International Committee
 - Robert Street Prize Monash University, School of Physics & Astronomy
For "the best PhD thesis awarded through the School of Physics and Astronomy"
 2021 Norris Family Award Monash University, Faculty of Science.
For "outstanding author contribution by a graduate student to published scholarly research output"
 - Herchel Smith Research Fellowship (accepted) University of Cambridge
 - Burke Fellowship (declined) Caltech
 - Flatiron Research Fellowship (declined) Flatiron Centre for Computational Astrophysics
 - Niels Bohr Fellowship (declined) Niels Bohr International Academy
 2020 Homeward Bound Membership STEMM Leadership Initiative
 - Outreach Award OzGrav Centre of Excellence for Gravitational Wave Discovery
 - ECR Poster Prize Royal Astronomical Society
 2019 Student Poster Award OzGrav Centre of Excellence for Gravitational Wave Discovery
 - Student Talk Award Astronomical Society of Australia
 2018 J.L. William International Scholarship Monash University, School of Physics and Astronomy
 - Dean's International Postgraduate Scholarship Monash University, Faculty of Science
 - International Postgraduate Research Scholarship Monash University
 - Nolan Merril Prize University of Birmingham
For "the highest-scoring M.Sc. project in the School of Physics & Astronomy"
 - M.Sc. Poster Prize, School of Physics & Astronomy University of Birmingham

SUPERVISION & TEACHING

▷ **Graduate Supervision:**

- Elizabeth Morgan (Cardiff). PhD project: *X-ray and Gravitational-Wave Joint Observations of Compact Objects using Machine Learning*
- Teagan Clarke (Monash). Honours (Masters) project: *Gravitational Waves from Eccentric Binary Black Holes*

▷ **Undergraduate Supervision:**

- Salman Khan (Cambridge). Data Intensive Science MPhil project: *Reproducing Third Gravitational Wave Transient Catalogue Population Inference*
- Daniel Gibson (Cambridge). Part III Mathematics MPhil project: *Understanding Neutron Stars with Future Gravitational-Wave Detector Networks*
- Joshua Sharkey (Cambridge). Summer project: *Wrong Model, Right Answer: Recovering traces of dynamical binary black hole formation from gravitational-wave data*
- Samir Goorachurn (McGill). Summer project: *Eccentricities of Binary Black Holes with Circumbinary Disks*
- Ajinkya Naik (Pune). Summer project: *Spins of Binary Black Holes from High Mass X-Ray Binaries*

▷ **PhD School Lectures:**

- [Kavli-Villum School on Gravitational Waves](#): Introduction to Gravitational Wave Astrophysics
- [ESO-Gruber Summer School](#): From Nearby Worlds to Distant Galaxies: Gravitational Waves

▷ **Problem Classes / Labs / Workshops:**

- Statistical Uncertainty Quantification (Cambridge), Introductory Astronomy, Introduction to Astrophysics, Computational Astrophysics & the Extreme Universe (Monash)

ACADEMIC SERVICE

2025	Subject-matter expert reviewer	<i>NASA peer review</i>
2019-	Referee	<i>Nature Astronomy, PRD, MNRAS, ApJ, ApJ Letters</i>
2018-	Eccentricity Task Force, internal paper reviews, paper writing	<i>LVK Collaboration</i>
2023	Gravitational Waves Session Co-convener	<i>National Astronomy Meeting (UK)</i>
2023	LOC, Conferences: Rubin/LSST, Astrostats/ML	<i>Kavli Institute Cambridge</i>
2022-2023	Organiser: GR Seminar, GR Journal Club, Theory Colloquia	<i>University of Cambridge</i>
2020-22	Steering Committee	<i>Australian National Institute for Theoretical Astrophysics</i>
2019	Women in Physics & Astronomy Student Co-Chair	<i>Monash University</i>
2018	Board of Misconduct Student Rep.	<i>University of Birmingham</i>
2013-18	Student Rep.	<i>University of Birmingham</i>

OUTREACH

Publications & Articles

- 2021 [Women in Physics](#), Colouring book; co-author, editor, and illustrator
- 2020 [Planetymology: Why Uranus is not called George and other facts about space and words](#), Children's non-fiction book; author, editor, and illustrator
- [The CO₂ Elephant in the Room: Curbing the Carbon Footprint of Astronomy](#), Astroblites article

Public Talks

- 2025 Taunton Astronomy Society
- Astronomy on Tap Cardiff
- 2024 Taunton Astronomy Society
- Bath Royal Literary & Scientific Institution
- 2023 Astronomy on Tap Chicago
- 2022 U3A Deepdene
- 2021 GWTC-3 Webinar
- Astronomical Society of Victoria
- Denver Astronomical Society
- 2020 Mount Burnett Observatory
- OzGrav Public Lecture Series
- 2019 Mount Burnett Observatory

Media Interviews

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| PODCASTS | The Science Pawdcast |
| - | Astrophiz |
| - | Storytellers of STEMM |
| - | Listening to the Cosmos (LIGO India) |
| RADIO | Einstein A Go-Go, Triple R |
| - | The Space Show, Southern FM |
| ARTICLES | Space Australia |
| - | Monash University Science |

Kid's Talks & Outreach Visits

- 2024 City Academy Bristol with We The Curious
- 2022 Casey Tech School with OzGrav
- Haileybury Middle School for Women's Day Australia
- 2021 Girlguiding UK
- Cambridge Festival

Other

- 2025 Scientific Consultant for We The Curious Planetarium Nights show: *The Space Between*

RESEARCH PUBLICATIONS: SHORT-AUTHOR

- [35] **Astrophysical Implications of Eccentricity in Gravitational Waves from Neutron Star-Black Hole Binaries** — **IRS**, J. Stegmann, G. Morras, M. Zevin. Submitted to *MNRAS*, Dec 2025
- [34] **Distinguishing the origin of eccentric black-hole mergers with gravitational-wave spin measurements** — J. Stegmann, D. Gerosa, **IRS**, G. Fumagalli, H. Tagawa, L. Zwick. Published in *ApJL*, Nov 2025
- [33] **Evidence for eccentricity in the population of binary black holes observed by LIGO-Virgo-KAGRA** — N. Gupte *et al.* (incl. **IRS**). Published in *PRD*, Nov 2025
- [32] **Fast and accurate parameter estimation of high-redshift sources with the Einstein Telescope** — F. Santoliquido *et al.* (incl. **IRS**). Published in *PRD*, Nov 2025
- [31] **Hierarchical Triples vs. Globular Clusters: Binary black hole merger eccentricity distributions compete and evolve with redshift** — A. Dorozsmai, **IRS**, A. Vijaykumar, S. Toonen, F. Antonini, K. Kremer, M. Zevin, E. Grishin. Published in *MNRAS*, Nov 2025
- [30] **Gravitational-Wave Signatures of Highly Eccentric Stellar-Mass Binary Black Holes in Galactic Nuclei** — E. Grishin, **IRS** A. A. Trani. Submitted to *MNRAS*, Oct 2025
- [29] **Biased parameter inference of eccentric, spin-precessing binary black holes** — Divyajyoti, **IRS** *et al.* Submitted to *PRD*, Oct 2025
- [28] **GW20020822617 as an eccentric black-hole binary merger: properties and astrophysical implications** — **IRS**, J. Stegmann, H. Tagawa, D. Gerosa, J. Samsing, N. Gupte, S. R. Green. Published in *PRD*, Sep 2025
- [27] **Inferring the pair-instability mass gap from gravitational wave data** — F. Antonini, T. Callister, F. Dosopoulou, **IRS**, D. Chattopadhyay. Published in *PRD*, Sep 2025
- [26] **Rapid stellar and binary population synthesis with COMPAS: methods paper II** — I. Mandel *et al.* incl. **IRS**. Published in *ApJS*, Sep 2025
- [25] **Gravitational waves reveal the pair-instability mass gap and constrain nuclear burning in massive stars** — F. Antonini, **IRS**, T. Callister, F. Dosopoulou, D. Chattopadhyay, M. Gieles, M. Mapelli. Submitted to *Nature Astronomy*, Sep 2025
- [24] **A Star Cluster Population of High Mass Black Hole Mergers in Gravitational Wave Data** — F. Antonini, **IRS**, T. Callister. Published *PRL*, Jan 2025
- [23] **Eccentric Signatures of Stellar-Mass Binary Black Holes with Circumbinary Disks in LISA** — **IRS**, S. Goorachurn, M. Siwek, C. J. Moore. Published in *MNRAS Letters*, Oct 2024
- [22] **Gravitational-wave data analysis with high-precision numerical relativity simulations of boson star mergers** — T. Evstafyeva, U. Sperhake, **IRS**, M. Agathos. Published in *PRL*, Sep 2024
- [21] **Residual eccentricity as a systematic uncertainty on the formation channels of binary black holes** — G. Fumagalli, **IRS**, D. Gerosa, V. De Renzis, K. Kritos, A. Olejak. Published in *ApJ*, Sep 2024
- [20] **Detecting gravitational-wave bursts from black hole binaries in the Galactic Center with LISA** — A. Knee, J. McIver, S. Naoz, **IRS**, B-M. Hoang. Published in *ApJL*, Aug 2024
- [19] **Blind Spots and Biases: The dangers of ignoring eccentricity in gravitational-wave signals from binary black holes** — Divyajyoti, S. Kumar, S. Tibrewal, **IRS**, C. Mishra. Published in *PRD*, Feb 2024
- [18] **Double black hole mergers in nuclear star clusters: eccentricities, spins, masses, and the growth of massive seeds** — D. Chattopadhyay, J. Stegmann, F. Antonini, J. Barber, **IRS**. Published in *MNRAS*, Dec 2023
- [17] **Rapid population synthesis of black-hole high-mass X-ray binaries: implications for binary stellar evolution** — **IRS**, R. Hirai, A. Bahramian, R. Willcox, I. Mandel. Published in *MNRAS*, Sep 2023
- [16] **Inferring Interference: Identifying a Perturbing Tertiary with Eccentric Gravitational Wave Burst Timing** — **IRS**, N. Loutrel, M. Zevin. Published in *PRD*, Jun 2023
- [15] **Eccentricity or spin precession? Distinguishing subdominant effects in gravitational-wave data** — **IRS**, D. Gerosa, N. Loutrel. Published in *MNRAS*, Jan 2023
- [14] **Gravitational-wave inference for eccentric binaries: the argument of periapsis** — T. A. Clarke, **IRS**, P. D. Lasky, E. Thrane. Published in *MNRAS*, Dec 2022
- [13] **Subtracting glitches from gravitational-wave detector data during the third observing run** — D. Davis, T. B. Littenberg, **IRS**, M. Millhouse, J. McIver, F. Di Renzo, G. Ashton. Published in *Class. Quant. Grav.*, Dec 2022
- [12] **Four eccentric mergers increase the evidence that LIGO-Virgo-KAGRA's binary black holes form dynamically** — **IRS**, P. D. Lasky, E. Thrane. Published in *ApJ*, Dec 2022
- [11] **General-relativistic precession in a black-hole binary** — M. Hannam *et al.* (incl. **IRS**). Published in *Nature*, Oct 2022
- [10] **A Rosetta Stone for Eccentric Gravitational Waveform Models** — A. Knee, **IRS**, P. D. Lasky, J. McIver, E. Thrane. Published in *ApJ*, Sep 2022
- [9] **When models fail: an introduction to posterior predictive checks and model misspecification in gravitational-wave astronomy** — **IRS**, P. D. Lasky, E. Thrane. Published in *PASA*, Jun 2022
- [8] **Implications of Eccentric Observations on Binary Black Hole Formation Channels** — M. Zevin, **IRS**, K. Kremer, E. Thrane, P. D. Lasky. Published in *ApJ Letters*, Nov 2021
- [7] **Signs of Eccentricity in Two Gravitational-Wave Signals may Indicate a Sub-Population of Dynamically Assembled Binary Black Holes** — **IRS**, P. D. Lasky, E. Thrane. Published in *ApJ Letters*, Nov 2021

RESEARCH PUBLICATIONS: SHORT-AUTHOR (CONT.)

- [6] **Gravitational Waves as a Probe of Globular Cluster Formation and Evolution** — **IRS**, K. Kremer, P. D. Lasky, E. Thrane, J. Samsing. Published in *MNRAS*, Jul 2021
- [5] **An Interactive Gravitational-Wave Detector Model for Museums and Fairs** — S. Cooper *et al.* (incl. **IRS**). Published in *Am. J. Phys.*, Jul 2021
- [4] **Bayesian Inference for Compact Binary Coalescences with BILBY: Validation and Application to the First LIGO-Virgo Gravitational-Wave Transient Catalogue** — **IRS**, C. Talbot, S. Biscoveanu, V. D'Emilio, G. Ashton *et al.* Published in *MNRAS*, Sep 2020
- [3] **GW190521: Orbital Eccentricity and Signatures of Dynamical Formation in a Binary Black Hole Merger Signal** — **IRS**, P. Lasky, E. Thrane, J. Calderón Bustillo. Published in *ApJ Letters*, Oct 2020
- [2] **On the origin of GW190425** — **IRS**, N. Farrow, S. Stevenson, X-J. Zhu, E. Thrane. Published in *MNRAS Letters*, May 2020
- [1] **Searching for Eccentricity: Signatures of Dynamical Formation in the First Gravitational-Wave Transient Catalogue of LIGO and Virgo** — **IRS**, P. Lasky, E. Thrane. Published in *MNRAS*, Oct 2019

RESEARCH PUBLICATIONS: LARGE COLLABORATION

I list here publications to which I have actively contributed.

To see all papers upon which I am listed as an author, please visit my [ADS bibliography](#).

- [7] **Observation of Gravitational Waves from the Coalescence of a 2.5 – 4.5 Msun Compact Object and a Neutron Star** — *The LVK Collaboration (incl. IRS)*. Published in *ApJ*, Aug 2024. Contribution: Internal review of parameter estimation results and presentation.
- [6] **Population of Merging Compact Binaries Inferred using Gravitational Waves through GWTC-3** — *The LVK Collaboration (incl. IRS)*. Published in *PRX*, Mar 2023. Contribution: Internal review of population spin analysis.
- [5] **GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run** — *The LVK Collaboration (incl. IRS)*. Published in *PRX*, Dec 2023. Contribution: Member of the paper-writing team. Event analysis, writing, result presentation.
- [4] **Population Properties of Compact Objects from the Second LIGO-Virgo Gravitational-Wave Transient Catalog** — *The LVK Collaboration (incl. IRS)*. Published in *ApJ Letters*, May 2021. Contribution: Internal review of population spin analysis.
- [3] **GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo During the First Half of the Third Observing Run** — *The LVK Collaboration (incl. IRS)*. Published in *PRX*, Apr 2021. Contribution: Analysis of strain data surrounding one event trigger.
- [2] **Neutron Star Extreme Matter Observatory: A Kilohertz-Band Gravitational-Wave Detector in the Global Network** — *OzGrav: K. Ackley *et al.* (incl. IRS)*. Published in *PASA*, Nov 2020. Contribution: Research into efficacy of GW detector network including Australian instrument for observing binary neutron stars.
- [1] **A cryogenic silicon interferometer for gravitational-wave detection** — *R. X. Adhikari *et al.* (incl. IRS)*. Published in *CQG*, Aug 2020. Contribution: Created one of the numerical models used to simulate noise at gravitational-wave interferometers.