Reinhold Willcox

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RESEARCH INTERESTS

Binary Stellar Evolution, Rapid Population Synthesis, Supernovae, Pulsars, Statistical & Computational Astrophysics

EDUCATION

PhD. Astrophysics — Melbourne, AU | Feb '19 - current
Monash University — Supervisors: Prof. Ilya Mandel
Scholarships: Dean's International Postgraduate Scholarship | Dean's Postgraduate Scholarship

BSc. Joint Honours Mathematics and Physics — Montreal, QC | Sep '12 - Jun '16
McGill University

SOCIETIES AND AFFILIATIONS

Monash Gravitational Wave (GW) group
ARC Centre of Excellence for Gravitational Wave Discovery (OzGrav)
Astronomical Society of Australia (ASA)

PUBLICATIONS

1. Stevenson, S., **Willcox, R.**, et al. "Wide binary pulsars from electron-capture supernovae." Monthly Notices of the Royal Astronomical Society, Volume 513, Issue 4, July 2022
2. Riley, J., et al. **incl. Willcox, R.** "Rapid Stellar and Binary Population Synthesis with COMPAS." The Astrophysical Journal Supplement Series, Volume 258, Issue 2, February 2022
3. Team COMPAS, Riley, J., et al. **incl. Willcox, R.** "COMPAS: A rapid binary population synthesis suite." Journal of Open Source Software, vol. 7, January 2022
4. **Willcox, R.**, Mandel, I., et al. "Constraints on Weak Supernova Kicks from Observed Pulsar Velocities." The Astrophysical Journal Letters, Volume 920, Issue 2, October 2021
5. Vigna-Gómez, A., et al. **incl. Willcox, R.**. "Fallback Supernova Assembly of Heavy Binary Neutron Stars and Light Black Hole-Neutron Star Pairs and the Common Stellar Ancestry of GW190425 and GW200115." The Astrophysical Journal Letters, Volume 920, Issue 1, October 2021
6. Ackley, K., et al. **incl. Willcox, R.**. "Neutron Star Extreme Matter Observatory: A kilohertz-band gravitational-wave detector in the global network." Publications of the Astronomical Society of Australia, Volume 37, November 2020

ACADEMIC EXPERIENCE

HARVARD CENTER FOR ASTROPHYSICS | Visiting Researcher — Cambridge, MA | May - June '22

- Collaborated with Dr. Morgan MacLeod to implement results from detailed hydrodynamic simulations of stable binary mass transfer into population synthesis, expected to result in a publication.

AUCKLAND UNIVERSITY OF TECHNOLOGY | Research Assistant — Auckland, NZ | Apr '18 – Aug '18

- Assisted in development of a radio frequency polyphase filterbank in **C++** for use in the data processing component of the **Square Kilometre Array** telescope.

TEACHING

INTRODUCTION TO ASTROPHYSICS: ASP2062 | Monash University — Melbourne, AU | Sep – Dec '19

- Teaching assistant: led tutorials, marked assignments

ADVANCED CALCULUS FOR ENGINEERS: MATH 264 | McGill University — Montreal, QC | May - June '13

- **Primary tutor**: designed & led tutorials, marked assignments

PROFESSIONAL TALKS

HARVARD GRAV WAVE GROUP MEETING | Invited talk — Cambridge, MA | June 16, '22

- "Variations in stripped supernovae and mergers in binary star populations"

HERNQUIST GROUP MEETING | Invited talk — Cambridge, MA | June 2, '22

- "Variations in stripped supernovae and mergers in binary star populations"

OZGRAV DATA/ASTRO TELECON | Invited talk — Online | Aug 13, '21

- "Constraints on Weak Supernova Kicks from Observed Pulsar Velocities"

SEBA GROUP MEETING | Invited talk — Online | Mar 12, '21

- "Using high speed pulsar observations to constrain models of supernovae in binary stars"

YITP-OZGRAV JOINT WORKSHOP | Contributed talk — Online | July '20

- "Limits on ECSN channels from pulsar speed observations"

STARS IN MELBOURNE CONFERENCE | Contributed talk — Melbourne, AU | Dec '19

- "Disruptive natal kicks in binary neutron stars"

LEADERSHIP & OUTREACH

PRINCETON ART COUNCIL | Invited speaker — Princeton, NJ | June 30 '22

- "The Diversity of Color, Size, and Texture of Planets"

CAS SERIES PUBLIC LECTURE | Invited speaker — Melbourne, AU | April 22, '22

- "Friendly stars: current frontiers in our understanding of stellar companions"

OZGRAV OUTREACH PROGRAM | Swinburne University — Melbourne, AU | June '19 - April '22

- **Education and Public Outreach node representative:** recruited outreach volunteers, coordinated travel logistics
- Regular volunteer: delivered presentations to audiences of all ages and backgrounds, assisted with VR equipment

GRAVITATIONAL WAVE GROUP | Monash University — Melbourne AU | Jan - Dec '21

- **Group chair:** ran weekly meetings involving research updates & news, and organizing speakers

MOUNT BURNETT OBSERVATORY | Invited speaker — Melbourne, AU | Oct '19

- "Supernovae in Binary Star Systems: practical life advice for when your partner explodes at you"

WORK EXPERIENCE

CITRIX SYSTEMS, INC. | Technical Analyst — Fort Lauderdale, FL | Sep '16 – Jun '17

- Completed the **Technical Consulting** and **Sales Engineer** training course, emphasizing technical communication.

MCGILL UNIVERSITY, PHYSICS DEPT. | Laboratory Technician — Montreal, QC | May – Aug '15

- Managed testing, repair, and inventory of lab stock. Designed Millikan's oil drop experiment for student lab use.

SKILLS

Software (Proficient): COMPAS (active core developer), Python, Git, Bash, Jupyter, Numpy, Scipy
Software (Intermediate): C++, Slurm (HPC management), LaTeX, HTML/CSS
Languages: English (Native), French (Proficient)

REFERENCES

Prof. Ilya Mandel: ilya.mandel@monash.edu
Dr. Morgan MacLeod: morgan.macleod@cfa.harvard.edu
Dr Ryosuke Hirai: ryosuke.hirai@monash.edu