

Mike Y. M. Lau

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Heidelberg Institute for Theoretical Studies
OzGrav: The ARC Centre of Excellence for Gravitational Wave Discovery

Research experience

- 09/23 – Croucher Research Fellow, Heidelberg Institute for Theoretical Studies
01 – 06/22 Center for Computational Astrophysics (CCA), Flatiron Institute
Research Analyst as part of the CCA Pre-Doctoral Program, supervised by Dr. Matteo Cantiello and Dr. Adam Jermyn

Education

- 09/19 – 03/23 **PhD, Monash University**
Dissertation: *Interactions in Stellar Binaries*, supervised by Prof. Ilya Mandel, Prof. Daniel J. Price, and Dr. Ryosuke Hirai
10/15 – 07/19 **MMathPhys, The University of Oxford**
Master of Mathematical and Theoretical Physics with First Class in Parts A, B, & C
Dissertation: *Detecting Double Neutron Stars with LISA*, supervised by Prof. Ilya Mandel and Prof. Philipp Podsiadlowski

Publications

Published by a peer-reviewed journal (*=key publication)

12. ***Lau, M. Y. M.**, Hirai, R., Mandel, I., Tout, C. A., *Expansion of accreting main-sequence stars during rapid mass transfer. ApJ Letters*, 966, 1, L7 (2024).
11. González-Bolívar, M., De Marco, O., **Lau, M. Y. M.**, Hirai, R., Price, D. J. *Common envelope binary interaction simulations between a thermally-pulsating AGB star and a low mass companion. MNRAS*, 517, 3, p.3181-3199 (2022).
10. ***Lau, M. Y. M.**, Hirai, R., Price, D. J., Mandel, I. *Common envelopes in massive stars II: The distinct roles of hydrogen and helium recombination. MNRAS*, 516, 4, p.4669-4678 (2022).
9. Renzo, M., Zapartas, E., Justham, S., Breivik, K., **Lau, M. Y. M.**, Farmer, R. J., Cantiello, M., Metzger, B. D. *Rejuvenated accretors have less bound envelopes: Impact of Roche lobe overflow on subsequent common envelope events. ApJ Letters*, 942, 2, id.L32 (2023).
8. ***Lau, M. Y. M.**, Hirai, R., González-Bolívar, M., Price, D. J., De Marco, O., Mandel, I. *Common envelopes in massive stars: Towards the role of radiation pressure and recombination energy in ejecting red supergiant envelopes. MNRAS*, 512, 4, p.5462-5480 (2022).
7. Amaro-Seoane, P., et al. (including **Lau, M. Y. M.**). *Astrophysics with the Laser Interferometer Space Antenna. Living Reviews in Relativity*, Volume 26, Issue 1, article id.2.
6. Team COMPAS: Riley, J., et al. (including **Lau, M. Y. M.**). *Rapid stellar and binary population synthesis with COMPAS. ApJ Supplement*, 258, 2, id.34, p.34 (2022).
5. Team COMPAS: Riley, J., et al. (including **Lau, M. Y. M.**). *COMPAS: A rapid binary population synthesis suite. Journal of Open Source Software*, 7, 69, id.3838 (2022).
4. Ackley, K., et al. (including **Lau, M. Y. M.**). *Neutron Star Extreme Matter Observatory: A kilohertz-band gravitational-wave detector in the global network. Publications of the Astronomical Society of Australia*, 37, id.e047 (2020).
3. **Lau, M. Y. M.**, Mandel, I., Vigna-Gómez, A., Neijssel, C. J., Stevenson, S., Sesana, A. *Detecting Double Neutron Stars with LISA. MNRAS*, 492, 3, p.3061-3072 (2020).

Submitted to a peer-reviewed journal

2. Bermúdez-Bustamante, L. C., De Marco, O., Siess, L., Price, D. J., González-Bolívar, M., **Lau, M. Y. M.**, Mu, C., Hirai, R., Danilovich, T., Kasliwal, M. M. *Dust formation in common envelope binary interactions – II: 3D simulations with self-consistent dust formation. Submitted to MNRAS* (2024; *arXiv:2401.03644*).
1. ***Lau, M. Y. M.**, Cantiello, M., Jermyn, A. S., MacLeod, M., Mandel, I., Price, D. J. *Hot Jupiter engulfment by a red giant in 3D hydrodynamics. Submitted to MNRAS* (2022; *arXiv:2210.15848*).

Selected talks

02/24	Joint Franco-Australian 5th Phantom and MCFOST Users Workshop (invited)	Monash University, remote
12/23	Astrophysics seminar	The Chinese University of Hong Kong
03/23	Colloquium	ICRAR-Curtin, Perth
02/23	Phantom users workshop 2023 (LOC)	Monash University
01/23	SESTAS meeting	MPA, Garching
01/23	Common envelope group meeting	HITS, Heidelberg
12/22	Gravitational Wave Physics and Astronomy Workshop (GWPAW, invited)	Melbourne
06/22	CCA Predoctoral Program Symposium	CCA, Flatiron Institute
06/22	Physics and Astrophysics of Common Envelope	Los Alamos National Laboratory
03/22	CCA Stars & Compact Objects Group Meeting	CCA, Flatiron Institute
12/21	OzGrav Data/Astro Telecon	Virtual
09/21	Common Envelope Physics and Outcomes 2021	Virtual
07/21	ASA Annual Meeting 2021	University of Melbourne
07/21	EAS Annual Meeting 2021	Leiden, virtual
02/21	LISA Workshop (invited)	University of Auckland, remote
08/20	The 13th International LISA Symposium	University of Auckland, remote
02/20	ANITA workshop and school 2020	UNSW, Canberra
01/20	Gravitational Waves Group Meeting	Cardiff University
01/20	Astrophysics Seminar	University of Birmingham
12/19	2019 Stars in Melbourne	Monash University
11/19	2019 OzGrav Annual Retreat	Lorne, Melbourne
11/19	OzGrav Data/Astro Telecon	Virtual

Grants & awards

04/23	Croucher Research Fellowship	Croucher Foundation
03/23	Humboldt Research Fellowship (declined for Croucher)	Alexander von Humboldt Foundation
01/23	Postgraduate publication award	Monash University
12/22	Max Planck Institute for Astrophysics Fellowship (declined for Croucher)	Max Planck Institute for Astrophysics
Q3/4 21	Lead CI for NCI Astronomy Program computing grant (670 kSU)	AAL Astronomy Supercomputer
Q1/2 21	Lead CI for NCI Astronomy Program computing grant (544 kSU)	AAL Astronomy Supercomputer
19 – 22	J. L. William International PhD Scholarship	Monash University
19 – 23	Research Training Program (RTP) Stipend	Monash University
19 – 23	Monash International Tuition Scholarship	Monash University
07/19	Schools Prize	St Edmund Hall, University of Oxford
17, 18	Open Scholarship	St Edmund Hall, University of Oxford
16	Open Exhibition	St Edmund Hall, University of Oxford
08/15	Hong Kong Scholarship for Excellence (tuition)	Hong Kong Government

Teaching & supervision

11 – 12/21	Co-supervisor for summer undergraduate student at Monash University
02 – 06/21	TA for <i>ASP3051 Relativity and Cosmology</i>
08 – 11/20	Tutor for <i>ASP3162 Computational Astrophysics and the Extreme Universe</i> under the Monash University Indigenous Academic Enhancement Program
08 – 11/20	IAEP tutor for <i>ASP3012 Stars and Galaxies</i>
08 – 09/20	Tutor for <i>MCD1180: Introductory Physics</i> under the Monash Indigenous Access Program
04 – 06/20	IAEP tutor for <i>ASP3051 Relativity and Cosmology</i>
04 – 06/20	IAEP tutor for <i>MAT9004 Mathematical Foundations for Data Science</i>
02 – 06/20	TA for <i>ASP1010: Earth to Cosmos—Introductory Astronomy</i>

Academic service & outreach

02/23	Local organising committee for 2023 Phantom Users Workshop
11/22	OzGrav Outreach Superstar Award
	Reviewer for MNRAS, ApJ Letters, and A&A
10/19 – 08/23	Organised weekly Whiteboard Sessions at Monash University
09/22	World Science Festival, Ipswich, Queensland
07/21	Dark Science holiday programme, Casey Tech School (Berwick)
07/21	Black Hole Sunday, TwistED Science Centre, Echuca, Victoria
04/21	OzGrav Interactive tech showcase, Bendigo Discovery Science and Technology Centre
12/19	Monash Minimizer Faire, Monash University
18	Organised St Edmund Hall Physics Journal Club
08/17 – 19	Academic and Scholarship Mentor at Project Access HK: Mentorship for talented, underprivileged students in Hong Kong

Software contributions

- Code development: COMPAS (rapid stellar population synthesis), PHANTOM (smoothed particle hydrodynamics)
- Programming: MATLAB, Fortran, C++, Python