Mike Y. M. Lau

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Heidelberg Institute for Theoretical Studies

Timeline

09/23 **Heidelberg Institute for Theoretical Studies**
09/23–08/25: Croucher Research Fellow. 09/25–Present: Postdoctoral researcher at Astronomisches Rechen-Institut, Zentrum für Astronomie der Universität Heidelberg

09/19 – 03/23 **Monash University (PhD)**
Dissertation: *Interactions in Stellar Binaries*, supervised by Prof. Ilya Mandel, Prof. Daniel J. Price, and Dr. Ryosuke Hirai

01 – 06/22 **Flatiron Institute CCA (Research Analyst)**
Center for Computational Astrophysics Pre-Doctoral Program, supervised by Dr. Matteo Cantiello and Dr. Adam Jermyn

10/15 – 07/19 **The University of Oxford (MMathPhys)**
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/accepted works (6 first-author publications)

19. Bermúdez-Bustamante, L., De Marco, O., Siess, L., Price, D., González-Bolívar, M., et al. (inc. **Lau, M.**), 2025, *Dust formation during the interaction of binary stars by common envelope, Planetary Nebulae (IAU S384) A Universal Toolbox in the Era of Precision Astrophysics*, Proceedings of the IAU Symposia and Colloquia, PDF
18. **Lau, M.**, Hirai, R., Price, D., Mandel, I., Bate, M., 2025, *Common envelopes in massive stars: III. The obstructive role of radiation transport in envelope ejection*, A&A, 699, PDF
17. Mandel, I., Riley, J., Boesky, A., Brcek, A., Hirai, R., et al. (inc. **Lau, M.**), 2025, *Rapid stellar and binary population synthesis with COMPAS: methods paper II*, ApJS, 280, 1, PDF
16. Vetter, M., Röpke, F., Schneider, F., Pakmor, R., Ohlmann, S., et al. (inc. **Lau, M.**), 2025, *Magnetically driven outflows in the 3D common envelope evolution of massive stars*, A&A, 698, PDF
15. Siess, L., Bermúdez-Bustamante, L., De Marco, O., Price, D., González-Bolívar, M., et al. (inc. **Lau, M.**), 2024, *Dusty Common Envelope Evolution*, Galaxies, 12, PDF
14. Schneider, F., **Lau, M.**, Röpke, F., 2025, *Stellar mergers and common-envelope evolution, Encyclopedia of Astrophysics - 1st Edition*, Elsevier, PDF
13. Vetter, M., Röpke, F., Schneider, F., Pakmor, R., Ohlmann, S., et al. (inc. **Lau, M.**), 2024, *From spherical stars to disk-like structures: 3D common-envelope evolution of massive binaries beyond inspiral*, A&A, 691, PDF
12. Bermúdez-Bustamante, L., De Marco, O., Siess, L., Price, D., González-Bolívar, M., et al. (inc. **Lau, M.**), 2024, *Dust formation in common envelope binary interactions - II: 3D simulations with self-consistent dust formation*, MNRAS, 533, 1, PDF
11. **Lau, M.**, Hirai, R., Mandel, I., Tout, C., 2024, *Expansion of Accreting Main-sequence Stars during Rapid Mass Transfer*, ApJL, 966, 1, PDF
10. Amaro-Seoane, P., Andrews, J., Arca Sedda, M., Askar, A., Baghi, Q., et al. (inc. **Lau, M.**), 2023, *Astrophysics with the Laser Interferometer Space Antenna*, Living Reviews in Relativity, 26, 1, PDF
9. Renzo, M., Zapartas, E., Justham, S., Breivik, K., **Lau, M.**, et al., 2023, *Rejuvenated Accretors Have Less Bound Envelopes: Impact of Roche Lobe Overflow on Subsequent Common Envelope Events*, ApJL, 942, 2, PDF
8. González-Bolívar, M., De Marco, O., **Lau, M.**, Hirai, R., Price, D., 2022, *Common envelope binary interaction simulations between a thermally pulsating AGB star and a low mass companion*, MNRAS, 517, 3, PDF
7. **Lau, M.**, Hirai, R., Price, D., Mandel, I., 2022, *Common envelopes in massive stars II: The distinct roles of hydrogen and helium recombination*, MNRAS, 516, 4, PDF
6. **Lau, M.**, Cantiello, M., Jermyn, A., MacLeod, M., Mandel, I., et al., 2025, *Hot Jupiter engulfment by an early red giant in 3D hydrodynamics*, A&A, 694, PDF

5. **Lau, M.**, Hirai, R., González-Bolívar, M., Price, D., De Marco, O., et al., 2022, *Common envelopes in massive stars: towards the role of radiation pressure and recombination energy in ejecting red supergiant envelopes*, MNRAS, 512, 4, PDF
4. Riley, J., Agrawal, P., Barrett, J., Boyett, K., Broekgaarden, F., et al. (inc. **Lau, M.)**, 2022, *Rapid Stellar and Binary Population Synthesis with COMPAS*, ApJS, 258, 2, PDF
3. Compas, T., Riley, J., Agrawal, P., Barrett, J., Boyett, K., et al. (inc. **Lau, M.)**, 2022, *COMPAS: A rapid binary population synthesis suite*, The Journal of Open Source Software, 7, 69, PDF
2. Ackley, K., Adya, V., Agrawal, P., Altin, P., Ashton, G., et al. (inc. **Lau, M.)**, 2020, *Neutron Star Extreme Matter Observatory: A kilohertz-band gravitational-wave detector in the global network*, Publications of the Astronomical Society of Australia, 37, PDF
1. **Lau, M.**, Mandel, I., Vigna-Gómez, A., Neijssel, C., Stevenson, S., et al., 2020, *Detecting double neutron stars with LISA*, MNRAS, 492, 3, PDF

Selected talks (* = invited)

09/25	*Astronomy seminar	*Tsung-Dao Lee Institute, Shanghai*
08/25	*Binary Stars in a New Era	*Lijiang*
06/25	*European Astronomical Society Annual Meeting (**invited review**)	*Cork*
06/25	*2nd European Phantom code family users workshop	*IPAG, Grenoble*
12/24	*Astrophysics seminar	*Chinese University of Hong Kong*
07/24	41st Liège International Astrophysical Colloquium: The eventful life of massive star multiples (**best linguistics invention**)	*University of Liège*
02/24	*Joint Franco-Australian 5th Phantom and MCFOST Users Workshop	*Monash University, remote*
12/23	*Astrophysics seminar	*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	*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	*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

24	Mollie Holman Doctoral Medal for Science (shortlisted)	*Monash University*
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	*Hong Kong Government*

Teaching & supervision

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

Academic service & outreach

	Reviewer for MNRAS, ApJ, ApJ Letters, The Open Journal of Astrophysics, and A&A
02/23	Local organising committee for the 2023 Phantom Users Workshop
11/22	OzGrav Outreach Superstar Award
10/19 – 08/23	Organiser for weekly Whiteboard Seminars 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 Minimaker Faire, Monash University
18	Organiser for 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 languages: Python, Fortran, MATLAB, C++