Mike Y. M. Lau

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

Timeline

09/23 – **Croucher Research Fellow, Heidelberg Institute for Theoretical Studies**

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

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

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/accepted works

16. Schneider, F., **Lau, M.**, Röpke, F., 2024, *Stellar mergers and common-envelope evolution*, invited chapter for the Encyclopedia of Astrophysics to be published by Elsevier, PDF
15. **Lau, M.**, Cantiello, M., Jermyn, A., MacLeod, M., Mandel, I., et al., 2025, *Hot Jupiter engulfment by a red giant in 3D hydrodynamics*, A&A, in press, PDF
14. 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
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., et al., 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.**, 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
5. 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
4. 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
3. 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
2. **Lau, M.**, Mandel, I., Vigna-Gómez, A., Neijssel, C., Stevenson, S., et al., 2020, *Detecting double neutron stars with LISA*, MNRAS, 492, 3, PDF

Submitted works

1. Bermúdez-Bustamante, L., De Marco, O., Siess, L., Price, D., González-Bolívar, M., et al. (inc. **Lau, M.)**, 2024, *Dust formation during the interaction of binary stars by common envelope*, Proceedings IAU Symposium No. 384, PDF

Selected talks

12/24	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 (**invited**)	*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 (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 *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

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	Organiser for 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 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: MATLAB, Fortran, C++, Python