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

Sep 2023 – Present **Heidelberg Institute for Theoretical Studies**
Croucher Research Fellow

Jan – Jun 2022 **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

Sep 2019 – Mar 2023 **PhD, Monash University**
Dissertation: *Interactions in Stellar Binaries*, supervised by Prof. Ilya Mandel, Prof. Daniel J. Price, and Dr. Ryosuke Hirai

Oct 2015 – Jul 2019 **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)

1. 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).
2. ***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).
3. 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* (in press, 2022)
4. ***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).
5. 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).
7. 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).
8. 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).
9. **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

1. ***Lau, M. Y. M.**, Hirai, R., Mandel, I., Tout, C. A., *Expansion of accreting main-sequence stars during rapid mass transfer.* Submitted to *ApJ Letters* (2024; *arXiv:2401.09570*).
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*).
3. ***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

Dec 2023	Astrophysics seminar	*The Chinese University of Hong Kong*
Mar 2023	Colloquium	*ICRAR-Curtin, Perth*
Feb 2023	Phantom users workshop 2023 (LOC)	*Monash University*
Jan 2023	SESTAS meeting	*MPA, Garching*
Jan 2023	Common envelope group meeting	*HITS, Heidelberg*
Dec 2022	Gravitational Wave Physics and Astronomy Workshop (GWPAW, **invited**)	*Melbourne*
Jun 2022	CCA Predoctoral Program Symposium	*CCA, Flatiron Institute*
Jun 2022	Physics and Astrophysics of Common Envelope	*Los Alamos National Laboratory*
Mar 2022	CCA Stars & Compact Objects Group Meeting	*CCA, Flatiron Institute*
Dec 2021	OzGrav Data/Astro Telecon	*Virtual*
Sep 2021	Common Envelope Physics and Outcomes 2021	*Virtual*
Jul 2021	ASA Annual Meeting 2021	*University of Melbourne*
Jul 2021	EAS Annual Meeting 2021	*Leiden, virtual*
Feb 2021	LISA Workshop (**invited**)	*University of Auckland, remote*
Aug 2020	The 13th International LISA Symposium	*University of Auckland, remote*
Feb 2020	ANITA workshop and school 2020	*UNSW, Canberra*
Jan 2020	Gravitational Waves Group Meeting	*Cardiff University*
Jan 2020	Astrophysics Seminar	*University of Birmingham*
Dec 2019	2019 Stars in Melbourne	*Monash University*
Nov 2019	2019 OzGrav Annual Retreat	*Lorne, Melbourne*
Nov 2019	OzGrav Data/Astro Telecon	*Virtual*

Grants & awards

Apr 2023	Croucher Research Fellowship	*Croucher Foundation*
Mar 2023	Humboldt Research Fellowship (declined for Croucher Fellowship)	*Alexander von Humboldt Foundation*
Dec 2022	Max Planck Institute for Astrophysics Fellowship (declined for Croucher Fellowship)	*Max Planck Institute for Astrophysics*
Q3/4 2021	Lead chief investigator, NCI Astronomy Program computing grant (670 kSU)	*AAL Astronomy Supercomputer*
Q1/2 2021	Lead chief investigator, NCI Astronomy Program computing grant (544 kSU)	*AAL Astronomy Supercomputer*
2019 – 2022	J. L. William International PhD Scholarship	*Monash University*
2019 – 2023	Research Training Program (RTP) Stipend	*Monash University*
2019 – 2023	Monash International Tuition Scholarship (MITS)	*Monash University*
Jul 2019	Schools Prize	*St Edmund Hall, University of Oxford*
2017, 2018	Open Scholarship	*St Edmund Hall, University of Oxford*
2016	Open Exhibition	*St Edmund Hall, University of Oxford*
Aug 2015	Hong Kong Scholarship for Excellence (tuition)	*Hong Kong Government*

Teaching & supervision

Nov – Dec 2021	Co-supervisor for summer undergraduate student at Monash University
Feb – Jun 2021	TA for *ASP3051 Relativity and Cosmology*
Aug – Nov 2020	Tutor for *ASP3162 Computational Astrophysics and the Extreme Universe* under the Monash University Indigenous Academic Enhancement Program
Aug – Nov 2020	IAEP tutor for *ASP3012 Stars and Galaxies*
Aug – Sep 2020	Tutor for *MCD1180: Introductory Physics* under the Monash Indigenous Access Program
Apr – Jun 2020	IAEP tutor for *ASP3051 Relativity and Cosmology*
Apr – Jun 2020	IAEP tutor for *MAT9004 Mathematical Foundations for Data Science*
Feb – Jun 2020	TA for *ASP1010: Earth to Cosmos—Introductory Astronomy*

Academic service & outreach

Feb 2023	Local organising committee for 2023 Phantom Users Workshop
Nov 2022	OzGrav Outreach Superstar Award
2022 – Present	Reviewer for Monthly Notices of the Royal Astronomical Society

2022 – Present	Reviewer for The Astrophysical Journal Letters
Oct 2019 – Present	Organiser of weekly Whiteboard Sessions at Monash University
10 Sep 2022	World Science Festival, Ipswich, Queensland
6 Jul 2021	Dark Science holiday programme, Casey Tech School (Berwick)
4 Jul 2021	Black Hole Sunday, TwistED Science Centre, Echuca, Victoria
16 Apr 2021	OzGrav Interactive tech showcase, Bendigo Discovery Science and Technology Centre
1 Dec 2019	Monash Minimaker Faire, Monash University
2018	Founder & organiser of St Edmund Hall Physics Journal Club
Aug 2017 – 2019	Academic and Scholarship Mentor at Project Access HK: Mentorship for talented, underprivileged students in Hong Kong

Software contributions

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