

# Ryosuke Hirai

## Curriculum Vitae

### Personal Information

Name Ryosuke Hirai (平井 遼介)  
Nationality Japanese  
Gender Male  
Date of Birth 12th August, 1989  
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ryosuke.hirai@monash.edu

### Research Interests

2012– Binary stars and supernovae  
2015– Efficient numerical schemes for difference equations  
2018– Stellar mergers and triple dynamics  
2021– Wind accretion in close binaries

### Education

2014–2017 **Doctor of Science**, Waseda University, Advanced Research Institute of Science and Engineering.  
2012–2014 **Master of Science**, Waseda University, Advanced Research Institute of Science and Engineering.  
2008–2012 **Bachelor of Engineering**, Waseda University, School of Advanced Science and Engineering.

### Languages

Japanese **Mothertongue**  
English **Fluent** *Spent 8.5 years of childhood in England*  
Mandarin **Basic** *>1000 days on Duolingo*

### Research Experience

2024.3– **Special Postdoctoral Research Fellow**, at Astrophysical Big Bang Laboratory, RIKEN.  
2019.12– **Research Fellow**, at School of Physics and Astronomy, Monash University.  
2017–2019 **JSPS Overseas Research Fellow**, at Department of Physics, University of Oxford.

- 2017.4–10 **JSPS Research Fellow (PD)**, at *Advanced Research Institute of Science and Engineering*, Waseda University.
- 2016–2017 **JSPS Research Fellow (DC2)**, at *Advanced Research Institute of Science and Engineering*, Waseda University.

## Teaching Experience

- 2024 **One-day Lecturer**, *PHS1022x*, Monash University.
- 2024 **Teaching Assistant**, *MESA Summer school*, University of Sydney.
- 2021–2022 **Facilitator**, *Astrophysics Book Club*, Monash University.
- 2020.7–10 **Teaching Assistant**, *PHS1022 (Waves and Quantum Physics)*, Monash University.
- 2014–2017 **Teaching Assistant**, *Introductory Physics*, Waseda University.

## Research Supervision

### PhD students

- 2024– **Adam Brček**, *Co-supervised with Ilya Mandel*, Monash University, Binary population synthesis.
- 2022–2023 **Reinhold Willcox**, *Co-supervised with Ilya Mandel and Eric Thrane*, Monash University, Binary population synthesis, Stripped-envelope supernova fractions.
- 2020–2023 **Mike Lau**, *Co-supervised with Ilya Mandel and Daniel Price*, Monash University, Smoothed-particle hydrodynamics, Common-envelope evolution.

### Honours students

- 2022–2023 **Lewis Picker**, *Co-supervised with Ilya Mandel*, Monash University, Implementing the two-stage common-envelope prescription into population synthesis codes.
- 2021–2022 **Andrew Atta**, *Co-supervised with Ilya Mandel and Bernhard Müller*, Monash University, Partially stripped red supergiant appearances.

### Undergraduate students

- 2024 **Barbod Vahedian Ghaffari**, Monash University, Effect of neutron star rocket mechanisms in triples.
- 2022 **Alvaro Herrera**, *Co-supervised with Ilya Mandel*, Monash University, Searching for black hole binaries in Gaia DR3.
- 2021–2022 **Andrew Atta**, *Co-supervised with Ilya Mandel*, Monash University, Partially stripped red supergiant appearances.
- 2021 **Amir Kashapov**, *Co-supervised with Ilya Mandel*, Monash University, Radial evolution of naked helium stars.
- 2021 **Bayley Tranter**, *Co-supervised with Ilya Mandel*, Monash University, Three-body scattering.

## Grants and Awards

- 2024–2027 **RIKEN Special Postdoctoral Research Fellow, Grant**,  $1000000\text{JPY} \times 3 \text{ yr} + 1000000 \text{ JPY}$  (*extra*).

- 2024 **ADACS Merit Allocation Program**, 12 weeks development support ( $\approx 42000$  AUD).
- 2023 **OzGrav Scientific Achievement Award–Astronomy Theme**, Winner.
- 2023 **OzGrav Rising Star Award–Postdoc**, Runner-up.
- 2023 **Best Presentation Prize (1st place)**, Monash Science ECN Symposium, 2000 AUD.
- 2023 **ANU 2.3 m Telescope time allocation (PI)**, 9 dark hours.
- 2023 **Adapter Allocation Scheme Q2, National Computational Infrastructure (NCI) Australia**, 208 KSU on NCI Gadi Supercomputer.
- 2018 **Hayakawa Satio Fund, Astronomical Society of Japan**,  $\sim 210000$  JPY.
- 2016–2017 **JSPS Research Fellow (DC2), Grant**, 1200000+1100000 JPY.
- 2015 **Research Grant for Young Scientists, Early Bird Program from Waseda Research Institute for Science and Engineering**, 400000 JPY.

## Invited Talks

- 2024.11 **Colloquium**, Academia Sinica Institute of Astronomy and Astrophysics, Taiwan.
- 2024.11 **Invited talk**, Stars in Brisbane, Australia.
- 2024.8 **Invited talk**, The Progenitors of Supernovae and their Explosions, China.
- 2024.6 **Seminar**, ABBL-iTHEMS, RIKEN, Japan (online).
- 2024.5 **Seminar**, RESCEU, University of Tokyo, Japan.
- 2024.5 **Seminar**, Department of Earth Science and Astronomy, University of Tokyo, Japan.
- 2024.3 **Invited talk**, Yamada lab 20th Anniversary Workshop, Japan.
- 2023.10 **Seminar**, Orange pulsar meeting (online), Australia.
- 2023.5 **Seminar**, Orange pulsar meeting (online), Australia.
- 2022.11 **Invited talk**, Supernovae in the Gravitational Wave Detection Era, Australia.
- 2022.11 **Seminar**, University of Melbourne, Australia.
- 2022.10 **Seminar**, University of Delaware (online), USA.
- 2022.9 **Seminar**, Heidelberg Institute for Theoretical Studies, Germany.
- 2022.9 **Seminar**, Max Planck Institute for Astrophysics, Germany.
- 2022.9 **Seminar**, European Southern Observatory, Germany.
- 2022.3 **Seminar**, Rikkyo University, Japan.
- 2022.3 **Seminar**, Institute of Cosmic Ray Research, University of Tokyo, Japan.
- 2021.6 **Seminar**, Macquarie University (online), Australia.
- 2021.6 **Invited talk**, European Astronomical Society Annual meeting 2021 (online), Netherlands.
- 2021.4 **Colloquium**, Heidelberg (online), Germany.
- 2021.3 **Seminar**, Technion (online), Israel.
- 2020.12 **Seminar**, Hebrew University of Jerusalem (online), Israel.
- 2020.11 **Seminar**, Kyoto University + Yukawa Institute (online), Japan.

- 2020.11 **Colloquium**, SWIFAR, Yunnan University (online), China.
- 2020.11 **Colloquium**, National Astronomical Observatory of Japan (online), Japan.
- 2020.10 **Invited talk**, Stellar alchemy to galactic archaeology (online), Japan.
- 2020.5 **Seminar**, RESCEU, University of Tokyo (online), Japan.
- 2020.4 **Colloquium**, Monash University (online), Australia.
- 2020.2 **Invited talk**, Phantom workshop, Australia.
- 2019.11 **Colloquium**, Tohoku University, Japan.
- 2019.9 **Colloquium**, JAXA, Japan.
- 2019.9 **Seminar**, Waseda University, Japan.
- 2019.9 **Colloquium**, University of Tokyo, Japan.
- 2019.9 **Seminar**, Peking University, China.
- 2019.9 **Seminar**, Yunnan National Astronomical Observatory, China.
- 2019.4 **Seminar**, Sheffield University, UK.
- 2019.3 **Seminar**, Anton Pannekoek Institute, Netherlands.
- 2019.3 **Seminar**, Heidelberg Institute of Theoretical Physics, Germany.
- 2018.12 **Seminar**, Chiba Institute of Technology, Japan.
- 2018.10 **Seminar**, Department of Earth Sciences, University of Oxford, UK.
- 2018.9 **Seminar**, University of Delaware, USA.
- 2018.6 **Colloquium**, Department of Physics, University of Oxford, UK.
- 2018.1 **Seminar**, Department of Physics, University of Oxford, UK.
- 2017.12 **Seminar**, Albert Einstein Institute, Germany.
- 2017.11 **Seminar**, Argelander Institute, University of Bonn, Germany.
- 2017.10 **Colloquium**, National Astronomical Observatory of Japan, Japan.
- 2017.10 **Seminar**, RIKEN, Japan.
- 2017.5 **Colloquium**, Institute of Cosmic Ray Research, University of Tokyo, Japan.
- 2016.7 **Seminar**, Kyoto University, Japan.
- 2016.1 **Seminar**, RESCEU, University of Tokyo, Japan.
- 2015.7 **Seminar**, KEK, Japan.
- 2015.6 **Seminar**, Kyoto University, Japan.
- 2014.4 **Seminar**, RIKEN, Japan.

## Contributed talks/posters

- 2024.7 **Contributed talk**, 41st Liège International Astrophysical Colloquium, Belgium.
- 2024.7 **Contributed talk**, StanFest: Fundamentals of Stellar Outflows, Belgium.
- 2024.3 **Contributed talk**, Spring ASJ Annual meeting (online), Japan.
- 2024.2 **Contributed talk**, ANITA workshop 2024, Australia.
- 2023.12 **Contributed talk**, RESCEU-NBIA workshop on gravitational-wave sources, Japan.
- 2023.9 **Contributed talk**, Australian LSST Workshop 2023, Australia.
- 2023.3 **Contributed poster**, eXtreme Black Holes, USA.

- 2023.2 **Contributed talk**, *ANITA workshop 2023*, Australia.
- 2023.2 **Contributed talk**, *Phantom users workshop 2023*, Australia.
- 2022.12 **Contributed talk**, *Gravitational Wave Physics and Astronomy Workshop*, Australia.
- 2022.11 **Contributed talk**, *Supervirtual 2022*, Fully online.
- 2022.6 **Contributed talk**, *ASA Annual science meeting 2022*, Australia.
- 2022.3 **Contributed talk**, *Spring ASJ Annual meeting (online)*, Japan.
- 2021.12 **Contributed talk**, *34th Rironkon Symposium (online)*, Japan.
- 2021.10 **Contributed talk**, *Asymmetrical Post-main-sequence Nebulae 8 (online)*, Spain.
- 2021.9 **Contributed talk**, *Autumn ASJ Annual meeting (online)*, Japan.
- 2021.8 **Contributed talk**, *Neutron star workshop 2021 (online)*, Japan.
- 2021.7 **Contributed talk**, *ASA Annual science meeting 2021 (online)*, Australia.
- 2021.3 **Contributed talk**, *Spring ASJ Annual meeting (online)*, Japan.
- 2021.3 **Contributed poster**, *Triple Evolution and Dynamics (online)*, Israel.
- 2021.2 **Contributed talk**, *ANITA workshop 2021 (online)*, Australia.
- 2021.1 **Contributed talk**, *Binary/Variable star workshop 2020 (online)*, Japan.
- 2021.1 **Contributed poster**, *43rd COSPAR Assembly (online)*, Australia.
- 2020.2 **Contributed talk**, *ANITA workshop 2020 (online)*, Australia.
- 2019.9 **Contributed talk**, *Autumn ASJ Annual meeting*, Japan.
- 2019.5 **Contributed talk**, *FOE19 Fifty-one Erg*, USA.
- 2018.12 **Contributed poster**, *31st Rironkon Symposium*, Japan.
- 2018.11 **Contributed talk**, *Massive stars and supernovae*, Argentina.
- 2018.7 **Contributed talk**, *Frontiers of the Physics of Massive stars*, Mexico.
- 2017.9 **Contributed talk**, *Autumn ASJ Annual meeting*, Japan.
- 2017.7 **Contributed talk**, *Ringberg Workshop*, Germany.
- 2017.7 **Contributed poster**, *FOE17 Fifty-One Erg*, USA.
- 2017.3 **Contributed talk**, *Spring ASJ Annual meeting*, Japan.
- 2017.3 **Contributed talk**, *Ultraluminous X-ray source workshop*, Japan.
- 2017.1 **Contributed talk**, *Workshop on Transient Universe in the Big Survey Era*, Japan.
- 2016.12 **Contributed talk**, *29th Rironkon Symposium*, Japan.
- 2016.10 **Contributed talk**, *Binary/Variable star workshop 2016*, Japan.
- 2016.9 **Contributed talk**, *Autumn ASJ Annual meeting*, Japan.
- 2016.7 **Contributed talk**, *NAOJ-ECT workshop*, Japan.
- 2015.12 **Contributed poster**, *28th Rironkon Symposium*, Japan.
- 2015.9 **Contributed talk**, *Numazu workshop*, Japan.
- 2015.6 **Contributed talk**, *Fifty-One Erg*, USA.
- 2015.3 **Contributed talk**, *Spring ASJ Annual meeting*, Japan.
- 2014.12 **Contributed poster**, *27th Rironkon Symposium*, Japan.
- 2014.10 **Contributed talk**, *2nd DTA Symposium*, Japan.
- 2014.9 **Contributed poster**, *Binary systems, their evolution and environments*, Mongolia.

- 2014.9 **Contributed talk**, *Autumn ASJ Annual meeting*, Japan.
- 2014.2 **Contributed talk**, *Binary star workshop*, Japan.
- 2013.12 **Contributed poster**, *Multi-Messengers from Core-Collapse Supernovae*, Japan.
- 2013.9 **Contributed talk**, *Autumn ASJ Annual meeting*, Japan.

## Service

- Grant referee**, *ISF (Israeli Science Foundation)*, *ARC (Australian Research Council)*, *DFG (German Research Foundation)*.
- Journal referee**, *MNRAS (Monthly Notices of the Royal Astronomical Society)*, *PASJ (Publications of the Astronomical Society of Japan)*, *Galaxies*, *ApJL (The Astrophysical Journal Letters)*, *PASA (Publications of the Astronomical Society of Australia)*, *ApJ (The Astrophysical Journal)*, *A&A (Astronomy & Astrophysics)*, *PRL (Physical Review Letters)*, *Nature Communications*.
- 2024.6 **TA**, *MESA Summer School (MESA Down Under)*.
- 2024.2 **Conference organiser**, *Transients Down Under*, SOC.
- 2024– **Committee member**, *ANITA steering committee*.
- 2023– **Junior Associate representative**, *AAL Australian LSST Management Committee (ALManaC)*.
- 2021–2023 **External Panelist**, *Hubble Space Telescope proposal review*.
- 2021–2024 **Program chair**, *ARC Centre of Excellence for Gravitational Wave Discovery (Oz-Grav)*, *Relativistic Astrophysics program*.
- 2021.7 **Conference organiser**, *Nuclear burning in massive stars – towards the formation of binary black holes –*, (Monash hub leader).
- 2020–2022 **Seminar/Colloquia organiser**, *Monash University*.
- 2018–2019 **SPI-MAX seminar series organiser**, *University of Oxford*.
- 2015–2017 **Seminar organiser**, *Waseda University*.

## Membership

- 2023– **Astronomical Society of Australia**.
- 2016– **Rironkon (Theoretical astrophysics society of Japan)**.
- 2015– **Astronomical Society of Japan**.

## Outreach/Interdisciplinary events

- 2023.9 **Interdisciplinary Talk**, *Monash Science ECN Symposium 2023*.
- 2023.9 **Public event**, *Notting Hill Neighbourhood House Astronomy Night*.
- 2022.6 **Public Talk**, *Free Public Astronomy Lecture at Swinburne University of Technology*.
- 2022.5 **High School Talk**, *Melbourne High School*.
- 2021.8 **High School Talk**, *Hikawa High School*.
- 2021.3 **High School Talk**, *Waseda Jitsugyo High School*.
- 2019.7 **Public event**, *Cowley Road Carnival*.

- 2019.4 **Interdisciplinary Talk**, *Oxbridge Japanese Society meet-up*.
- 2019.1 **Public event**, *Stargazing Oxford 2019*.
- 2018.1 **Public event**, *Stargazing Oxford 2018*.
- 2016.3 **Interdisciplinary Talk**, *Early Bird Program Final Report Symposium*.
- 2015.6 **High School Talk**, *Waseda Jitsugyo High School*.

## Publications

### First Author

- [14] **Post-supernova binary interactions**  
Ryosuke Hirai  
 accepted to the 41st Liège International Astrophysical Colloquium (LIAC41) Conference Proceedings (2024)
- [13] **Neutron star kicks plus rockets as a mechanism for forming wide low-eccentricity neutron star binaries**  
Ryosuke Hirai, Philipp Podsiadlowski, Alexander Heger, Hiroki Nagakura  
*The Astrophysical Journal Letters*, Volume 972, Issue 1, id.L18, 8 pp. (2024)
- [12] **Constraining mass-transfer and common-envelope physics with post-supernova companion monitoring**  
Ryosuke Hirai  
*Monthly Notices of the Royal Astronomical Society*, Volume 523, Issue 4, pp.6011-6019 (2023)
- [11] **A two-stage formalism for common-envelope phases of massive stars**  
Ryosuke Hirai, Ilya Mandel  
*The Astrophysical Journal Letters*, Volume 937, Issue 2, id.L42, 7 pp. (2022)
- [10] **Neutron stars colliding with binary companions: formation of hypervelocity stars, pulsar planets, bumpy superluminous supernovae and Thorne-Żytkow objects**  
Ryosuke Hirai, Philipp Podsiadlowski  
*Monthly Notices of the Royal Astronomical Society*, Volume 517, Issue 3, pp.4544-4556 (2022)
- [9] **Conditions for accretion disc formation and observability of wind-accreting X-ray binaries**  
Ryosuke Hirai, Ilya Mandel  
*Publications of the Astronomical Society of Australia*, Volume 38, article id. e056 (2021)
- [8] **Simulating the formation of  $\eta$  Carinae's surrounding nebula through unstable triple evolution and stellar merger-induced eruption**  
Ryosuke Hirai, Philipp Podsiadlowski, Stanley Owocki, Fabian R. N. Schneider, Nathan Smith  
*Monthly Notices of the Royal Astronomical Society*, Volume 503, Issue 3, pp.4276-4296 (2021)

- [7] **Formation pathway for lonely stripped-envelope supernova progenitors: implications for Cassiopeia A**  
Ryosuke Hirai, Toshiki Sato, Philipp Podsiadlowski, Alejandro Vigna-Gómez, Ilya Mandel  
*Monthly Notices of the Royal Astronomical Society*, Volume 499, Issue 1, pp.1154-1171 (2020)
- [6] **Comprehensive study of ejecta-companion interaction for core-collapse supernovae in massive binaries**  
Ryosuke Hirai, Philipp Podsiadlowski, Shoichi Yamada  
*The Astrophysical Journal*, Volume 864, Issue 2, article id. 119, 17 pp. (2018)
- [5] **The Origin of the Possible Massive Black Hole in the Progenitor System of iPTF13bvn**  
Ryosuke Hirai  
*Monthly Notices of the Royal Astronomical Society: Letters*, Volume 469, Issue 1, p.L94-L98 (2017)
- [4] **Formation Scenario of the Progenitor of iPTF13bvn Revisited**  
Ryosuke Hirai  
*Monthly Notices of the Royal Astronomical Society*, Volume 466, Issue 4, p.3775-3783 (2017)
- [3] **Hyperbolic Self-Gravity Solver for Large Scale Hydrodynamical Simulations**  
Ryosuke Hirai, Hiroki Nagakura, Hirotada Okawa, Kotaro Fujisawa  
*Physical Review D*, Volume 93, Issue 8, article id.083006 (2016)
- [2] **Possible Signatures of Ejecta-Companion Interaction in iPTF 13bvn**  
Ryosuke Hirai, Shoichi Yamada  
*The Astrophysical Journal*, Volume 805, Issue 2, article id. 170, 7 pp. (2015)
- [1] **The Outcome of Supernovae in Massive Binaries; Removed Mass, and its Separation Dependence**  
Ryosuke Hirai, Hidetomo Sawai, Shoichi Yamada  
*The Astrophysical Journal*, Volume 792, Issue 1, article id. 66, 15 pp. (2014)

Co-Author

- [31] **Evidence of non-Solar elemental composition in the clocked bursts from SRGA J144459.2–604207**  
 Akira Dohi, Nobuya Nishimura, Ryosuke Hirai, Tomoshi Takeda, Wataru Iwatari, Toru Tamagawa, Amira Aoyama, Teruaki Enoto, Satoko Iwata, Yo Kato, Takao Kitaguchi, Tatehiro Mihara, Naoyuki Ota, Takuya Takahashi, Sota Watanabe, Kaede Yamasaki  
 submitted to PASJL



- [30] **NinjaSat monitoring of Type-I X-ray bursts from the clocked burster SRGA J144459.2–604207**  
Tomoshi Takeda, Toru Tamagawa, Teruaki Enoto, Takao Kitaguchi, Yo Kato, Tatehiro Mihara, Wataru Iwakiri, Masaki Numazawa, Naoyuki Ota, Sota Watanabe, Arata Jujo, Amira Aoyama, Satoko Iwata, Takuya Takahashi, Kaede Yamasaki, Chin-Ping Hu, Hiromitsu Takahashi, Akira Dohi, Nobuya Nishimura, [Ryosuke Hirai](#), Yuto Yoshida, Hiroki Sato, Syoki Hayashi, Yuanhui Zhou, Keisuke Uchiyama, Hirokazu Odaka, Tsubasa Tamba, Kentaro Taniguchi  
submitted to PASJL
- [29] **Constraining the CSM structure and progenitor mass-loss history of interacting supernovae through 3D hydrodynamic modeling: The case of SN 2014C**  
Salvatore Orlando, Emanuele Greco, [Ryosuke Hirai](#), Tomoki Matsuoka, Marco Miceli, Shigehiro Nagataki, Masaomi Ono, Ke-Jung Chen, Dan Milisavljevic, Daniel Patnaude, Fabrizio Bocchino, Nancy Elias-Rosa  
accepted for publication in ApJ
- [28] **Evolution of the Convective Core Mass during the Main Sequence**  
Minori Shikauchi, [Ryosuke Hirai](#), Ilya Mandel  
submitted to ApJ
- [27] **Bumpy Superluminous Supernovae Powered by Magnetar-star Binary Engine**  
Jin-Ping Zhu, Liang-Duan Liu, Yun-Wei Yu, Ilya Mandel, [Ryosuke Hirai](#), Bing Zhang, Aming Chen  
The Astrophysical Journal Letters, Volume 970, Issue 2, id.L42, 10 pp. (2024)
- [26] **Fits for the convective envelope mass in massive stars**  
Lewis Picker, [Ryosuke Hirai](#), Ilya Mandel  
The Astrophysical Journal, Volume 969, Issue 1, id.1, 8 pp. (2024)
- [25] **Expansion of accreting main-sequence stars during rapid mass transfer**  
Mike Y. M. Lau, [Ryosuke Hirai](#), Ilya Mandel, Christopher A. Tout  
The Astrophysical Journal Letters, Volume 966, Issue 1, id.L7, 10 pp. (2024)
- [24] **Dust formation in common envelope binary interactions – II: 3D simulations with self-consistent dust formation**  
Luis C. Bermúdez-Bustamante, Orsola De Marco, Lionel Siess, Daniel J. Price, Miguel González-Bolívar, Mike Y. M. Lau, Chunliang Mu, [Ryosuke Hirai](#), Taïssa Danilovich, Mansi M. Kasliwal  
Monthly Notices of the Royal Astronomical Society, Volume 533, Issue 1, pp.464-481 (2024)
- [23] **Evidence for Evolved Stellar Binary Mergers in Observed B-type Blue Supergiants**  
Athira Menon, Andrea Ercolino, Miguel A. Urbaneja, Daniel J. Lennon, Artemio Herrero, [Ryosuke Hirai](#), Norbert Langer, Abel Schootemeijer, Emmanouil Chatzopoulos, Juhan Frank, Sagiv Shiber  
The Astrophysical Journal Letters, Volume 963, Issue 2, id.L42, 12 pp. (2024)
- [22] **SN 2022jli: a type Ic supernova with periodic modulation of its light curve and an unusually long rise**  
Moore et al. (including [Ryosuke Hirai](#))  
The Astrophysical Journal Letters, Volume 956, Issue 1, id.L31, 13 pp. (2023)

- [21] **The Impact of Angular Momentum Loss on the Outcomes of Binary Mass Transfer**  
Reinhold Willcox, Morgan MacLeod, Ilya Mandel, [Ryosuke Hirai](#)  
*The Astrophysical Journal*, Volume 958, Issue 2, id.138, 12 pp. (2023)
- [20] **Time-independent Simulations of Steady-State Accretion with Nuclear Burning**  
Kaho Tse, Alexander Heger, [Ryosuke Hirai](#), Duncan Galloway  
submitted to ApJ
- [19] **Rapid population synthesis of black-hole high-mass X-ray binaries: implications for binary stellar evolution**  
Isobel M. Romero-Shaw, [Ryosuke Hirai](#), Arash Bahramian, Reinhold Willcox, Ilya Mandel  
*Monthly Notices of the Royal Astronomical Society*, Volume 524, Issue 1, pp.245-259 (2023)
- [18] **The Galactic underworld: The spatial distribution of compact remnants**  
David Sweeney, Peter Tuthill, Sanjib Sharma, [Ryosuke Hirai](#)  
*Monthly Notices of the Royal Astronomical Society*, Volume 516, Issue 4, pp.4971-4979 (2022)
- [17] **Common envelopes in massive stars II: The distinct roles of hydrogen and helium recombination**  
Mike Y. M. Lau, [Ryosuke Hirai](#), Daniel J. Price, Ilya Mandel  
*Monthly Notices of the Royal Astronomical Society*, Volume 516, Issue 4, pp.4669-4678 (2022)
- [16] **Common envelope binary interaction simulations between a thermally-pulsating AGB star and a low mass companion**  
Miguel González-Bolívar, Orsola De Marco, Mike Y. M. Lau, [Ryosuke Hirai](#), Daniel J. Price  
*Monthly Notices of the Royal Astronomical Society*, Volume 517, Issue 3, pp.3181-3199 (2022)
- [15] **An environmental analysis of the Type Ib SN 2019yvr and the possible presence of an inflated binary companion**  
Ning-Chen Sun, Justyn R. Maund, Paul Crowther, [Ryosuke Hirai](#), Amir Kashapov, Ji-Feng Liu, Liang-Duan Liu, Emmanouil Zapartas  
*Monthly Notices of the Royal Astronomical Society*, Volume 510, Issue 3, pp.3701-3715 (2022)
- [14] **Common envelopes in massive stars: The role of radiation pressure and recombination energy in ejecting red supergiant envelopes**  
Mike Lau, [Ryosuke Hirai](#), Miguel González-Bolívar, Daniel J. Price, Orsola De Marco and Ilya Mandel  
*Monthly Notices of the Royal Astronomical Society*, Volume 512, Issue 4, pp.5462-5480 (2022)
- [13] **Rapid stellar and binary population synthesis with COMPAS**  
Team COMPAS: Riley et al. (including [Ryosuke Hirai](#))  
*The Astrophysical Journal Supplement Series*, Volume 258, Issue 2, id.34, 30 pp. (2022)

- [12] **COMPAS: A rapid binary population synthesis suite**  
Team COMPAS: Riley et al. (including [Ryosuke Hirai](#))  
*Journal of Open Source Software*, vol. 7, issue 69, id. 3838 (2022)
- [11] **Stellar Core-Merger-Induced Collapse: new Formation Pathways for Black Holes, Thorne-Żytkow objects, Magnetars and Superluminous Supernovae**  
Iminhaji Ablimit, Philipp Podsiadlowski, [Ryosuke Hirai](#), James Wicker  
*Monthly Notices of the Royal Astronomical Society*, Volume 513, Issue 4, pp.4802-4813 (2022)
- [10] **Supernova explosions in active galactic nuclear discs**  
Evgeni Grishin, Alexey Bobrick, [Ryosuke Hirai](#), Ilya Mandel, Hagai B. Perets  
*Monthly Notices of the Royal Astronomical Society*, Volume 507, Issue 1, pp.156-174 (2021)
- [9] **The observability of inflated companion stars after supernovae in massive binaries**  
Misa Ogata, [Ryosuke Hirai](#), Kotaro Hijikawa  
*Monthly Notices of the Royal Astronomical Society*, Volume 505, Issue 2, pp.2485-2499 (2021)
- [8] **Wind Mass-loss Rates of Stripped Stars Inferred from Cygnus X-1**  
Coenraad J. Neijssel, Serena Vinciguerra, Alejandro Vigna-Gómez, [Ryosuke Hirai](#), James C. A. Miller-Jones, Arash Bahramian, Thomas J. Maccarone, Ilya Mandel  
*The Astrophysical Journal*, Volume 908, Issue 2, id.118, 9 pp. (2021)
- [7] **Neutron Star Extreme Matter Observatory: A kilohertz-band gravitational-wave detector in the global network**  
Ackley et al. (including [Ryosuke Hirai](#))  
*Publications of the Astronomical Society of Australia*, Volume 37, article id. e047 (2020)
- [6] **The sensitivity of presupernova neutrinos to stellar evolution models**  
Chinami Kato, [Ryosuke Hirai](#), Hiroki Nagakura  
*Monthly Notices of the Royal Astronomical Society*, Volume 496, Issue 3, pp.3961-3972 (2020)
- [5] **A Subsolar Metallicity Progenitor for Cassiopeia A, the Remnant of a Type IIb Supernova**  
Toshiki Sato, Takashi Yoshida, Hideyuki Umeda, Shigehiro Nagataki, Masaomi Ono, Keiichi Maeda, [Ryosuke Hirai](#), John P. Hughes, Brian J. Williams, Yoshitomo Maeda  
*The Astrophysical Journal*, Volume 893, Issue 1, id.49, 9 pp. (2020)
- [4] **Origins of Type Ibn SNe 2006jc/2015G in interacting binaries and implications for pre-SN eruptions**  
Ning-Chen Sun, Jusytn R. Maund, [Ryosuke Hirai](#), Paul A. Crowther, Philipp Podsiadlowski  
*Monthly Notices of the Royal Astronomical Society*, Volume 491, Issue 4, p.6000-6019 (2020)
- [3] **Hydrodynamical simulations and similarity relations for eruptive mass loss from massive stars**  
Stanley P. Owocki, [Ryosuke Hirai](#), Philipp Podsiadlowski, Fabian R. N. Schneider  
*Monthly Notices of the Royal Astronomical Society*, Volume 485, Issue 1, p.988-1000 (2019)

- [2] **The W4 method: a new multi-dimensional root-finding scheme for nonlinear systems of equations**

Hirotsada Okawa, Kotaro Fujisawa, Yu Yamamoto, [Ryosuke Hirai](#), Nobutoshi Yasutake, Hiroki Nagakura, Shoichi Yamada

*Applied Numerical Mathematics*, Volume 183, p.157-172 (2023)

- [1] **Formation pathway of Population III coalescing binary black holes through stable mass transfer**

Kohei Inayoshi, [Ryosuke Hirai](#), Tomoya Kinugawa, Kenta Hotokezaka

*Monthly Notices of the Royal Astronomical Society*, Volume 468, Issue 4, p.5020-5032 (2017)

#### Other Articles

- [3] **Roman CCS White Paper: Characterizing the Galactic population of isolated black holes**

C. Y. Lam et al. (including [R. Hirai](#))

arXiv: 2306.12514

- [2] **Science Cases for the Keck Wide-Field Imager**

J. Cooke et al. (including [R. Hirai](#))

arXiv: 2207.11698

- [1] **水素欠乏超新星の親星の起源(The Origin of the Progenitors of Stripped-Envelope Supernovae)**

平井 遼介 (Ryosuke Hirai)

天文月報(*The Astronomical Herald*), Volume 111, Issue 9, p.580-588 (2018)