

Tyrone E. Woods

Citizenship Canadian
Languages English (*fluent*), French (*proficient*)
Research interests Interacting stars, formation of gravitational wave sources, quasars, interstellar medium, supernovae
Publication stats 19 refereed publications (9 first-author, 7 second-author), 356 citations, h-index 11

Research Positions

2018– **Prize Research Fellow**, Institute for Gravitational Wave Astronomy, University of Birmingham Birmingham, GBR
• Independent research fellowship

2015–18 **Research Fellow**, School of Physics and Astronomy, Monash University Melbourne, AUS
• Postdoctoral research fellowship hosted by Prof. Alexander Heger

Education

2011–15 **PhD Physics**, Max Planck Institute for Astrophysics / Ludwig Maximilian University of Munich Garching, DEU
• Primary Supervisor: Prof. Marat Gilfanov
• Thesis: “Emission line diagnostics of the progenitors of type Ia supernovae”
• Honours: Graduated *magna cum laude*

2009–11 **MSc Physics**, University of Alberta Edmonton, CAN
• Supervisor: Prof. Natalia Ivanova
• Thesis: “Selected topics in the evolution of binary stars”
• Societies: Graduate Physics Student Association (*elected student representative 2009–11*)

2005–09 **BSc Honours Astrophysics**, University of Alberta Edmonton, CAN

Awards

Approximate monetary value of prizes, scholarships, grants, and observing time awarded over the past 5 years = **\$489,000**

Selected Prizes, Scholarships, & Grants

2018 **Lorentz Center Workshop Grant** to support “Observational Signatures of SN Ia Progenitors III” Leiden, NLD
2017 **JINA-CEE Workshop Grant** to support “Titans of the Early Universe” East Lansing, USA
2014 **Rudolf Kippenhahn Prize** for best student publication 2013, Max Planck Institute for Astrophysics Garching, DEU
2011 **Profiling Alberta’s Graduate Students Award** to support research travel, University of Alberta Edmonton, CAN
2009 **NSERC USRA** to support a 16-week research term at Athabasca University (*also awarded in '07, '08*) Edmonton, CAN
2008 **Jason Lang Scholarship** for outstanding academic achievement, University of Alberta Edmonton, CAN

Successful Observing Proposals

2018	Australian National University 2.3m Telescope	Co-I	ID: 4180034	5 nights
2017	Australian National University 2.3m Telescope	Co-I	ID: 2170118	5 nights
2017	XMM-Newton	Co-I	ID: 080346	52 ksec
2015	Magellan (Baade) Telescope	Co-I	ID: CN2015B-100	1 night
2013	Gemini (North) Telescope	Co-I	ID: GN-2013B-Q-92	8 hours

Teaching Experience

- 2016–18 **Instructor**, Monash University **In-class**
- “The Interstellar Medium” – 4th-year undergraduate course, developed then taught 2 years in a row 36 hours
 - “Computational Astrophysics: High Energy Unit” – week-long unit of 3rd-year undergraduate course 6 hours
 - “Intro to Scientific Computing: LaTeX” – half-day session of 4th-year undergraduate workshop (x3) 9 hours
- 2009–11 **Teaching Assistant**, University of Alberta
- “Particles & Waves / Fluids, Fields, & Radiation” – lab component of 1st-year undergraduate course 144 hours

Supervisory Experience

- 2017–18 **Adelle Goodwin**¹, Monash University – PhD project on low-mass X-ray binaries
- 2017 **Jake King**, Monash University – 3rd-year undergraduate research project on He II nebulae in M33
- 2016 **Kieran Hirsh**, Monash University – undergraduate summer research project on He II emission nebulae
- currently a PhD student in Astrophysics at University of Lyon
- 2013–15 **Hailiang Chen**², Max Planck Institute for Astrophysics – PhD project on populations of accreting WD binaries
- published 3 first-author journal articles under my co-supervision
 - currently a postdoctoral researcher at Yunnan Astronomical Observatory
- 2011 **David McBean**³, University of Alberta – 4th-year undergraduate research project on X-ray binaries

¹ co-supervisors: D. Galloway, A. Heger | ² co-supervisors: L. Yungelson, M. Gilfanov, Z. Han | ³ co-supervisor: N. Ivanova

Professional Service

- 2015– **Expert Reviewer**
- Invited to referee for several academic journals including *Monthly Notices of the Royal Astronomical Society* (main journal and *Letters*), *Physical Review D*, *The Astrophysical Journal*, *Publications of the Astronomical Society of Australia*, as well as the Czech Science Foundation
- Conference Organizer** (*co-chair*)
- 2018 • “Observational Signatures of Type Ia Supernova Progenitors III” – Leiden, the Netherlands
- 2017 • “Titans of the Early Universe: The Origin of the First Supermassive Black Holes” – Prato, Italy
- 2011 • “Second Annual Symposium for Graduate Physics Research at the University of Alberta” – Edmonton, Canada
- 2016–17 **Seminar Coordinator**, Monash Centre for Astrophysics, Monash University
- Organized the seminar visits of 50 guest lecturers from Australia and abroad

Professional Memberships

- 2010– **Canadian Astronomical Society (CASCA)** 2016– **Astronomical Society of Australia (ASA)**

Outreach Activities

- 2017 **Interviewee**, University of Alberta – Discussed black holes and careers in science for an online astronomy course
- 2016–17 **Guest Expert**, John Monash Science School – Spoke to and helped evaluate 10th grade science students
- 2016 **Public Lecturer**, Monash Centre for Astrophysics – Presented a public-level talk on Tycho’s Supernova
- 2011 **Panellist**, Grandview Heights School – Answered 8th grade students’ questions about space and astronomy

Presentations

16 invited talks, 18 contributed talks, 5 poster presentations at institutes and conferences spanning 11 countries, 4 continents

Selected Invited Talks

11.10.2018	Institute of Cosmology and Gravitation (ICG Portsmouth) Colloquium	Portsmouth, GBR
18.07.2018	University of Melbourne Astrophysics Colloquium	Melbourne, AUS
15.02.2018	Research Institute in Astrophysics and Planetology (IRAP) Seminar	Toulouse, FRA
07.12.2017	Canadian Institute for Theoretical Astrophysics (CITA) Seminar	Toronto, CAN
21.11.2017	Titans of the Early Universe (<i>international conference</i>)	Prato, ITA
13.02.2017	Australian National University (ANU) RSAA Colloquium	Canberra, AUS
14.06.2016	National Observatory of Athens IAASARS Seminar	Athens, GRC
26.01.2015	Max Planck Institute for Astrophysics (MPA) Seminar	Garching, DEU
24.09.2014	Harvard-Smithsonian Center for Astrophysics (CfA) HEAD Lunch Talk	Cambridge, USA
17.07.2014	Quenching and Quiescence (<i>international conference</i>)	Heidelberg, DEU

Press Coverage

28.09.2017	Tycho's supernova challenges theories on what makes stars explode https://iflscience.com/space/tychos-supernova-challenges-theories-on-what-makes-stars-explode/	Stephen Luntz IFLScience
27.09.2017	A famous supernova's mysteries are still unraveling hundreds of years later https://gizmodo.com/a-famous-supernovas-mysteries-are-still-unraveling-hund-1818816208	Ryan F. Mandelbaum Gizmodo
26.09.2017	Progenitor for Tycho's supernova was not hot and luminous https://phys.org/news/2017-09-progenitor-tycho-supernova-hot-luminous.html	Max Planck Society Phys.org
16.06.2017	Maxing out the mass of early stars https://aasnova.org/2017/06/16/maxing-out-the-mass-of-early-stars/	Susanna Kohler AAS Nova

Recent Highlighted Publications *(see Publication List for more)*

Woods, T. E., Agarwal, B., Bromm, V., Bunker, A., Chen, K.-J., Chon, S., ... Yoshida, N. (2018). *Titans of the early Universe: The Prato statement on the origin of the first supermassive black holes*. Manuscript submitted for publication. arXiv:1810.12310

Woods, T. E., Ghavamian, P., Badenes, C., & Gilfanov, M. (2017). No hot and luminous progenitor for Tycho's supernova. *Nature Astronomy*, 1, 800–804. doi:10.1038/s41550-017-0263-5

Woods, T. E., Heger, A., Whalen, D. J., Haemmerlé, L., & Klessen, R. S. (2017). On the maximum mass of accreting primordial supermassive stars. *The Astrophysical Journal Letters*, 842, L6. doi:10.3847/2041-8213/aa7412

References

Marat Gilfanov Professor	Max Planck Institute for Astrophysics Karl-Schwarzschild-Strasse 1, 85748, Garching, Germany	Ph: +49 89 30000 2227 gilfanov [at] mpa-garching.mpg.de
Alexander Heger Professor	Monash Centre for Astrophysics, School of Physics and Astronomy Monash University, Victoria, 3800, Australia	Ph: +61 3 9905 4478 alexander.heger [at] monash.edu
Dan Maoz Director	Wise Observatory Tel Aviv University, 69978, Tel Aviv, Israel	Ph: +972 3 640 8538 maoz [at] astro.tau.ac.il

Publications

19 refereed publications in 6 journals incl. Nat. Astron. | ADS citation count = 356, h-index = 11 | * co-supervised student

Invited Review Articles

1. **Woods, T. E.**, Agarwal, B., Bromm, V., Bunker, A., Chen, K.-J., Chon, S., ... Yoshida, N. (2018). *Titans of the early Universe: The Prato statement on the origin of the first supermassive black holes*. Manuscript submitted for publication. arXiv:1810.12310

Journal Articles

21. Kuuttila, J., Gilfanov, M., Seitenzahl, I. R., **Woods, T. E.**, & Vogt, F. P. A. (2018). *Excluding super-soft X-ray sources as progenitors for four Type Ia supernovae in the Large Magellanic Cloud*. Manuscript submitted for publication.
20. Chen, H.-L., **Woods, T. E.**, Yungelson, L. R., Gilfanov, M., Piersanti, L., & Han, Z. (2018). *Comprehensive models of novae at metallicity $Z = 0.02$ and $Z = 10^{-4}$* . Manuscript submitted for publication.
19. Surace, M., Whalen, D. J., Hartwig, T., Zackrisson, E., Glover, S. C. O., Patrick, S., **Woods, T. E.**, Heger, A., & Haemmerlé, L. (2018). *On the detection of supermassive primordial stars*. Manuscript submitted for publication. arXiv:1811.08911
18. Graur, O., & **Woods, T. E.** (2018). *Progenitor constraints on the Type Ia supernova SN 2014J from Hubble Space Telescope $H\beta$ and [O III] observations*. Manuscript submitted for publication. arXiv:1811.04944
17. **Woods, T. E.**, Ghavamian, P., Badenes, C., & Gilfanov, M. (2018). Balmer-dominated shocks exclude hot progenitors for many Type Ia supernovae. *The Astrophysical Journal*, 863, 120. doi:10.3847/1538-4357/aad1ee
16. Haemmerlé, L., **Woods, T. E.**, Klessen, R. S., Heger, A., & Whalen, D. J. (2018). On the rotation of supermassive stars. *The Astrophysical Journal Letters*, 853, L3. doi:10.3847/2041-8213/aaa462
15. Haemmerlé, L., **Woods, T. E.**, Klessen, R. S., Heger, A., & Whalen, D. J. (2018). The evolution of supermassive Population III stars. *Monthly Notices of the Royal Astronomical Society*, 474, 2757–2773. doi:10.1093/mnras/stx2919
14. **Woods, T. E.**, Ghavamian, P., Badenes, C., & Gilfanov, M. (2017). No hot and luminous progenitor for Tycho's supernova. *Nature Astronomy*, 1, 800–804. doi:10.1038/s41550-017-0263-5
13. **Woods, T. E.**, Heger, A., Whalen, D. J., Haemmerlé, L., & Klessen, R. S. (2017). On the maximum mass of accreting primordial supermassive stars. *The Astrophysical Journal Letters*, 842, L6. doi:10.3847/2041-8213/aa7412
12. Johansson, J., **Woods, T. E.**, Gilfanov, M., Sarzi, M., Chen, Y.-M., & Oh, K. (2016). Diffuse gas in retired galaxies: nebular emission templates and constraints on the sources of ionization. *Monthly Notices of the Royal Astronomical Society*, 461, 4505–4516. doi:10.1093/mnras/stw1668
11. Chen, H.-L.*, **Woods, T. E.**, Yungelson, L. R., Gilfanov, M., & Han, Z. (2016). Modelling nova populations in galaxies. *Monthly Notices of the Royal Astronomical Society*, 458, 2916–2927. doi:10.1093/mnras/stw458
10. **Woods, T. E.**, & Gilfanov, M. (2016). Where are all of the nebulae ionized by supersoft X-ray sources? *Monthly Notices of the Royal Astronomical Society*, 455, 1770–1781. doi:10.1093/mnras/stv2423

9. Chen, H.-L.*, **Woods, T. E.**, Yungelson, L. R., Gilfanov, M., & Han, Z. (2015). Population synthesis of accreting white dwarfs – II. X-ray and UV emission. *Monthly Notices of the Royal Astronomical Society*, 453, 3024–3034. doi:10.1093/mnras/stv1865
8. Chen, H.-L.*, **Woods, T. E.**, Yungelson, L. R., Gilfanov, M., & Han, Z. (2014). Next generation population synthesis of accreting white dwarfs – I. Hybrid calculations using BSE + MESA. *Monthly Notices of the Royal Astronomical Society*, 445, 1912–1923. doi:10.1093/mnras/stu1884
7. Nielsen, M. T. B., Gilfanov, M., Bogdán, Á., **Woods, T. E.**, & Nelemans, G. (2014). Upper limits on the luminosity of the progenitor of Type Ia supernova SN 2014J. *Monthly Notices of the Royal Astronomical Society*, 442, 3400–3406. doi:10.1093/mnras/stu913
6. Johansson, J., **Woods, T. E.**, Gilfanov, M., Sarzi, M., Chen, Y.-M., & Oh, K. (2014). Diffuse gas in galaxies sheds new light on the origin of Type Ia supernovae. *Monthly Notices of the Royal Astronomical Society*, 442, 1079–1089. doi:10.1093/mnras/stu907
5. **Woods, T. E.**, & Gilfanov, M. (2014). Emission-line diagnostics to constrain high-temperature populations in early-type galaxies. *Monthly Notices of the Royal Astronomical Society*, 439, 2351–2363. doi:10.1093/mnras/stu072
4. **Woods, T. E.**, & Gilfanov, M. (2013). He II recombination lines as a test of the nature of SN Ia progenitors in elliptical galaxies. *Monthly Notices of the Royal Astronomical Society*, 432, 1640–1650. doi:10.1093/mnras/stt586
3. **Woods, T. E.**, Ivanova, N., van der Sluys, M. V., & Chaichenets, S. (2012). On the formation of double white dwarfs through stable mass transfer and a common envelope. *The Astrophysical Journal*, 744, 12. doi:10.1088/0004-637X/744/1/12
2. **Woods, T. E.**, & Ivanova, N. (2011). Can we trust models for adiabatic mass loss? *The Astrophysical Journal Letters*, 739, L48. doi:10.1088/2041-8205/739/2/L48
1. Ivanova, N., Chaichenets, S., Fregeau, J., Heinke, C. O., Lombardi, J. C., Jr., & **Woods, T. E.** (2010). Formation of black hole X-ray binaries in globular clusters. *The Astrophysical Journal*, 717, 948–957. doi:10.1088/0004-637X/717/2/948

White Papers

1. in 't Zand, J. J. M., Bozzo, E., Qu, J.-L., Li, X.-D., Amati, L., ... **Woods, T. E.**, ... Zingale, M. (2019). Observatory science with eXTP. *Science China Physics, Mechanics & Astronomy*, 62, 29506. doi:10.1007/s11433-017-9186-1

Refereed Conference Proceedings

1. **Woods, T. E.**, & Gilfanov, M. (2014). UV emission lines in passively evolving galaxies can reveal the progenitors of type Ia supernovae. *Astrophysics and Space Science*, 354, 69–74. doi:10.1007/s10509-014-2070-0