Steffani Grondin

PhD Candidate · Dept. of Astronomy & Astrophysics

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Research Interests

My research combines observations, simulations and machine learning to study binary and star cluster evolution. Currently, I am observing binary systems in open star clusters to better resolve uncertainties in the common envelope phase of evolution. I am also the lead developer of `Corespray`, which is a Python-based software that quickly samples dynamical interactions in globular clusters.

Education

University of Toronto — *Toronto, ON, Canada*
PhD in Astronomy & Astrophysics — *2020-2025*
Advisors: Dr. Maria Drout and Dr. Jeremy Webb
Title: Novel Insights into Stellar and Binary Evolution and Dynamics with Star Clusters

University of British Columbia — *Vancouver, BC, Canada*
HBSc. in Physics & Astronomy (w/ Distinction) — *2015 - 2020*
Advisor: Dr. Harvey Richer
Title: White Dwarf Natal Kicks in Open Star Clusters

Additional Research Positions

University of Toronto (Dunlap Institute for Astronomy & Astrophysics) — *Toronto, ON, Canada*
Research Assistant — *May - Aug. 2019*
Advisor: Dr. Cherry Ng
Project: Comparing Pulse Morphologies of RRATs to FRBs using CHIME Pulsar

University of British Columbia — *Vancouver, BC, Canada*
Research Assistant — *May - Aug. 2018*
Advisor: Dr. Ingrid Stairs
Project: Improving the Systematics of Pulsar Timing Using the Double Pulsar System

Scholarships, Fellowships & Awards

Scholarships/Fellowships

UofT	**NSERC Postgraduate Scholarship - Doctoral (PGS-D)**, $61,000 over two years	*2023-2025*
UofT	**Walter C. Sumner Memorial Fellowship**, $14,050 over two years	*2023-2025*
UofT	**Ontario Graduate Scholarship (OGS)**, $15,000	*2022-2023*
UofT	**Faculty Of Arts And Science Program-Level Fellowship**, $3,000	*2020*
UofT	**Domestic Graduate Entrance Award**, $1,765	*2020*
UofT	**Summer Undergraduate Research Program (SURP) Fellowship**, $9,500	*2019*
UBC	**NSERC Undergraduate Student Research Award (USRA)**, $8,500	*2018*

Academic/Research Awards

UBC	**Top 10 Finalist**, Undergraduate 3 Minute Thesis	*2020*
UofT	**Top Research Poster**, UofT SURP Research Poster Symposium	*2019*
SFU	**Second Place Research Poster**, Physics Summer Research Poster Competition	*2018*
UBC	**Dean's Honour List**, Faculty of Science	*2018*

Peer-Reviewed Publications

First Author (3)

3. **Grondin, S.M.**, Drout, M.R., Muirhead, P., Nordhaus. J., Speagle, J.S. & Chornock, R., "The first catalogue of candidate white dwarf + main sequence binaries in open star clusters: A new window into common envelope evolution", 2024, accepted for publication in *ApJ*.

2. **Grondin, S.M.**, Webb, J.J., Lane, J.M.M., Speagle, J.S. & Leigh, N., "A catalogue of Galactic GEMS: Globular cluster Extra-tidal Mock Stars", 2024, *MNRAS*, 528, 3.

1. **Grondin, S.M.**, Webb, J.J., Leigh, N., Speagle, J.S. & Khalifeh, R., "Searching for the extra-tidal stars of globular clusters with high-dimensional analysis and a core particle-spray code", 2023, *MNRAS*, 518, 3.

Second & Third Author (1)

1. Leigh, N., Ye, C., **Grondin, S.M.**, Fragione, G., Webb, J.J. & Heinke, C., "The dominant mechanism(s) for populating the outskirts of star clusters with neutron star binaries", 2023, accepted for publication in *MNRAS*.

Contributing Author (3)

3. Herrera-Urquieta, A. et al. (12 co-authors including **Grondin, S.M.**), "A systematic method to identify runaways from star clusters produced from single-binary interactions: A case study of M67", submitted to *A&A*.

2. Kramer, M. et al. (29 co-authors including **Grondin, S.M.**), "Strong Field Gravity Tests with the Double Pulsar", 2021, *Physical Review X*, 11, 4.

1. Richer, H.B. et al. (8 co-authors including **Grondin, S.M.**), "Massive White Dwarfs in Young Star Clusters", 2021, *ApJ*, 912, 165.

Observing Programs

Observing Experience

6.5-meter Magellan Telescope [in-person and remote observing] *Las Campanas Observatory*
PIs: Dr. Maria Drout & Dr. Ylva Götberg *2021, 2022, 2023, 2024*
- Spectroscopy of candidate WD+MS post-common envelope binaries in star clusters.

Successful Observing Proposals

Gemini allocated time to date: 58 hours [Principle Investigator]; 14 hours [Co-Investigator]

[PI] Spectroscopy of candidate post-common envelope binaries in star clusters *Gemini-N/S*
Co-Is: Drout, M., Muirhead, P., & Nordhaus, J. (Awarded: 38 hours) *2022A/B, 2023B, 2024A/B*

[PI] A new post-common envelope binary candidate in Alessi 12 *Gemini-N*
Co-Is: Drout, M., Muirhead, P., & Nordhaus, J. (Awarded: 10 hours; Top-Quartile) *May 2023/April 2024 FT*

[PI] A new post-common envelope binary candidate in the Pleiades *Gemini-N*
Co-Is: Drout, M., Muirhead, P., & Nordhaus, J. (Awarded: 10 hours; Top-Quartile) *2024A, Oct. 2023 FT*

[Co-I] Spectroscopy of white dwarfs in Stock 2 and Stock 12 [Co-I] *Gemini-N*
PI: Richer, H. (Awarded: 4 hours) *2020B*

[Co-I] Spectroscopy of very massive white dwarfs in young clusters [Co-I] *Gemini-N/S*
PI: Richer, H. (Awarded: 10 hours) *2020B*

Teaching Experience

I have instructed 2000+ undergraduate students in 14 university classes as a teaching assistant from 2018-2024. From 2021-present, I have acted as **Head Teaching Assistant** for the largest undergraduate university courses in Canada (AST 101/201), designing weekly tutorial curricula for thousands of students each year.

UofT	**AST 201: Stars and Galaxies**, Head Tutorial TA (x3), Graduate TA (x1)	*2021-2024*
UofT	**AST 101: The Sun and Its Neighbours**, Head Tutorial TA (x3), Graduate TA (x4)	*2020-2023*
UBC	**PHYS 109: Enriched Experimental Physics Lab**, Undergraduate TA	*2020*
UBC	**PHYS 101: Energy and Waves Lab**, Undergraduate TA	*2019*
UBC	**PHYS 119: Experimental Physics Lab**, Undergraduate TA	*2018*

Advising Experience

I have co-supervised the following senior undergraduate students with Dr. Joshua Speagle and Dr. Jeremy Webb.

BSc.	**Max Zabrodski**, Project: A rview of multiple stellar populations in globular clusters	*2023-2024*
BSc.	**Rosalind Liang**, Project: Optimizing chemical abundances for extra-tidal star searches	*2022-2023*
BSc.	**Ryan Wang**, Project: Automating a search for extra-tidal stars of globular clusters	*2022-2023*
BSc.	**Eric Connena**, Project: A high-order dimensional analysis of APOGEE DR16 using UMAP	*2021-2022*

Academic Presentations

Conferences and Workshops

Organization & Chairing

Canada	[**Harvey Richer Memorial Session Co-Organizer**] **CASCA 2024**, University of Toronto	*June 2024*
Canada	[**LOC Co-Chair**] **Globular Clusters and Their Tidal Tails**, University of Toronto	*May 2024*

Contributed Talks

Brazil	**IAU Symposium 395: Stellar populations in the Milky Way and beyond**, IAU	*Nov. 2024*
Poland	**MODEST-24 Star Clusters**, Nicolaus Copernicus Astronomical Centre	*Aug. 2024*
Spain	**EuroWD24**, Universitat Politècnica de Catalunya	*July 2024*
Canada	**CASCA 2024**, University of Toronto	*June 2024*
Canada	**Globular Clusters and Their Tidal Tails**, University of Toronto	*May 2024*
Germany	**The Interplay Between Binaries and Star Clusters**, ESO Garching	*Sept. 2023*
USA	**MODEST-23 Star Clusters**, Northwestern University	*Aug. 2023*
USA	**Great Lakes Star Clusters & Streams**, University of Michigan	*Aug. 2023*
[Online]	**Spoken-WERRD Binaries & Transients**, Online Symposium	*Nov. 2022*
Canada	**Star Clusters at McMaster**, McMaster University	*Aug. 2022*
Korea	**IAU General Assembly XXXI (Machine Learning in Astronomy Session)**, IAU	*Aug. 2022*
[Online]	**CASCA 2022**, York University	*May 2022*

Contributed Tutorials

50+ people	**'Machine Learning Techniques for Star Cluster Science'**, ESO Garching	*Sept. 2023*
50+ people	**'Dimensionality Reduction: Applications to Star Clusters'**, University of Michigan	*Aug. 2023*

Departmental Presentations, Seminars and Academic Talks

Invited Talk	**Multi-Star Group Meeting**, University of Amsterdam (API)	*July 2024*
Invited Talk	**Institute Seminar**, Institute of Science and Technology Austria	*July 2024*
Invited Talk	**Joint Galaxies and Cosmology Seminar**, L'Observatoire de Paris [virtual]	*Dec. 2023*
Invited Talk	**Local Galaxy Group Department Meeting**, UofT	*Feb/Nov. 2023*
Invited Talk	**Department Lunch Seminar**, UofT	*Nov. 2022*
Invited Talk	**Statistics and Machine Learning Journal Club**, UofT [virtual]	*Nov. 2021*
Poster	**SURP Poster Symposium**, UofT [Top Poster]	*Aug. 2019*
Poster	**Physics Summer Research Symposium**, Simon Fraser University [Second-Place Poster]	*Aug. 2018*

Selected Service & Outreach

Co-President [Former: Colloquium Dinner Coordinator, Social Committee] *2020-Present*
UofT Graduate Astronomy Student Association (GASA) *UofT*
- Lead and advocate for 50+ UofT astronomy graduate students, overseeing financial, social, and mentorship initiatives.

Education and Public Outreach Committee & Grad Student Representative *2021-2023*
Canadian Astronomical Society (CASCA) *UofT*
- Acted as a liason between the CASCA graduate student committee and the UofT GASA.

Speaker & Volunteer Coordinator *2022-2023*
UofT AstroTours *UofT*

Volunteer & Roaming Astronomer *2023*
Astronomy on Tap T.O. *UofT*

Secretary *2019-2020*
UBC Physics Society *UBC*

Co-President *2017-2018*
UBC Astronomy Club *UBC*

Science Communication

Science Writer *Jan. – Oct. 2021*
Up and Atom YouTube Channel *YouTube*
- Created popular-science video scripts that explain astronomy concepts for a YouTube channel with 350K+ subscribers.

Science Communications Assistant *Sept. - Dec. 2018*
TRIUMF (Canada's particle accelerator centre) *Vancouver, BC*
- Synthesized complex science into engaging communications pieces (e.g. web articles, public tours and social media).

STEM Instructor *May - Sept. 2017*
UBC Geering Up Engineering Outreach *Vancouver, BC*
- Educated 1000 K-12 aged children across British Columbia about STEM in both a classroom and summer camp environment.

Media Experience

Article	**Relativity results measured for first time as astronomers observe pulsars**, UBC PHAS	*Dec. 2021*
Interview	**Introduction to UBC PHAS**, UBC PHAS	*Aug. 2020*
Article	**A cosmic game of hide and seek**, UBC Science	*Jan. 2020*
Profile	**How Stephen Hawking changed the life of this UBC astronomy student**, CBC News	*March 2018*
Interview	**Stephen Hawking Inspired the Next Generation: Daily Planet**, Discovery Canada	*March 2018*
Interview	**CBC News Vancouver at Six (Interview about Dr. Stephen Hawking)**, CBC News	*March 2018*
Interview	**Eclipse inspires large crowds at Vancouver Art Gallery and UBC campus**, The Ubyssey	*Aug. 2017*
Article	**Don't expect the universe to wipe your post-MATH 100 tears**, The Ubyssey	*Oct. 2017*