Alicia M. Savelli | Curriculum Vitae

D.A.D. Dept. of Astronomy & Astrophysics, University of Toronto, 50 St. George St., Toronto, ON M5S 3H4

alicia.savelli@utoronto.ca aliciasavelli.github.io aliciamariesavelli

I am a fifth-year PhD candidate in the Department of Astronomy & Astrophysics at the University of Toronto and at the Canadian Institute for Theoretical Astrophysics. Primarily, I model radiative relativistic magnetic reconnection in environments such as black hole coronae by developing analytic subgrid models in magnetohydrodynamics that recover kinetic physics, thus bridging particle-in-cell and MHD scales. More generally, my research interests lie in theoretical astrophysics, particularly in plasma astrophysics, computational astrophysics, relativity, and galaxy evolution. I come from a unique background as a secondary maths and physics teacher, and science education remains central to my work – I therefore prioritize outreach, teacher training, and student supervision alongside my research.

Education

PhD	**University of Toronto** Astronomy & Astrophysics *Thesis: Modelling Multiwavelength Emission from Active Galactic Nuclei* *Advisors: Profs. Bart Ripperda & Norman Murray*	2022 – Aug 2027 (expected)
BSc	**Brock University** Physics (Honours) *Thesis: Exploring the Possibility of Faster-than-Light Travel in Our Universe* *Advisor: Prof. Barak Shoshany*	2020 – 2022
BEd	**Brock University** Education (Professional degree)	2014 – 2019
BSc	**Brock University** Mathematics (Honours), minor in Physics	2014 – 2019

Publications

★ *supervised student*

Refereed (1)

[1] **Savelli, A. M.**, Speagle, J. S., Mackereth, J. T., Murray, N., Iyer, K. G. 2025, *SF-R You Sure? The Conflicting Role of Star Formation Rates in Constraining the Evolution of Milky Way Analogs in Cosmological Simulations*, ApJ, 984, 195

Submitted (3)

[2] **Savelli, A. M.**, Grošelj, D., Ripperda, B., Levinson, A., Philippov, A., Murray, N. 2026, *Making Reconnection Cooler: A relativistic resistive magnetohydrodynamics model for radiative collisionless reconnection*, ApJL, subm. arXiv:2611.28035

[3] **Savelli, A. M.**, Kustec, M. A.★, Speagle, J. S., Iyer, K. G., Ahmed, E.★, Peng, Z.★, Murray, N., Kuang, C.★ 2026, *Untangling Similarities and Differences in Star Formation Histories Across Cosmological Simulations*, ApJ, subm. arXiv:2610.17359

[4] **Savelli, A. M.** 2026, *Warp Drives in 5 Dimensions*, GRG, subm.

Grants, Fellowships & Awards

Grants & Fellowships

NSERC PGS-D, $120,000 total	2024 – 2027
Walter C. Sumner Memorial Fellowship, $13,400 total	2024, 2025
NSERC CGS-M, $17,500	2023
Mary and Ron Martin Graduate Fellowship in Astrophysics, $5,000	2023
Queen Elizabeth II/Walter John Helm Graduate Scholarships in Science & Technology, $15,000	2022
David A. Dunlap Department of Astronomy & Astrophysics Entrance Scholarship, $5,000	2022
Summer Undergraduate Research Program (SURP) Fellowship, $9,690	2022
Summer Undergraduate Research Program (SURP) Fellowship, $9,595	2021

Awards & Honours

SURP Poster Contest – Runner Up, Dunlap Institute	2021
Dean's Honour List, Brock University	2015 – 2018
Brock Scholars Award, Brock University, $8,000 total	2014 – 2017
Eric Ford Scholarship, Top Hat Marching Orchestra, $1,000	2014

Talks & Presentations

Invited Talks & Seminars

Making Reconnection Cooler: Modelling bright emission around black holes — **Online**
SCEECS Seminars — Nov 2026

Making Reconnection Cooler: Modelling bright emission around black holes — **University of Toronto**
TASTY Lunch Talks — Sep 2026

Magnetic reconnection around black holes: powering bright multiwavelength emission — **KU Leuven**
Plasma Astrophysics Seminars — Jul 2026

Magnetic reconnection around black holes: powering bright multiwavelength emission — **McGill**
TSI Seminar — Feb 2026

Recovering kinetic radiative reconnection in MHD: analytics — **CITA**
CITA Blackboard Talks — Jul 2025

SF-R you sure? The Conflicting Role of SFR in Constraining the Evolution of Milky Way Analogues in Cosmological Simulations — **University of Toronto**
TASTY Lunch Talks — Nov 2023

Analogues of the Milky Way in Cosmological Simulations — **Online**
SDSS MWAG Telecon — Nov 2021

Contributed Talks

Making Reconnection Cooler: Modelling bright emission around black holes — **Princeton**
SCEECS Workshop on Accretion Disk "Coronae" — Oct 2026

Recovering Kinetic Relativistic Radiative Reconnection with Inverse Compton Cooling in Magnetohydrodynamics — **KITP, UCSB**
Frontiers of Relativistic Plasma Physics in Astrophysics and Laboratory Experiments — Aug 2025

Characterizing Milky Way Analogues in Cosmological Simulations — **Penticton, BC**
CASCA 2023 — Jun 2023

Characterizing Milky Way Analogues in Cosmological Simulations — **Wollongong, Australia**
Linking the Galactic and Extragalactic — Dec 2022

Characterizing Milky Way Analogues in Cosmological Simulations — **Salt Lake City, UT**
AAS 239$^{\text{th}}$ Meeting [cancelled] — Jan 2022

Analogues of the Milky Way in Cosmological Simulations — **JHU (online)**
SDSS-V 2021 Collaboration Meeting, lightning talk & poster — Aug 2021

Posters

Modelling Radiative Reconnection in Magnetohydrodynamics with Effective Resistivity — **Purdue**
Workshop on Relativistic Plasma Astrophysics — May 2026

Modelling Radiative Reconnection in Magnetohydrodynamics with Effective Resistivity — **Flatiron Institute**
SCEECS Annual Meeting — Feb 2026

Modelling Radiative Reconnection in MHD and PIC — **WashU**
SCEECS Extreme Plasmas in the Universe Summer School — Jun 2024

Characterizing Milky Way Analogues in Cosmological Simulations — **Waterloo (online)**
CASCA 2022 — May 2022

Selected Informal Talks & Group Meetings

Making Reconnection Cooler: A relativistic resistive MHD model for radiative collisionless reconnection, *Astro-Coffee*, IAS — Oct 2026

Making Reconnection Cooler: Modelling bright emission around black holes, *Sironi Group*, Columbia — Sep 2026

Making Reconnection Cooler, *Nalewajko Group*, CAMK — Jul 2026

Recovering kinetic radiative reconnection in MHD: analytics, *Most Group*, Caltech — Aug 2025

Recovering kinetic radiative reconnection in MHD, *Bacchini Group*, KU Leuven — Apr 2025

SF-R you sure? The Conflicting Role of SFR in Constraining the Evolution of Milky Way Analogues in Cosmological Simulations, *RandoAstro (Murray) Group*, CITA — Mar 2024

SF-R you sure? …, *PlasmaAstro (Ripperda) Group*, CITA — Feb 2024

Characterizing Milky Way Analogues in Cosmological Simulations, *Hernquist Group*, Harvard — Aug 2023

Characterizing Milky Way Analogues in Cosmological Simulations, *Astrostatistics Research Team (Speagle & Eadie)*, U of T — Nov 2022
Exploring the Possibility of Faster-than-Light Travel in Our Universe, *Bovy Group*, U of T — Nov 2021
Exploring the Possibility of Faster-than-Light Travel in Our Universe, *Causality (Shoshany) Group*, Brock — Jun 2021

Other Research Experience

CO Emission in FIRE-2 — **University of Toronto**
PhD mini-project, advisor: Prof. Norman Murray — May – Aug 2023
Quantified CO in giant molecular clouds in FIRE-2 simulations as a tracer for H_2

Constraining Theories of Modified Gravity Using Milky Way Dynamics — **University of Toronto**
PhD mini-project, advisor: Prof. Jo Bovy — Sep 2022 – Apr 2023
Implemented modified potentials in galpy to test new MOND models against Milky Way constraints

Characterizing Analogues of the Milky Way in Cosmological Simulations — **University of Toronto**
SURP & Research Assistant, advisors: Dr. J. Ted Mackereth & Prof. Joshua S. Speagle — May 2021 – Aug 2022
Identified Milky Way-like galaxies in simulations to study their properties and histories; led to [1]

Supervision, Mentorship & Service

Student Supervision (6)

Synchrotron Cooling in Magnetohydrodynamics — **University of Toronto**
Maëlle Magnan, AST425 undergraduate thesis; co-supervised with Prof. Bart Ripperda — Sep 2025 – Apr 2026

Present-Day Properties of Milky Way Analogues in Cosmological Simulations — **University of Toronto**
Cissy Kuang, Research Opportunities Program; co-supervised with Prof. J. S. Speagle — Summer 2024

Understanding Galaxy Assembly Using Simulations and Machine Learning — **University of Toronto**
Zehao Peng, Research Opportunities Program; co-supervised with Prof. J. S. Speagle — Summer 2024

Understanding Galaxy Evolution Using Cosmological Simulations — **University of Toronto**
Matthew A. Kustec, AST425 undergraduate thesis; co-supervised with Prof. J. S. Speagle — Sep 2023 – Apr 2025

Star Formation Histories in Cosmological Simulations — **University of Toronto**
Eshal Ahmed, SURP; co-supervised with Prof. J. S. Speagle — Summer 2023

Exploring the Definition of Milky Way "Analogues" in Cosmological Simulations — **University of Toronto**
Ishika Bangari, AST430 mini research course; co-supervised with Prof. J. S. Speagle — Winter 2023

Mentorship & Service

Summer Undergraduate Research Program (SURP) Committee, graduate student member — **University of Toronto**
Organized the full program and linked it with CITA's SURF: adjudicated scholarships, scheduled and hosted the talk series, and designed the final poster & presentation session and awards ceremony — 2025, 2026

Panelist, SURP professional development panels — **University of Toronto**
Grad school applications & grad student life (2025, 2026); careers beyond academia (2026) — Summer 2025, 2026

Panelist, Career Panel — **University of Toronto**
Training & Mentoring Committee — Dec 2025

Graduate Mentorship Program — **University of Toronto**
2 students mentored — 2025 – Present

Undergraduate Mentorship Program — **University of Toronto**
3 students mentored — 2022 – 2026

Teaching Experience

Teaching Assistant, University of Toronto

AST424 *Introduction to Astrophysical Research* (course development; sole TA) — Fall 2025
CTA200 *Computational Astrophysics* (sole TA) — Spring 2025, 2026
AST320 *Introduction to Astrophysics* (head TA) — Winter 2024 – 2026
AST221 *Stars and Planets* — Fall 2024
AST201 *Stars and Galaxies* — Winter 2023
AST101 *The Sun and Its Neighbours* — Fall 2022, 2023

Guest Lectures

SURP *Black Holes 101*, lecture for the Summer Undergraduate Research Program cohort — Summer 2025, 2026
AST320 *Introduction to Astrophysics*, short research guest lecture — Apr 2025, 2026

Classroom Teaching

Secondary Maths Teacher — **London, UK**
Wembley High Technology College — Sep 2019 – Jul 2020
Physics Secondary Student Teacher, B.Ed. practicum — **Stoney Creek, ON**
St. John Henry Newman Catholic Secondary School (HWCDSB) — Mar – May 2019
Maths Secondary Student Teacher, B.Ed. practicum — **Hamilton, ON**
Cathedral High School (HWCDSB) — Nov – Dec 2018
Primary Student Teacher, Levelled Literacy Intervention, B.Ed. practicum — **Thorold, ON**
Prince of Wales South Public School (NDSB) — Oct 2015 – Mar 2016

Tutoring & Assessment

Teacher — **ON**
Oxford Learning Centres Inc. — May 2017 – Jun 2022
Private Tutor — **ON**
Independent — 2014 – 2025
Scorer, provincial standardized assessments — **Etobicoke, ON**
Education Quality and Accountability Office (EQAO) — Jul 2019

Outreach

Leadership & Program Roles

Education Specialist (part-time, paid), *Discover the Universe* — May 2023 – Present
Develop teacher resources and training; deliver webinars and workshops; run national contests
Co-director, *AstroTours*, Dunlap Institute — Oct 2023 – Oct 2024
Led the executive team running monthly public events (∼200–300 guests)
Curriculum Lead, Organizer & Presenter, *Coding the Cosmos*, Dunlap Institute — Aug 2023 – Aug 2024
Designed a curriculum-aligned astronomy & coding summer camp
Keynote Director, *AstroTours*, Dunlap Institute — Oct 2022 – Oct 2023
Organized the 2023 Keynote with Dr. Katie Mack and evening activities (>400 guests)
Curriculum Advisor, *Age of the Universe*, Dunlap Institute — 2022 – 2023
Project Mentor, *Adventures in Science*, University of Toronto — Oct 2022 – May 2023
Co-led a team of high school students researching a chosen science concept
Project Leader, *Scientifically Yours*, Brock University — May 2022
Designed and co-led Relatively Yours, an intro to special relativity for high school students

Public & School Talks

Black Holes Explained: A User's Guide – What we know, how we know it, and what we're still trying to figure out, *Sip & Scholar*, Toronto — Oct 2026
The Science of *Project Hail Mary*, *Discover the Universe* webinar (organizer & presenter) — Oct 2026
All About Black Holes, *classroom visit* (contest prize), St. Joseph's College School — Jun 2026
BH FAQ, *Voyagers student visit* (organizer & presenter), CITA — Apr 2026
BH FAQ, *Astrophysics Club*, Marc Garneau Collegiate Institute (TDSB) — Dec 2025
How Can We See Black Holes?, *Astro on Tap*, Toronto — Nov 2025
Black Holes and Their Environments, *AstroTours*, Dunlap Institute — Sep 2025
Ask Me Your Astro Questions, *classroom guest speaker*, Nelson High School (HDSB) — Jun 2022

Teacher Training & Workshops

Science Teachers' Association of Ontario (STAO) Conference, presenter — Nov 2026
Teaching the Universe Workshop, organizer, presenter & host, Discover the Universe — May 2025, Apr 2026
Astronomy in Any Classroom!, organizer & presenter, Discover the Universe — Nov 2025
AST Provincial Conference, presenter, Halifax, NS — Oct 2025
Eclipse 101 & 201 Workshop Series, presenter, Discover the Universe — Sep 2023 – Apr 2024
Reached thousands of participants: in person in Ontario & New Brunswick; online across Canada

Events & Volunteering

Emcee, *The Restless Universe* Symposium, U of T Astronomy & Space Exploration Assoc. — Mar 2026
Judge, *Bay Area Science and Engineering Fair (BASEF)*, Hamilton — Mar 2019, 2025, 2026
Volunteer, *Open Air Astro Fair*, Dunlap Institute, York University — Jun 2025
Emcee, *Cosmic Whispers* Symposium, U of T Astronomy & Space Exploration Assoc. — Mar 2025
Volunteer, *Girls in STEM Workshop*, Dunlap Institute — Nov 2022

Workshops, Schools & Professional Development

Scientific Workshops & Schools

SCEECS Workshop on Accretion Disk "Coronae", Princeton University — Oct 2026
Workshop on Relativistic Plasma Astrophysics, Purdue University — May 2026
SCEECS Annual Meeting, Flatiron Institute — Feb 2026
Relativistic Plasma Physics: From the Lab to the Cosmos, KITP — Aug – Sep 2025
SCEECS Extreme Plasmas in the Universe Summer School, Washington University — Jun 2024
Michigan Cosmology Summer School, University of Michigan (online) — Jun 2023
SURP Astro 101 Lecture Series, University of Toronto — Summer 2021
Introduction to Computational Astrophysics, University of Toronto — May 2021

Professional Development

4 Seasons of Indigenous Learning, Season 1 (certified 2026), Season 2 (in progress) — 2025 – Present
Discover the Universe Retreat Workshop, Kingston, ON — Sep 2026
SURP Professional Development Series, University of Toronto — Summer 2021
safeTALK Mental Health Training (certified), Brock University — Mar 2018

Other Relevant Work Experience

Data Analyst — **Hamilton, ON**
ArcelorMittal Dofasco — Summer 2018

Skills

Programming languages: Fortran, Python, VisualBasic, Physica/Extrema
Codes: BHAC, Tristan-MP, H-AMR
Software: LaTeX, Mathematica, Maple
HPC: Canada (SciNet/Trillium), Belgium (Hortense)
Spoken Languages: English (native), French (working proficiency)

Professional Memberships

Simons Collaboration on Extreme Electrodynamics of Compact Sources (SCEECS) — 2026 – Present
Affiliated Scientist
Ontario College of Teachers (OCT) — 2019 – 2025
Member ID: 698209

Media Appearances

Creativity in Black Hole Research, *blog post interview* — Aug 2026
Science careers & life after high school, *student-run podcast interview*, New Brunswick — Feb 2024
Discover the Universe is growing!, *blog post* — Jul 2023
SURP Project Showcase, *poster*, *research summary* — Aug 2021
SURP Student Spotlight, *Student of the Week interview* — Aug 2021
A university mathematics department's adoption of constructionist math courses, *MICA Project interview* — Jul 2021

Extracurricular Activities

Toronto Concert Band, 3rd Clarinet — 2025 – Present
Burlington Concert Band, 1st Clarinet — 2018 – 2019

Brock University Wind Ensemble, 2nd Clarinet 2014 – 2018