Alicia M. Savelli | Curriculum Vitae

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I am a first year graduate student at the University of Toronto in the department of Astronomy & Astrophysics. I come from a unique background as a secondary math and physics teacher before I became an undergraduate research assistant. I am extremely passionate about astronomy, physics, mathematics, research, and teaching, and have significant experience and skills to support me in a career in science. I am interested in the fields of cosmology, galaxy formation and evolution, and relativity.

Education

University of Toronto
PhD Astronomy & Astrophysics *2022 – 2027*

Brock University
B.Sc. Physics (Honours) *2020 – 2022*

- 93% average in upper year courses (4.0 GPA on 4 point scale)
- 90% cumulative average (4.0 GPA on 4 point scale)
- Top 15% of faculty every year
- Completed as a second degree (10.0 credits transferred from B.Sc. in Mathematics + 10.0 new credits in 2 years)

Brock University
B.Sc. Mathematics (Honours), minor in Physics *2014 – 2019*

- 93% average in upper year courses (4.0 GPA on 4 point scale)
- 88% cumulative average (4.0 GPA on 4 point scale)
- Top 15% of faculty every year

Brock University
B.Ed. *2014 – 2019*

- Intermediate/Senior qualifications
- Straight P1s (As)
- 94% cumulative average (4.0 GPA on 4 point scale)

Research Experience

PhD Mini Projects

Constraining theories of Modified Gravity with Milky Way Dynamics
Supervisor: Prof. Jo Bovy *September 2022 – April 2023*

- Applying constraints from Milky Way observables to existing MOND models
- Implementing modified potentials in galpy to make predictions for new MOND models
- Analyzing the results in comparison with pure CDM models
- Written proposal and final report with various opportunities to present to peers and faculty

Undergraduate Thesis

Exploring the Possibility of Faster-than-Light Travel in Our Universe **Brock University**
Supervisor: Prof. Barak Shoshany *October 2020 – February 2022*

- Used General Relativity and Mathematica to investigate the possibility of faster-than-light travel
- Extended the Alcubierre Warp Drive metric to 5 spacetime dimensions to successfully minimize the energy requirements to travel faster-than-light
- Proposal, midterm, and final presentations to faculty and interested public along with written thesis submission

– Received additional credit for quality and quantity of research

Research Projects

Characterizing Analogues of the Milky Way in Cosmological Simulations **University of Toronto**
Supervisors: Dr. Ted Mackereth & Prof. Josh Speagle *Summer 2021, Winter & Summer 2022*

– Used Python and data from the EAGLE suite of cosmological simulations and IllustrisTNG to identify and analyze Milky Way Analogues
– Determined a "Milky Way-ness" parameter to assign a metric of similarity to each galaxy
– Studied various properties of the Milky Way analogues both at present-day and throughout their formation histories in order to investigate the uniqueness of the MW and its simulated analogues
– Midterm and final presentations, academic poster, and research summary delivered to faculty and interested public (for both summer terms)
– Attended multiple research group meetings and participated in department events at the University of Toronto

Publications

SF-R you sure? The Conflicting Role of SFR in Constraining the Evolution of Milky Way Analogues in Cosmological Simulations
Alicia Savelli, Joshua S. Speagle & J. Ted Mackereth *In prep.*

Warp drives in 5 dimensions
Alicia Savelli & Barak Shoshany *In prep.*

Scholarships, Awards & Honours

Queen Elizabeth II/Walter John Helm Graduate Scholarships in Science & Technology
University of Toronto, Department of Astronomy & Astrophysics, $15,000 *2022 – 2023*

David A. Dunlap Department of Astronomy & Astrophysics Entrance Scholarship
University of Toronto, Department of Astronomy & Astrophysics, $10,000 *2022, 2023*

– $5,000/year for first 2 years in Direct-Entry PhD program

Summer Undergraduate Research Program (SURP) Fellowship
Dunlap Institute for Astronomy & Astrophysics, $9,690 *2022*

Summer Undergraduate Research Program (SURP) Fellowship
Canadian Institute for Theoretical Astrophysics; Dunlap Institute for Astronomy & Astrophysics, $9,595 *2021*

SURP Student Spotlight
Canadian Institute for Theoretical Astrophysics; Dunlap Institute for Astronomy & Astrophysics *2021*

SURP Poster Contest – Runner Up
Canadian Institute for Theoretical Astrophysics; Dunlap Institute for Astronomy & Astrophysics *2021*

Dean's Honour List
Brock University *2015, 2016, 2017, 2018*

– Awarded to students with an 80% average or greater each academic year
– Received every year of B.Sc. (Math) degree
– Additional distinction of top 15% of the faculty

Brock Scholars Award
Brock University, $8,000 *2014, 2015, 2016, 2017*

– Entrance scholarship for incoming averages of 90% or greater
– $2,000/year for a maximum of 4 years, renewed if average is maintained at 80% or greater

Ontario Scholar
Halton Catholic District School Board *2014*
- Distinction for graduating students with an average of 79.5% or greater in top six grade 12 courses

Eric Ford Scholarship
Top Hat Marching Orchestra, $1,000 *2014*
- Scholarship awarded to support music instruction or further studies in the field of music

French Second Language Award
Halton Catholic District School Board, $50 *2014*
- Awarded to graduating student with the highest mark in a grade 12 French course

Conference Talks

Linking the Galactic and Extragalactic **Wollongong, Australia**
Characterizing Milky Way Analogues in Cosmological Simulations, Contributed Talk *December 2022*

AAS 239th Meeting [Cancelled] **Salt Lake City, UT**
Analogues of the Milky Way in Cosmological Simulations, Contributed Talk *January 2022*

SDSS-V 2021 Collaboration Meeting **Johns Hopkins University/Online**
Analogues of the Milky Way in Cosmological Simulations, Lightning Talk *August 2021*

Conference Posters

CASCA 2022 **University of Waterloo/Online**
Characterizing Milky Way Analogues in Cosmological Simulations *May 2022*

SDSS-V 2021 Collaboration Meeting **Johns Hopkins University/Online**
Analogues of the Milky Way in Cosmological Simulations *August 2021*

Teaching Experience

Teaching Assistant

University of Toronto **Toronto, ON**
AST201 *January 2023 – April 20223*
- Co-led weekly tutorials
- Participated in TA training and weekly TA meetings
- Supervised and assisted students with observing projects
- Invigilation

University of Toronto **Toronto, ON**
AST101 *September 2022 – December 2022*
- Co-led weekly tutorials
- Participated in TA training and weekly TA meetings
- Supervised and assisted students with observing projects
- Invigilation

Secondary Teacher

Wembley High Technology College **London, UK**
Secondary Maths Teacher *September 2019 – July 2020*
- Taught five maths classes from the GCSE Foundation and Higher curricula to Key Stage 3 and Key stage 4 learners at various levels of academic achievement
- Developed and delivered engaging and differentiated lessons, managed classroom behaviour, regularly assigned and marked homework
- Year 9 form tutor

– Volunteered to participate in and organize extra curricular activities such as a tutoring club, a puzzles club, a maths news letter, and UKMT national maths challenges

St. John Henry Newman Catholic Secondary School (HWCDSB) **Stoney Creek, ON**
Physics Student Teacher *March – May 2019*

– B.Ed. Practicum
– Taught one SPH3U grade 11 universy level physics class and two SPH4U grade 12 university level physics classes
– Entirely responsible for creating notes and lessons that delivered the curriculum, and developing and marking tests, quizzes, assignments, and lab experiments/reports
– Volunteered with the school's concert band and lunchtime and after-school tutoring/homework clubs

Cathedral High School (HWCDSB) **Hamilton, ON**
Math Student Teacher *November – December 2018*

– B.Ed. Practicum
– Taught one MPM1D grade 9 academic level math class and one MCR3U grade 11 university level math class
– Entirely responsible for creating notes and lessons that delivered the curriculum, and developing and marking tests, quizzes, and assignments
– Volunteered with the after-school homework club

Primary Teacher

Prince of Wales South Public School (NDSB) **Thorold, ON**
Student Teacher *October 2015 – March 2016*

– B.Ed. Practicum
– Delivered Levelled Literacy Intevervention (LLI) program
– Helped students of all ages advance their reading levels in small groups of three to four students

Professional Primary, Secondary, & Post-Secondary Tutor

Oxford Learning Centres Inc. **Burlington & Stoney Creek, ON**
Teacher *May 2017 – June 2022*

– Tutored in groups of one to three high school students, and occasionally students at the college or primary levels
– Specialized in intermediate and senior level math, calculus, data management, and physics, but also tutored students in chemistry, general science, English, French, and more

Private Tutor
Independent Private Tutor *2014 – Present*

– One-on-one private tutoring in all levels and categories of secondary math and science and first-year math and physics

Other

Education Quality and Accountability Office (EQAO) **Etobicoke, ON**
Scorer *July 2019*

– Scored academic- and applied-level grade 9 math EQAO tests

Brock University Mathematics Department **St. Catharines, ON**
Exam Proctor *2015-2016*

– Proctored first-year math midterms and final exams

Other Relevant Work Experience

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

– Developed and enhanced queries and data reports to improve company efficiency, wrote macros to supplement reports
– Enhanced technical skills with Visual Basic, SQL, MS Excel, and MS Access

Outreach Experience

Adventures in Science — **University of Toronto**
Project Mentor — *October 2022 – May 2023*

– Guided a group of high school students in developing a science project they will present to a group of elementary or middle school students
– Monthly meetings which consisted of one hour of science presentations directed at all students participating, and one hour of guided project development with my smaller group of mentees and co-mentor

Girls in STEM Workshop — **University of Toronto**
Project Mentor — *November 2022*

– Assisted with gravitational lensing workshop presented to middle school girls interested in science
– Assisted with telescope tour

Scientifically Yours — **Brock University**
Project Leader — *May 2022*

– Designed and co-led *Relatively Yours* workshop – an introduction to Special Relativity and spacetime diagrams for high school students
– Led scavenger hunt

Bay Area Science and Engineering Fair (BASEF) — **Hamilton, ON**
Judge — *March 2019*

– Interviewed students and scored projects

Mentorship Experience

Undergraduate Mentorship Program — **University of Toronto**
Mentor — *October 2022 – April 2023*

– Regular meetings with an upper-year undergraduate mentee
– Offered advice and guidance regarding circumstances including but not limited to final years of undergrad, transitioning out of undergrad, and applications to graduate school

Selected Workshops, Training, & Professional Development

Introduction to Python — **University of Toronto**
Student — *May 2021*

– 2-week intensive introductory course to coding and data analysis with Python
– Covered topics such as advanced plotting, statistical analysis, and machine learning

SURP Astro 101 Lecture Series — **University of Toronto**
Summer Research Student — *Summer 2021*

– Summer series of weekly introductory astronomy lectures
– Topics covered included planets & exoplanets, galaxy formation & evolution, instrumentation, statistics, cosmology, and black holes

SURP Professional Development Series — **University of Toronto**
Summer Research Student — *Summer 2021*

– Summer series of weekly professional development workshops and seminars
– Topics covered included careers in astronomy, grad school applications and experiences, and presenting research

Shutdown STEM — **University of Toronto**
Attendee — *July 2021*

– Day-long workshop within the Astronomy & Astrophysics department pertaining to action against racism with a special focus on Indigenous peoples
– Workshop included presentations, discussions, and activities such as researching and letter-writing

SAFETALK Mental Health Training — **Brock University**
Attendee — *March 2018*

– Training in speaking to young people about their mental health and the best ways to be available and offer

support
  - Awarded certificate

Relevant Coursework

- **Astronomy:** Introduction to Astronomy, Planetary Science, Radiation Processes & Gas Dynamics
- **Physics:** Classical Mechanics, Electromagnetism, Quantum Mechanics, Statstical Mechanics & Thermal Physcis, Optics, Special & General Relativity, Experimental Physics, High Energy Physics
- **Mathematics:** Calculus, Vector Calculus, Differential Equations, Linear Algebra, Statistics, Mathematical Physics, Differential Geometry
- **Computer Programming:** Mathematics Integrated with Computers and Applications (3 part course taken over 3 years), Introduction to Scientific Computing
- **Education:** Mathematics, Physics, Diversity, Special Education

Technical & Personal Skills

- **Programming Languages:** Python, Visual Basic, SQL, Physica, Extrema
- **Software:** Maple, Mathematica, LaTeX, Git
- **Operating Systems:** Windows, Linux
- **Professional Skills:** Teaching, writing, presenting
- **Personal Skills:** Enthusiasm, curiosity, organization, communication, time management, leadership, collaboration, perseverance, diligence

Professional Memberships

Ontario College of Teachers (OCT)
Member ID: 698209 *2019 – Present*

Extracurricular Activities

Burlington Concert Band **Burlington, ON**
1^{st} *Clarinet* *2018-2019*

Brock University Winds Ensemble **St. Catharines, ON**
2^{nd} *Clarinet* *2014-2018*

Brock Intramural Sports **Brock University**
Soccer, Softball, Volleyball *2016-2018*

Media Appearances

SURP Project Showcase
Poster, *Research Summary* *2021*

SURP Student Spotlight
Student of the Week interview *2021*

A university mathematics department's adoption of constructionist math courses
MICA Project interview *2017*