Samantha Berek

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EDUCATION

University of Toronto   2020 – present
PhD candidate in Astronomy and Astrophysics

Yale University   2016 – 2020
B.S. in Astrophysics and Anthropology, *cum laude*

RESEARCH POSITIONS

Graduate Researcher | University of Toronto   2021 – present
- Advisors: Gwendolyn Eadie and Joshua Speagle
- *Thesis*: Understanding Globular Cluster Populations and Their Host Galaxy Properties with Statistical Models

First-year Graduate Researcher | University of Toronto   2021
- Advisor: Abigail Crites
- *Project*: Mechanical Work on the Tomographic Ionized-Carbon Mapping Experiment (TIME)

First-year Graduate Researcher | University of Toronto   2020 – 2021
- Advisor: Gwendolyn Eadie
- *Project*: Bayesian Methods of Estimating the Mass Profile and Phase-Space Coordinates of Giant Elliptical NGC 1407

Undergraduate Researcher | Yale University   2019 – 2020
- Advisor: Marla Geha
- *Project*: The SAGA Survey: Improving Targeting Efficiency with Narrow-Band Color Selection

Research Experience for Undergraduates (REU) Summer Researcher | University of Notre Dame   2019
- Advisor: Christopher Howk and Nicolas Lehner
- *Project*: Project AMIGA: Circumgalactic Gas about Andromeda and its Dwarf Satellites

PUBLICATIONS

1. **Berek, S.** et. al. *Should zeros count? Modeling the galaxy-globular cluster scaling relation with(out) zero-inflated count models*, 2024, ApJ

2. **Berek, S.** , Reina-Campos, M., et. al. *Galactic properties that favour star cluster formation: a statistical view*, 2023, MNRAS

3. **Berek, S.** et al. *The HERBAL model: A hierarchical errors-in-variables Bayesian lognormal hurdle model for galactic globular cluster populations*, 2023, ApJ

4. Sasserville, G., Hlavacek-Larrondo, J., **Berek, S.** , et. al. *A novel approach to understanding the link between supermassive black holes and host galaxies*, 2024, ApJ [submitted, in review]

5. Lehner, N., **Berek, S.,** Howk, J.C., et. al. *Project AMIGA: The Circumgalactic Medium of Andromeda.*, 2020, ApJ

6. Booth, S.L., **Berek, S.,** Green, B., et. al. *Measuring and Learning from Success and Innovation in Early Stage Technology Development: A Case Study of NASA's Center Innovation Fund.* 2018. AIAA SPACE and Astronautics Forum and Expedition

Invited seminar/journal club talks

Rubin Observatory Star Clusters Science Working Group   2024
- The HERBAL model: a hierarchical Bayesian hurdle model for the galaxy mass — globular cluster system mass scaling relation

Toronto AstrophysicS Talks, Y'all (TASTY) *(University of Toronto)*   2023
- The HERBAL model: a hierarchical hurdle model for the galaxy stellar mass — globular cluster system mass scaling relation

Great Lakes Clusters and Streams Conference Workshop *(University of Michigan, Ann Arbor, MI)*   2023
- Zero-inflated and hurdle models in astronomy

Department of Statistical Sciences Brown Bag Seminar *(University of Toronto)*   2023
- The HERBAL model: A hierarchical errors-in-variables Bayesian lognormal hurdle model for galaxies and their globular cluster populations

The Local Galaxy Group *(University of Toronto)*   2022
- An errors-in-variables hurdle model for the relation between galaxy and globular cluster system masses

Senior Thesis Talk Series *(Yale University)*   2020
- The SAGA Project: Narrow Band Color Cuts to Increase Efficiency

REU Symposium *(University of Notre Dame)*   2019
- Project AMIGA: Circumgalactic Gas about Andromeda and its Dwarf Satellites

Conference Talks

Globular Clusters and their Tidal Tails: from the Milky Way to the Local Group *(Toronto, ON)*   2024
- Should zeros count? Modeling the galaxy-GC scaling relation with(out) zero-inflated count models

Astrostatistics in Canada and Beyond *(Banff, AB)*   2023
- The HERBAL model: A hierarchical errors-in-variables Bayesian lognormal hurdle model for the galaxy mass – globular cluster system mass scaling relation

Great Lakes Clusters and Streams *(University of Michigan, Ann Arbor, MI)*   2023
- Galactic properties that favour star cluster formation: a statistical view

A multi-wavelength view on globular clusters near and far: from JWST to the ELT *(Sexten, Italy)*   2023
- The HERBAL model: A hierarchical errors-in-variables hurdle model for galaxies and their globular cluster populations

McMaster Clusters workshop *(McMaster University, Hamilton, ON)*   2022
- An errors-in-variables hurdle model for the relation between galaxy and globular cluster system masses

Posters

Canadian Astronomical Society AGO *(Toronto, ON)*   2024
- Should zeros count? Modeling the galaxy-globular cluster scaling relation with(out) zero-inflated count models

Joint Statistical Meetings *(Toronto, ON)*   2023
- The HERBAL model: A hierarchical errors-in-variables Bayesian lognormal hurdle model for galactic globular cluster populations

235th Meeting of the American Astronomical Society *(Honolulu, HI)*   2020
- Project AMIGA: Identifying the Circumgalactic Gas Associated with Andromeda and its Dwarf Satellites

Conference for Undergraduate Women in Physics *(Yale University)*   2020
- Project AMIGA: Identifying the Circumgalactic Gas Associated with Andromeda and its Dwarf Satellites

Awards

Data Sciences Institute Doctoral Student Fellowship, *25,000 CAD / year, up to 3 years*	2024 – present
Astrostatistics Student Paper Competition, *finalist*	2024
Connaught International Scholarship for Doctoral Students, *10,000 CAD / year, 5 years*	2020 – present
School of Graduate Studies Conference Grant, *900 CAD*	2023
Frank S. Hogg Memorial Fellowship, *5,000 CAD*	2021 – 2022
Beckwith Prize in Astronomy, *333 USD*	2020
Michele Dufault Scholarship for Women in Science	2018-2019
Brooke Owens Fellow	Class of 2018
Samuel Hodgkinson Scholarship	2016-2018

Supervision

Michelle Denny, University of Toronto (*undergraduate*)	2024
Rufat Ismayilov, University of Toronto (*undergraduate*)	2023
Grisha Kit, University of Toronto (*undergraduate*)	2023
Shu Yan (Alice) Wang, University of Toronto (*undergraduate*)	2023
Gabriel Sasseville, University of Montreal (*undergraduate/masters*)	2022 – present

Teaching Experience

Course Instructor, AST 199, University of Toronto　　　　　　　　　　　　　　2024
- Winter 2024, Astronomy at the Frontier (first-year seminar for non-majors)
- Developed syllabus and course content from scratch, including assignments, lectures, and class activities.
- Taught class, led office hours, and handled communication with students.
- Managed a teaching assistant for the course.

Teaching Assistant, AST 198, University of Toronto　　　　　　　　　　　　　　2023
- Fall 2023, Great Astronomical Issues (first-year seminar for non-majors)
- Assisted with teaching during class and led help sessions.
- Helped with course administration, managing online course materials, and discussion board and email moderation.
- Graded assignments and class projects.

Guest Lecture, AST 199, University of Toronto　　　　　　　　　　　　　　2023
- Fall 2023, Astronomy at the Frontier (first-year seminar for non-majors)
- Gave a one hour long guest lecture about dark matter and dark energy to a class of 24 students.
- Facilitated an article discussion activity after the lecture.

Teaching Assistant, AST 101/201 series, University of Toronto　　　　　　　　2020 – 2023
- Fall 2022, Fall 2021: AST101, The Sun and its Neighbors.
- Summer 2023, Winter 2023, Winter 2022, Winter 2021: AST201, Stars and Galaxies.
- Taught multiple tutorial sections per semester of 30-40 students each.
- Ran telescope observing sessions for course projects.
- Held help sessions and review sessions, and monitered discussion boards to answer student questions.
- Graded class projects, midterms, and final exams.

Leadership

Astrostatistics Interest Group of the American Statistical Association, *Secretary and Website Director*	2023-2024
Graduate Astronomy Student Association (GASA), *Co-President*	2022-2023
Graduate Astronomy Student Association (GASA), *Secretary*	2021-2022
UofT Department of Astronomy Training and Mentoring Committee, *Member*	2020-2022
UofT Graduate Student - Postdoc Mentorship Program, *Graduate Student Chair*	2021-2022
UofT GASA Graduate Student Peer Mentorship Program, *Chair*	2020-2021
Graduate Student Course Committee, *Member*	2020-2021
Astronomy Climate and Diversity Committee, *Member*	2019-2020
Ask a Brookie Mentor Program, *Co-Founder; Statistics and Data Lead*	2018-2019