Nathaniel Starkman

Postdoctoral Associate
Brinson Prize Fellow
@ MIT Kavli

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Publications arXiv Zenodo 0000-0003-3954-3291

Education

2018 – 2024 **PhD in Astronomy & Astrophysics**, University of Toronto — Toronto, ON, Canada
NSERC CGS-D Fellow 2020–2023. NSERC CGS-M Fellow 2019–2020.
Thesis: Charting Stellar Streams of the Milky Way
Supervisors: Jo Bovy, Jeremy Webb

2014 – 2018 **B.S. in Mathematical Physics and Astronomy**, Case Western Reserve University — Cleveland, OH, USA
Summa Cum Laude.
Supervisors: Stacy McGaugh
GPA 4.0.

Professional Appointments

2024 – 2027 **Postdoctoral Associate**, MIT Kavli Institute for Astrophysics and Space Research — Cambridge, MA, USA
Brinson Prize Fellowship (2024–2027).

2021 – **Coordinator (2025 – 2028), Strategic Planner (2025 – 2026) & Core Developer**, Astropy — Remote
Coordination Committee (executive committee), 2025–2028.
Strategic Planning and Organizing Committee, 2025–2026.
Member, Core Developer Team; lead maintainer for Cosmology, co-maintainer of Units.
Funding: Astropy Cycle III — Cosmology and Quantity 2.0.
Team awards: 2025 AAS Lancelot M. Berkeley–New York Community Trust Prize, the 2023 IOP Publishing Top Cited Paper Award and the 2022 ADASS Prize for an Outstanding Contribution to Astronomical Software.

May 2017 **SOURCE Participant**, Case Western Reserve University — Cleveland, OH, USA
Mentor: Stacy McGaugh (CWRU Astronomy).
Role: summer research position.
Funding: Support of Undergraduate Research and Creative Endeavors (SOURCE).
Project: an algorithm for maximal disc decompositions of galactic rotation curves, applied to the SPARC database to extract lower bounds on the dark matter content of the sample galaxies. Published in Starkman et al. 2018.

Jun 2016 **NSF-REU Participant**, Cornell Laboratory for Accelerator-based Sciences and Education (CLASSE) — Ithaca, NY, USA
Mentor: Ira Wasserman (Cornell Astronomy).
Role: summer research position at CLASSE.
Funding: NSF Research Experiences for Undergraduates.
Project: whether monopolar neutron-star magnetospheres can produce coherent curvature radiation. Coherent radiation near the light-cylinder boundary is a candidate source of FRB-like signals.

May 2015 **Summer Researcher**, Case Western Reserve University — Cleveland, OH, USA
Advisor: John Ruhl (CWRU Physics).
Funding: federal grants awarded to Prof. Ruhl.
Project: Markov Chain Monte Carlo programs predicting how well South Pole Telescope detectors can distinguish B-modes from noise.

Grants & Fellowships

Oct 2026 **Pacific Postdoc Program at the University of Washington**, Dark Universe Science Center, University of Washington; Simons Institute

A one-month fellowship at the Dark Universe Science Center at the University of Washington in Seattle, funded by the Dark Universe Science Center and the Simons Institute.

Feb 2024 **Brinson Prize Fellowship** — USD 360,000
"to support early-career astrophysicists and cosmologists who are committed to chasing bold ideas with creative, nimble, and innovative research."

Feb 2024 **NSERC PDF** — declined
Postdoctoral Fellowships program (Natural Sciences and Engineering Research Council of Canada). Declined

Jul 2022 **Astropy Cycle III Funding Grant** — USD 12,000
USD 12,000 NASA ROSES and Moore Foundation funding to Astropy Lead: "Cosmology in Astropy"

Jul 2022 **Astropy Cycle III Funding Grants** — USD 8,000
USD 8,000 NASA ROSES and Moore Foundation funding to Astropy Lead: "Quantity 2.0: unitful calculations beyond NumPy"

2020 – 2023 **NSERC - CGS D** — CAD 105,000
Alexander Graham Bell Canada Graduate Scholarship-Doctoral Award (Natural Sciences and Engineering Research Council of Canada)

2019 – 2020 **NSERC - CGS M** — CAD 17,500
Canada Graduate Scholarships (Natural Sciences and Engineering Research Council of Canada)

2018 – 2024 **University of Toronto Graduate Fellowship**, University of Toronto — CAD 23,000–32,000 p.a.

Awards

Jan 2025 **AAS Lancelot M. Berkeley–New York Community Trust Prize**, American Astronomical Society, *to the Astropy Collaboration*
Team award, as a core developer and Coordination Committee member of Astropy.

Nov 2023 **IOP Publishing Top Cited Paper Award, North America**, IOP Publishing
to the Astropy Collaboration
Team award, as an author of the v5.0 paper: top 1% most-cited in Astronomy and Astrophysics.

May 2022 **Jackman Massey Bursary**

May 2022 **OSOTF HUDD Award at Massey**, Massey College
Ontario Student Opportunity Trust Fund

2022 **ADASS Prize for an Outstanding Contribution to Astronomical Software**, Astronomical Data Analysis Software and Systems
to the Astropy Project
Team award, as a core developer of Astropy.

Sep 2018 **Graduate Admissions Award**
UofT Faculty of Arts & Science

May 2018 **Donald A. Glaser Award**
To an outstanding Mathematics and Physics Senior

May 2018 **John Schoff Millis Award**
To the senior with the best academic record in the College of Arts and Sciences

May 2018 **Summa Cum Laude**

Apr 2017 **Outstanding Junior Award of Arts and Sciences**

Apr 2017 **The Albert A. Michelson Prize**
"To a [3rd year] physics major who has demonstrated superior performance"

Mar 2017 **Goldwater Scholarship Honorable Mention**
"For exceptional promise of becoming this nation's next generation of research leaders"

Apr 2016 **Phi Beta Kappa Academic Award**

Mar 2016 **Goldwater Scholarship Honorable Mention**

2014 – 2018 **Dean's High Honor List**
To the students with the best academic record. Awarded semesterly

2014 – 2018 **Case Western Reserve University Merit Scholarship**

Publications

Students I supervised or advised: undergraduate†, graduate‡.

21. **N. Starkman**, A. Price-Whelan. *Coordinax: an extended framework for coordinates and differential geometry in JAX.* IN-PREP

20. **N. Starkman**. *Spatial Correlations in Extragalactic Stellar Stream Convexities: Distinguishing CDM, SIDM, and MOND.* IN-PREP

19. **N. Starkman**. *Directly Model the Stream: A State-Space Model for Gravitational Potentials from Stellar Streams.* IN-PREP

18. **N. Starkman**, J. Nibauer, S. Pearson, S. Wu‡, L. Necib. *When Streams Curve Away: a Test of Dark Matter from Extragalactic Stellar Stream Populations.* SUBMITTED arXiv:2609.40057

17. Euclid Collaboration, **N. Starkman**, J. Nibauer, S. Pearson, S. Wu‡, M. Walmsley, L. Necib, et al. *Euclid Quick Data Release (Q1): The geometry of dark matter halos from extragalactic streams.* Astronomy & Astrophysics SUBMITTED ADS arXiv:2606.21774

16. C. Myers†, **N. Starkman**, L. Necib. *Reconstructing Galactic Gravitational Potentials from Stellar Kinematics with Physics-Informed Neural Networks.* Monthly Notices of the Royal Astronomical Society SUBMITTED ADS arXiv:2606.18386

15. L. Necib, D. Folsom, E. Y. Davies, **N. Starkman**, A. Thoyas. *Galactic Amnesia: The Information Washout of the Milky Way Merger History.* SUBMITTED ADS arXiv:2605.04138

14. **N. Starkman**, J. Nibauer. *phasecurvefit: A High-Performance JAX Framework for Phase-Space Walks with Pluggable Metrics and Strategies.* Journal of Open Source Software SUBMITTED pyOpenSci review

13. S. Wu‡, **N. Starkman**, S. Pearson, J. Nibauer, J. Miro-Carretero, D. Martinez-Delgado. *Potamides: Mapping Dark Matter Halo Shapes from Stellar Stream Tracks in the Local Universe.* The Astrophysical Journal ACCEPTED ADS arXiv:2605.07809

12. S. Wu‡, **N. Starkman**, J. Nibauer, S. Pearson. *Potamides: JAX tools for curvature-based inference from stellar streams.* Journal of Open Source Software 11, 10712 10.21105/joss.10712

11. C. Myers†, **N. Starkman**, L. Necib. *Physics-Informed Neural Networks for Modeling Galactic Gravitational Potentials.* Advances in Neural Information Processing Systems (NeurIPS 2025) OpenReview

10. J. Nibauer, A. Bonaca, D. N. Spergel, A. M. Price-Whelan, J. E. Greene, **N. Starkman**, et al. *Stream-Sculptor: Hamiltonian Perturbation Theory for Stellar Streams in Flexible Potentials with Differentiable Simulations.* The Astrophysical Journal 983, 68 10.3847/1538-4357/adb8e8 ADS arXiv:2410.21174

9. **N. Starkman**, A. M. Price-Whelan, J. Nibauer. *unxt: A Python package for unit-aware computing with JAX.* Journal of Open Source Software 10, 7771 10.21105/joss.07771

8. **N. Starkman**, J. Nibauer, J. Bovy, J. Webb, K. Tavangar, A. Price-Whelan, et al. *Stream Members Only: Data-Driven Characterization of Stellar Streams with Mixture Density Networks.* The Astrophysical Journal 980, 253 10.3847/1538-4357/ad94f2 ADS arXiv:2311.16960

7. **N. Starkman**, G. Starkman, A. Kosowsky. *Angular Correlations of Cosmic Microwave Background Spectrum Distortions from Photon Diffusion.* Monthly Notices of the Royal Astronomical Society 529, 2274 10.1093/mnras/stae665 arXiv:2310.01578

6. **N. Starkman**, J. Bovy, J. Webb, D. Calvetti, E. Somersalo. *On the fast track: Rapid construction of stellar stream paths.* Monthly Notices of the Royal Astronomical Society 522, 5022 10.1093/mnras/stad1166 arXiv:2212.00949

5. The Astropy Collaboration, A. M. Price-Whelan, P. L. Lim, N. Earl, **N. Starkman**, L. Bradley, D. L. Shupe, et al. *The Astropy Project: Sustaining and Growing a Community-oriented Open-source Project and the Latest Major Release (v5.0) of the Core Package.* The Astrophysical Journal 935, 167 ADS arXiv:2206.14220

4. **N. Starkman**, J. S. Sidhu, H. Winch, G. Starkman. *Straight Lightning as a Signature of Macroscopic Dark Matter.* Physical Review D 103, 063024 10.1103/PhysRevD.103.063024 arXiv:2006.16272

3. **N. Starkman**, J. Bovy, J. Webb. *An extended Pal 5 stream in Gaia DR2*. Monthly Notices of the Royal Astronomical Society 10.1093/mnras/staa534 arXiv:1909.03048

2. P. Li, F. Lelli, S. S. McGaugh, **N. Starkman**, J. M. Schombert. *A constant characteristic volume density of dark matter haloes from SPARC rotation curve fits*. Monthly Notices of the Royal Astronomical Society 10.1093/mnras/sty2968 arXiv:1811.00553

1. **N. Starkman**, F. Lelli, S. S. McGaugh, J. Schombert. *A new algorithm to quantify maximum discs in galaxies*. Monthly Notices of the Royal Astronomical Society 480, 2292 10.1093/mnras/sty2011 ADS arXiv:1802.09967

Software Development

preamble
A LaTeX preamble worth reusing

galactoPINNs 2026
Physics-informed neural networks for galactic potentials

diffraxtra
Extras for Diffrax

spexial
scipy.special in JAX

dataclassish
dataclasses, for everything

zeroth
Efficiently get the index-0 element of any iterable

plum
Multiple dispatch in Python

unxt 2025
Units in JAX

trackstream 2023
Stellar stream tracks

jaxmore
There's more to JAX

oncequinox
Singletons for Equinox

quax-blocks
Building blocks for quax classes

plotting_backends
Dispatch over plotting backends

galactic_dynamics_interoperability
Interoperability between galactic dynamics libraries

optional_dependencies
Construct checks for optional dependencies

coordinax
Coordinates in JAX

quax
Multiple dispatch in JAX

macro_lightning 2020
Constrain macroscopic dark matter with lightning

phasecurvefit 2026
Paths through phase space

potamides 2026
Constrain gravitational potentials from stellar stream curvature

mvgkde
Multivariate Gaussian KDE

is_annotated
Check whether a type hint is Annotated

immutablemap
An immutable mapping, JAX-compatible

galax
Galactic dynamics in JAX

quaxed
Pre-quaxed libraries

cosmology.api
A standard interface for cosmology libraries

Astropy 2022
Astronomy in Python

Invited Talks

Aug 2026	**Marche III: Big Bang, Big Stars, Big Computers (Jesi)** Energy Structures of Extragalactic Stellar Streams Reveal Dark Matter Halos	Jesi, Italy
Jun 2026	**EAS 26-S10 (Lausanne)** The Geometry of Dark Matter Halos from Extragalactic Streams	Lausanne, Switzerland
Feb 2026	**CWRU Seminar (Cleveland)** Computationally Unscrambling EGGS (Extra-Galactic Gravity from Streams)	Cleveland, OH, USA
Nov 2025	**TevPA (Valencia)** The Geometry of Dark Matter Halos from Extragalactic Streams	Valencia, Spain
Oct 2025	**DARK seminar (Copenhagen)** The Geometry of Dark Matter Halos from Extragalactic Streams	Copenhagen, Denmark
Oct 2025	**Texas A&M Seminar (Texas)** The Geometry of Dark Matter Halos from Extragalactic Streams	College Station, TX, USA
Sep 2025	**CCA Software seminar (NYC)** unxt, coordinax, and software development in JAX	New York, NY, USA
Sep 2025	**Princeton Thunch Seminar (Princeton)** Euclid: The Geometry of Dark Matter Halos from Extragalactic Streams	Princeton, NJ, USA
Mar 2025	**DARK seminar (Copenhagen)** Bayesian models for detecting streams in LSST data	Copenhagen, Denmark

Oct 2024	**CWRU Seminar** 🔗 Stream Members Only: Data-Driven Characterization of Stellar Streams for Inference on the Galactic Potential	Cleveland, OH, USA
Jan 2023	**CITA Seminar** Astropy Cosmology: the Present and the Expanding Future	Toronto, ON, Canada
Mar 2022	**Oxford Physics Colloquium** Straight Lightning as a Signature of Macroscopic Dark Matter (Invited Colloquium Talk)	Online
Aug 2020	**Johns Hopkins University Physics Journal Club** Straight Lightning as a Signature of Macroscopic Dark Matter	Online
Aug 2017	**Origins Cruise to the British Isles, Iceland and Norway (Talk)** 🔗 The Life and Death of the Universe: An Overview Lecture on Cosmology	Reykjavik, Iceland

Presentations

Aug 2026	**New Frontiers in Cosmology (Talk)** Energy Structures of Extragalactic Stellar Streams Reveal Dark Matter Halos	A Coruña, Spain
Jul 2026	**Near Field Cosmology in the Era of Big Data (Talk)** 🔗 Energy Structures of Extragalactic Stellar Streams Reveal Dark Matter Halos	Toronto, ON, Canada
Jun 2026	**DARK Seminar (Talk)** Energy Structures of Extragalactic Stellar Streams Reveal Dark Matter Halos	Copenhagen, Denmark
Jan 2026	**York Seminar (Talk)** Euclid: The Geometry of Dark Matter Halos from Extragalactic Streams	Toronto, ON, Canada
Nov 2025	**TeVPA (Talk)** 🔗 Euclid: The Geometry of Dark Matter Halos from Extragalactic Streams	Valencia, Spain
Oct 2025	**IAUS 403 (Talk)** 🔗 Euclid: The Geometry of Dark Matter Halos from Extragalactic Streams	Córdoba, Spain
Sep 2025	**Cosmology 2025 (Talk)** 🔗 Euclid: The Geometry of Dark Matter Halos from Extragalactic Streams	Portoferraio, Italy
Sep 2025	**MKI Journal Club (Talk)** Euclid: The Geometry of Dark Matter Halos from Extragalactic Streams	Cambridge, MA, USA
May 2025	**DDA #56** 🔗 Extra-Galactic Gravity using Streams (EGGS) from Euclid's Zoo(niverse)	Atlanta, GA, USA
May 2025	**Euclid LU-SWG (Talk)** Extra-Galactic Gravity using Streams (EGGS) from Euclid's Zoo(niverse)	Lausanne, Switzerland
Aug 2024	**ASA: Astrostatistics Interest Group Paper Competition** 🔗 Stream Members Only: Data-Driven Characterization of Stellar Streams	not attended
Aug 2024	**Streams 24: The theory edition (Talk)** 🔗 From JAX to Galax, a new generation of stellar stream tools Using ML to select stellar stream members	Durham, UK
May 2024	**Division on Dynamical Astronomy #55 (Talk)** 🔗 Stream Members Only: Data-Driven Characterization of Stellar Streams	Toronto, ON, Canada
May 2024	**Globular Clusters and Their Tidal Tails (Talk)** 🔗 Stream Members Only: Data-Driven Characterization of Stellar Streams	Toronto, ON, Canada
Oct 2023	**DESC sprint week**	Pittsburgh, PA, USA
May 2023	**Astropy Conference (Talk)** An Interoperable Future with Astropy	Cambridge, MA, USA
Mar 2023	**IAUS379: Dynamical Masses of Local Group Galaxies (Poster)** 🔗 🔗 Stellar Stream Track Reconstruction, with Errors	Potsdam, Germany
Jan 2023	**AAS 2023 (Talk)** Astropy Tutorials on Units & Constants	Seattle, WA, USA

Oct 2022	**CATS-2022** 🔗 Streams22: A workshop for assembling a Community Atlas of Tidal Streams	Pasadena, CA, USA
Jun 2021	**AAS 2021 (Talk)** Astropy Tutorials on Units & Constants, Coordinates, and Cosmology	Online
May 2021	**CASCA AGM (Poster)** Straight Lightning as a Signature of Macroscopic Dark Matter	Online
May 2021	**CASCA AGM (Poster)** Stellar Stream Track Reconstruction, with Errors	Online
May 2021	**Stellar Stats Workshop (Talk)** Stellar Stream Track Reconstruction, with Errors	Toronto, ON, Canada
Aug 2020	**STScI 2020 The Local Group: Assembly and Evolution Symposium (Poster)** Constraints on Milky Way Halo Triaxiality from Palomar 5	Online
Jul 2020	**Kaplan cosmology course (Talk)** Paid lecturer in Kaplan Cosmology course at Case Western Reserve University	Cleveland, OH, USA
Dec 2019	**30th Texas Symposium On Relativistic Astrophysics (Talk)** Resolving the Recombination Visibility Function Width Tension Awarded best graduate student presentation	Portsmouth, UK
Sep 2019	**5th Gaia Challenge Conference (Talk)** Using Manifold Learning Techniques to Identify Stream Progenitors	Paris, France
Sep 2019	**5th Gaia Challenge Conference (Talk)** Extending the Pal5 Stream Detection Limits	Paris, France
Aug 2019	**Great Lakes Cosmology Workshop (Talk)** Parameterizing the recombination visibility function	Rochester, NY, USA
May 2018	**CWRU SOURCE Intersections (Poster)** A new algorithm to quantify maximal disks	Cleveland, OH, USA
Oct 2017	**CWRU Physics Seminar (Talk)** Understanding the Dark Matter distribution in galaxies using maximal disks	Cleveland, OH, USA
Aug 2017	**CWRU Astronomy Summer Seminar (Talk)** Understanding the Dark Matter distribution in galaxies using maximal disks	Cleveland, OH, USA
Jun 2017	**Dwarf Galaxies on the Shoulders of Giants** Workshop on topics related to dwarf galaxies and the dark matter problem Conference Volunteer	Cleveland, OH, USA
Aug 2016	**Cornell CLASSE Summer Seminar (Talk)** Coherent curvature radiation in a neutron star's monopolar magnetic field	Ithaca, NY, USA

Conferences

Sep 2026	**Astropy 2026 Conference** Role: Coordination Committee and Strategic Planning Committee; moderated online discussion and helped moderate the AI sessions.	Online
Aug 2026	**Astrophysics and Space Science in Marche III: Big Bang, Big Stars, Big Computers** Role: SOC	Jesi, Italy
Jan 2026	**Gaia Hackathon** 🔗 Role: LOC	Cambridge, MA, USA
Jun 2025	**Astropy Coordination Meeting** 🔗 Role: SOC	Santa Cruz, CA, USA
May 2025	**Division of Dynamical Astronomy #56** 🔗 🔗 Role: SOC	Atlanta, GA, USA
Jan 2025	**Gaia Hackathon** 🔗 Role: LOC	Cambridge, MA, USA
Oct 2024	**JAXtronomy Workshop** 🔗 Role: SOC	New York, NY, USA
Jun 2024	**Astropy Core Developer Conference**	Santa Cruz, CA, USA

May 2024 **From JAX to Galax** Toronto, ON, Canada
Workshop at Globular Clusters and Their Tidal Tails

Feb 2023 **The Future of Astrophysical Data Infrastructure** Online

Mar 2022 **Astropy Core Developer Conference (Talk)** Boston, MA, USA
The future of interoperability with Python's Protocols Role: Core developer, maintainer for Astropy Cosmology and Units

Jul 2021 **ComSciCon GTA 2021** Online
Role: Organizing Committee member for the Toronto ComSciCon – a workshop series for graduate students on science communication skills

Jul 2020 **ComSciCon GTA 2020** Online
Role: Organizing Committee member for Toronto's first ComSciCon

Apr 2020 **Massey Telescope Public Talk Series** Toronto, ON, Canada
Role: Co-host and gave talk on Ojibwe (First Nation) constellations

Oct 2019 **.Astronomy 11** Toronto, ON, Canada
Role: Local Organizing Committee member and lead workshop on scientific plotting

Jul 2019 **ComSciCon Canada 2019** Hamilton, ON, Canada
Selected participant at Canada's first national science communication workshop for graduate students

Jun 2018 **The Standard Model at 50 Years** Cleveland, OH, USA
A Celebratory Symposium for the Standard Model Conference Volunteer

Mentoring

May 2026 **Reem Hamraz Google Summer of Code for Astropy**
Hardening Astropy's core stability

2025 – 2026 **Amir Abdul (Howard)**
Baryon Modeling in External Galaxies with Stellar Streams
Leadership Alliance National Symposium, July 23–25, 2025
2025 NSBP-NSHP Joint Annual Conference, November 19–23, 2025
2026 APS Global Physics Summit, March 14–20, 2026

2025 – 2026 **Taisiia Karasova (MIT) with Prof. Lina Necib (MIT)**
Machine Learning Galaxy intrinsic sizes

2024 – 2026 **Charlotte Myers (MIT) with Prof. Lina Necib (MIT)**
Physics-Informed Neural Networks for Modeling Galactic Gravitational Potentials
NeurIPS Paper

2023 – 2025 **Connor McKeigan (Astronomy, UofT) with Prof. Ting Li (UofT)**
Undergraduate thesis project: "Characterizing the stellar streams of S5"

2019 – 2022 **Massey Tutoring Program**
Volunteer math and physics tutor to prospective first-generation college students
2019, 2020 and 2022.

Teaching

2019 – 2020 **Lead Observer: AST101-325**, University of Toronto
Role: Trained and liaised with TAs and students in all courses using the campus telescope facilities.

2019 – 2024 **TA, AST 201: Stars and Galaxies**, University of Toronto
Role: Designed and ran weekly course tutorial sections, created exam questions, proctored exams, and graded course projects.
2019, 2021–2024.

2018 – 2023 **TA, AST 101: The Sun and its Neighbours**, University of Toronto
Role: Designed and ran weekly course tutorial sections, planetarium shows, & observing nights; created exam questions, proctored exams, and graded course projects.
2018, 2021–2023.

Aug 2015 **Grader: Honors Mechanics**, CWRU
Graded assignments and exams

2014 – 2015 **Physics Instructor for IB Physics**, Montessori High School, Cleveland
Prepared and tutored IB physics class, assigning and grading homework, for IB exam

Peer Review

- Journals — Astronomy & Astrophysics · The Astrophysical Journal · European Physical Journal C · Monthly Notices of the Royal Astronomical Society · Journal of Open Source Software (commensurability: a Python package for classifying astronomical orbits based on their toroid volume)
- Panels — National Science Foundation project funding panel

Professional Service

2022 – 2023 **Massey House Committee**
Junior Fellow governance committee at Massey college.

2019 – **Massey Junior Fellow**, Massey College
University of Toronto's graduate college for those showing exceptional promise and engagement within academia and the world beyond it.

2019 – **MasseyScope Committee Member**, Massey College
Organizing astronomy outreach with a focus on underprivileged communities

2019 – 2020 **Sigma Nu Alumni Advisory Board**
Role: Member of the Sustainability and Chapter Operations committees

2018 – **Canadian Astronomical Society (CASCA)**, Canadian Astronomical Society

2015 – 2017 **Executive Board Member for Chabad at CWRU**
Organized events on campus: dinners, holidays, charity events, and outreach programs Role: General Executive Board Member (2016-2017) Role: Chief financial officer (2015 -2016)

2015 – 2018 **Sigma Nu Fraternity**
Member in good standing. Served as webmaster (2016-2018) in charge of the fraternity webpage for news, programmed events, and intra-fraternal governance

Outreach

Oct 2021 **Origins Science Scholars Lecture Series**, Origins Science Scholars program, Case Western Reserve University — Online
Science of Origins: Dark Matter and the Milky Way

2019 – 2021 **AstroTours Telescope Organizer**, Dunlap Institute for Astronomy & Astrophysics, University of Toronto
Organizer for all telescope outreach in Dunlap's public event

2019 – 2022 **Massey Telescopes Outreach Coordinator**, Massey College
Organizing committee member for astronomy outreach and appreciation at Massey College

2019 **Planet Party Toronto Volunteer**, Department of Astronomy and Astrophysics, University of Toronto

2018 – 2020 **Astronomy on Tap Toronto Volunteer**, Department of Astronomy and Astrophysics, University of Toronto

2018 – 2019 **AstroTours Planetarium Presenter**, Dunlap Institute for Astronomy & Astrophysics, University of Toronto
Regular planetarium show designer and presenter for Dunlap's AstroTours public outreach

2018 – 2021 **AstroTours Toronto Outreach Volunteer**, Dunlap Institute for Astronomy & Astrophysics, University of Toronto

2017 **Cosmology Overview at CWRU Origins (Talk)** — Cleveland, OH, USA
The Universe: A Brief History

Small Grants

Sep 2023 **Dunlap Student Training Grant**
To attend the DESC sprint week

Jun 2023 **Collaboration Meeting Grant**
To visit the Center for Computational Astrophysics and collaborate on the paper

May 2023 **Astropy Moore Travel Grant**
To participate in the 2023 Astropy Coordination meeting

Sep 2022 **Dunlap Student Training Grant**
To attend Streams22: the Community Atlas of Tidal Streams workshop

Sep 2022 **Streams22 Conference Bursary**
To attend Streams22: the Community Atlas of Tidal Streams workshop

Dec 2019 **Reinhardt Travel Award**
To present at the 30th Texas Symposium on Relativistic Astrophysics

Dec 2019 **STScI Travel Funding**
To attend STScI 2020 The Local Group: Assembly and Evolution Symposium

Aug 2019 **Dunlap Student Travel Grant**
To present at the 5th Gaia Challenge Workshop (Value: $2,075)

Aug 2019 **Reinhardt Travel Award**
To present at the Great Lakes Cosmology Workshop

Jul 2019 **ComSciCon Canada Travel Award**
To attend the first Canadian Science Communication Conference, ComSciConCAN

Media

May 2023 **The JCR: A Massey Podcast - ChatGPT: Friend or Foe**, The JCR: A Massey Podcast - ChatGPT: Friend or Foe
Panelist for a public podcast interviewing researchers on how generative AI is used in various scientific fields

Feb 2023 **The New Scientist**, The New Scientist
Featured in article on various strategies to detect dark matter, including the method from my paper

Mar 2022 **Massey Dialogue: Science and Aesthetics**, Massey Dialogue: Science and Aesthetics
Panelist for interdisciplinary salon discussion series

May 2021 **Smithsonian Feature Article**, Smithsonian Feature Article
Interviewed for feature article about my paper

Sep 2020 **Massey Dialogue: Techplomacy with Consul General Rana Sarkar**, Massey Dialogue: Techplomacy with Consul General Rana Sarkar
Panelist and co-organizer for a salon discussion on the Future of regulating Big Tech