



Nathaniel Starkman

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📄 Publications 🔗 arXiv 📄 Zenodo 📞 0000-0003-3954-3291



🏛️ EDUCATION

- 2018 – 2024 **PhD in Astronomy & Astrophysics**, University of Toronto 🔗 Toronto, ON, Canada
- 2014 – 2018 **B.S. in Mathematical Physics and Astronomy**, Case Western Reserve University 🔗 Cleveland, OH, USA

🏢 SELECT PROFESSIONAL APPOINTMENTS

- 2024 – 2027 **Postdoctoral Associate**, MIT Kavli Institute for Astrophysics and Space Research 🔗 Cambridge, MA, USA
- 2021 – **Coordinator & Core Developer**, Astropy 🔗

📄 SELECT PUBLICATIONS

- 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
- C. Myers, **N. Starkman**, L. Necib. *Physics-Informed Neural Networks for Modeling Galactic Gravitational Potentials*. *Monthly Notices of the Royal Astronomical Society* SUBMITTED 🔗 ADS 🔗 arXiv:2606.18386 🔗
- 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
- 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* SUBMITTED 🔗 ADS 🔗 arXiv:2605.07809
- 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 🔗
- J. Nibauer, **N. Starkman**, K. Johnston. *StreamSculptor: Hamiltonian Perturbation Theory for Stellar Streams in Flexible Potentials with Differentiable Simulations*. *The Astrophysical Journal* 983, 68 🔗 ADS 🔗 arXiv:2410.21174
- 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 🔗
- 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 🔗
- N. Starkman**, A. Kosowsky, G. Starkman. *Angular Correlations of Cosmic Microwave Background Spectrum Distortions from Photon Diffusion*. *Monthly Notices of the Royal Astronomical Society* 529, 2274 📄 10.1093/mnras/stae665 🔗
- 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 🔗

🏆 SELECT FELLOWSHIPS & AWARDS

- Jan 2025 **AAS Lancelot M. Berkeley–New York Community Trust Prize**, American Astronomical Society 🔗
to the Astropy Collaboration
- Feb 2024 **Brinson Prize Fellowship** 🔗
- 2020 – 2023 **NSERC - CGS D** 🔗
- 2019 – 2020 **NSERC - CGS M** 🔗

2018 – 2024 **University of Toronto Graduate Fellowship**, University of Toronto
2014 – 2018 **Case Western Reserve University Merit Scholarship**

 MAJOR GRANTS

Jul 2022	Astropy Cycle III Funding Grant 	USD 12,000
Jul 2022	Astropy Cycle III Funding Grants 	USD 8,000

 SELECT SOFTWARE

galax   Galactic dynamics in JAX	plum  Multiple dispatch in Python	coordinax  Coordinates in JAX
unxt   Units in JAX	quax  Multiple dispatch in JAX	

 SELECT 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

 SELECT MENTORING

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

 PEER REVIEW

Journals — Astronomy & Astrophysics · The Astrophysical Journal · European Physical Journal C · 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