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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

Students I supervised or advised: [undergraduate<sup>†</sup>](#), [graduate<sup>†</sup>](#).

1. **N. Starkman**, J. Nibauer, S. Pearson, [S. Wu<sup>†</sup>](#), L. Necib. *When Streams Curve Away: a Test of Dark Matter from Extragalactic Stellar Stream Populations*. [SUBMITTED](#) 🔗 [arXiv:2609.40057](#)
2. Euclid Collaboration, **N. Starkman**, J. Nibauer, S. Pearson, [S. Wu<sup>†</sup>](#), 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](#)
3. [C. Myers<sup>†</sup>](#), **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](#) 🔗
4. 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](#)
5. **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](#) 🔗
6. [S. Wu<sup>†</sup>](#), **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](#)
7. [S. Wu<sup>†</sup>](#), **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](#) 🔗
8. 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](#) 🔗 🔗
10. **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](#) 🔗 📄

## 🏆 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 | <b>Astropy Cycle III Funding Grant</b>   | USD 12,000 |
| Jul 2022 | <b>Astropy Cycle III Funding Grants</b>  | USD 8,000  |

 SELECT SOFTWARE

|                                                                                                         |                                                                                                                                                                                      |                                                                                                 |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <b>potamides</b>  2026 | <b>galax</b>       | <b>plum</b>  |
| Constrain gravitational potentials from stellar stream curvature                                        | Galactic dynamics in JAX                                                                                                                                                             | Multiple dispatch in Python                                                                     |
| <b>coordinax</b>       | <b>unxt</b>  2025  |                                                                                                 |
| Coordinates in JAX                                                                                      | Units in JAX                                                                                                                                                                         |                                                                                                 |

 SELECT INVITED TALKS

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

 SELECT MENTORING

|             |                                                                                                                                            |  |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|--|
| May 2026    | <b>Reem Hamraz Google Summer of Code for Astropy</b>  |  |
|             | Hardening Astropy’s core stability                                                                                                         |  |
| 2025 – 2026 | <b>Amir Abdul (Howard)</b>                                                                                                                 |  |
|             | 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 | <b>Taisiia Karasova (MIT) with Prof. Lina Necib (MIT)</b>                                                                                  |  |
|             | Machine Learning Galaxy intrinsic sizes                                                                                                    |  |
| 2024 – 2026 | <b>Charlotte Myers (MIT) with Prof. Lina Necib (MIT)</b>                                                                                   |  |
|             | Physics-Informed Neural Networks for Modeling Galactic Gravitational Potentials                                                            |  |
|             | NeurIPS Paper                                                                                                                              |  |

 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