Tri V. Nguyen

CIERA Postdoctoral Fellow

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Professional Appointments

CIERA Postdoctoral Fellow Sep 2024 – Present
Center for Interdisciplinary Exploration and Research in Astrophysics (CIERA)
Northwestern University

Pre-Doctoral Research Analyst Sep 2022 – Jan 2023
Center for Computational Astrophysics (CCA)
Flatiron Institute, Simons Foundation

Undergraduate Research Fellow Jun 2018 – Aug 2018
Caltech LIGO Summer Undergraduate Research Fellowships (SURF)
California Institute of Technology

Professional Affliations

Postdoctoral Affliate Oct 2024 – Present
The NSF-Simons AI Institute for the Sky (SkAI Institute)

Graduate Student Affliate Sep 2022 – Sep 2024
The NSF AI Institute for Artificial Intelligence and Fundamental Interactions (IAIFI)

Education

Ph.D. in Physics, Massachusetts Institute of Technology 2019 – 2024
Thesis: Decoding Dark Matter Halos through the lens of Machine Learning
Thesis Advisor: Lina Necib

B.S. in Physics & Astronomy, University of Rochester 2015 – 2019
Magna Cum Laude with the highest distinction

Research Interest

Astrophysics: Dark Matter; Dwarf Galaxies; Stellar Stream; Galactic Dynamics; Galaxy Formation & Evolution

Machine Learning: Simulation-based Inference; Generative Models: Diffusions, Flows; Geometric Deep Learning; Multi-modal Learning

Selected External Collaborations

DaRk mattEr and Astrophysics with Machine learning and Simulations (DREAMS) 2024 – Present
Interdisciplinary collaboration between astrophysicists, particle physicists, and machine learning scientists
Core member, leading development of machine learning methods
1 first-author publication, 1 (2) collaboration (in-prep) publications

Vera C. Rubin Observatory LSST Dark Energy Science Collaboration (DESC) 2023 – Present
Dark Matter Working Group member, leading stellar stream simulation-based inference projects
1 first-author in-prep publication

Feedback In Realistic Environment (FIRE) Simulation 2021 – Present
2 first-author publications

Awards and Honors

2024 **CIERA Postdoctoral Fellowship** – Northwestern University
fully independent fellowship awarded through a competitive selection process
$231,000 USD salary and $45,000 USD research funds over 3 years

2024 **GECO Postdoctoral Fellowship** – University of Virginia
fully independent fellowship awarded through a competitive selection process, (declined)

2023 **LEAdership and Professional Strategies and Skills (LEAPS) Certificate** – MIT
13-week program in leadership development and professional skills for postdocs and graduate students

2023 **Graduate Student Service Award** – MIT
Astrophysics Division recognition for outstanding service to the graduate community

2019 **Undergraduate Teaching Award** – University of Rochester
Department of Physics & Astronomy recognition for excellence in undergraduate teaching

2015 – 2019 **Rush Rhees Scholarship** – University of Rochester
merit-based scholarship awarded to undergraduate students for academic excellence
approximately $120,000 USD over 4 years

2015 – 2019 **Dean's List** – University of Rochester

Mentoring and Advising Experience

Student Mentees – Students that I supervise as formal co-advisor through funded programs:

Christine Hao – MIT Undergraduate Research Opportunity Program (UROP) Jun – Aug 2024
undergraduate student at Wellesley College
co-advised with Stephanie O'Neil and Mark Vogelsberger

Hanna Chen – MIT Undergraduate Research Opportunity Program (UROP) Jun – Aug 2023
undergraduate student at MIT
co-advised with Lina Necib

Anna Orgel – MIT Undergraduate Research Opportunity Program (UROP) Jun – Aug 2023
undergraduate student at MIT
co-advised with Lina Necib

Hang (Chelsea) Su – MIT Summer Research Program (MSRP) Jun – Aug 2022
undergraduate student at MIT
co-advise with Lina Necib

Michael Huang – MIT Research Science Institute (RSI) Jul – Aug 2022
high school student at Phillips Exeter Academy, current undegraduate student at MIT
co-advise with Lina Necib

Student Collaborators – Students that I collaborate closely with. I hold regular meetings with these students individually or with their advisors (listed).

Andreas Filipp – Université de Montréal – Yashar Hezaveh & Laurence Perreault-Levasseur Feb 2025 – Present
Chester Li – University of Washington – Nora Shipp Aug 2024 – Present
Rutong Pei – Carnegie Mellon University – Nora Shipp & Scott Dodelson Aug 2023 – Present

Teaching Experience

Graduate Teaching Assistant, Massachusetts Institute of Technology

8.022 Physics II Spring 2024
8.022 Physics II Spring 2022
8.01L Physics I Fall 2021
8.S50 Computational Data Science in Physics Jan 2021
8.S50 Computational Data Science in Physics Jan 2020

Undegraduate Teaching Assistant, University of Rochester

PHY 121 Mechanics Lab Spring 2018
PHY 235 Classical Mechanics Fall 2018
PHY 121 Mechanics Lab Spring 2017
AST 111 The Solar System & Its Origin Fall 2017
PHY 113 Mechanics Lab Fall 2016

Leadership Roles & Professional Services

Co-chair, OpenSkAI Conference Local Organizing Committee (LOC) 2025
inaugural conference of the NSF-Simons AI Institute for the Sky (SkAI Institute), interdisciplinary astronomy and AI, 149 participants (max capacity), 42 accepted talks and 39 accepted posters

Co-organizer, SkAI Journal Club 2024 – Present
bi-weekly, astronomy and AI interdisciplinary journal club between Northwestern University, University of Chicago, University of Illinois, and other partnered institute

Reviewer, peer-reviewed journals, workshops and conferences 2021 – Present
journals: ApJ, A&C, A&A, Phys. Rev. D, Phys. Rev. Lett., etc.
workshops and conferences: ML4Astro (ICML 2023, 2025), ML4PS (NeurIPS 2022, 2023, 2024, 2025)

Co-organizer, Astronomy on Tap 2023 – 2024
monthly public astronomy events in bars and cafes, organized 4+ events each reaching 100+ attendees

Co-director, MIT Astrogazers Initiative 2022 – 2024
graduate student organization for astronomy public engagement and outreach activities

Member, IAIFI Public Engagement Committee 2021 – 2024

Member, MIT Physics Graduate Student Council (PGSC) Social Committee 2019 – 2020

President, The Kapitza Society for Theoretical Physics, University of Rochester 2018 – 2019

Observatory Guide & Telescope Operator, C. E. Kenneth Mees Observatory 2017 – 2018
volunteer summer tour guide, 24-inch computerized Cassegrain telescope

Vice President, Astronomy Club, University of Rochester 2017 – 2018

Public Engagement & DEI Activities

Student Mentoring & Career Support – Activities supporting diversity, equity, inclusion and student development:

Judge, NASA Space Apps Challenge (hackathon) Oct 2025
Panelist, CIERA REACH Career Panel for high school students Jul 2025
Mentor, NASA Space Apps Challenge (hackathon) Oct 2024
Mentor, Physics Graduate Application Assistance Program (PhysGAAP) Nov – Dec 2023
Panelist, IAIFI Internship & Career Panel Oct 2023
Panelist, MIT Physics Graduate Student Council (PGSC) Internship & Career Panel Apr 2023
Contributed author, MIT Physics Graduate Student Council (PGSC) Handbook Mar 2023
Lecturer, Learning to Lead @ Accenture Boston Jul 2023
Volunteer, American Astronomical Society (AAS) 241st Meeting Graduate School Fair Jan 2023
Lecturer, Gaia Hackathon Jun 2022

Public Outreach – Community engagement and education:

Astronomer Presenter, Astronomy Conversations @ The Adler Planetarium Jul 2025
Astronomer Presenter, Astronomy Conversations @ The Adler Planetarium Dec 2024
Volunteer, Astronomy on Tap Chicago: *Cosmic Road Trip: Touring Planets Near* & Far Nov 2024
Co-organizer, Astrogazers Solar Telescope Workshop @ Cambridge Science Festival Oct 2023
Co-organizer, Astrogazers Observing Night @ MIT/Kendall Fall Festival Oct 2023
Co-organizer, Astronomy on Tap Boston: *AI in Astronomy* Oct 2023
Co-organizer, Astronomy on Tap Boston: *Science (in) Fiction* Aug 2023
Co-organizer, Teen Programming Council @ MIT Museum May 2023
Co-organizer, After Dark @ MIT Museum May 2023
Co-organizer, Astronomy on Tap Boston: *Solar System Exploration* Apr 2023
Co-organizer, Astronomy on Tap Boston Mar 2023
Volunteer, Astrogazers Telescope Workshop @ Cambridge Science Festival Oct 2022
Volunteer, Solar Telescope for Middle Schoolers Jul 2019

Co-organizer, Earth Hour @ University of Rochester Mar 2018

Invited Conference Talks

[5] (*Plenary*) *IAIFI Summer Workshop*, Harvard University Aug 2025
[4] *Simulation Based Inference for Galaxy Evolution*, University of Bristol May 2025
[3] *DREAMS Workshop*, Flatiron Institute May 2025
[2] *Galaxy Formation and Evolution in the Data Science Era*, Kavli Institute for Theoretical Physics Mar 2023
[1] *NCSA Accelerated Artificial Intelligence for Big-Data Experiments Conference*, Remote Oct 2020

Contributed Conference Talks

[13] *OpenSkAI Conference*, NSF-Simons AI Institute for the Sky Sep 2025
[12] *ML4Astro Workshop*, International Conference on Machine Learning (ICML) 2025 Jul 2025
[11] *Cosmic Horizons Conference*, University of Texas at Austin May 2025
[10] *Cosmology and Galaxy Astrophysics with Simulations and Machine Learning*, Flatiron Institute Dec 2024
[9] *ML4Astro Workshop*, International Conference on Machine Learning (ICML) 2023 Jul 2023
[8] *Galactic Frontiers: Dwarf Galaxies in the Local Volume and Beyond*, Flatiron Institute Jul 2023
[7] *Statistical Challenges in Modern Astronomy VIII*, Penn State University Jun 2023
[6] *Cosmic Connections: A ML X Astrophysics Symposium*, Flatiron Institute May 2023
[5] *241st AAS Winter Meeting* Jan 2023
[4] *ML4Astro Workshop*, International Conference on Machine Learning (ICML) 2022 Jul 2022
[3] *IAIFI-AIMLAC Lightning Talk*, Massachusetts Insitute of Technology Mar 2022
[2] *Fast Machine Learning Workshop*, Fermilab Sep 2019
[1] *233rd AAS Winter Meeting* Jan 2019

Seminars & Posters

[17] (*Upcoming*) *CITA Seminar*, University of Toronto Jan 2026
[16] *Astrophysics Research Group Seminar*, University of Surrey Jun 2025
[15] *TASTY Seminar*, University of Toronto Mar 2025
[14] *Astronomy and Astrophysics Seminar*, Université de Montréal Feb 2025
[13] *Machine Learning for Physical Sciences Seminar*, Mila - Québec AI Institute Feb 2025
[12] *CIERA Theory Seminar*, Northwestern University Jan 2025
[11] *CIERA Theory Seminar*, Northwestern University Sep 2024
[10] *Cosmology Journal Club*, Carnegie Mellon University Jan 2024
[9] *Physics Journal Club*, University of Pittsburgh Jan 2024
[8] *Dark Cosmos Seminar*, Princeton University Dec 2023
[7] *Astronomy Lunch Talk*, University of Washington Nov 2023
[6] *Kavli Institute for Cosmological Physics Seminar*, University of Chicago Nov 2023
[5] *CIERA Theory Seminar*, Northwestern University Oct 2023
[4] *Astrophysics Lunch Talk*, Flatiron Institute Dec 2022
[3] *Blackboard Lunch Talk*, Columbia University Nov 2022
[2] *Nature of Dark Matter on Small Scales Seminar*, Remote Oct 2022
[1] *AI in Astronomy*, University of São Paulo Sep 2021

Publications

Led/Co-led/Major Contributions

[10] **Nguyen T.**, et al. (in prep.) *Forecasting Dark Matter Subhalo Constraints from Stellar Streams using Implicit Likelihood Inference.* under LSST DESC Collaboration review.

[9] Sun G., **Nguyen T.**, et al. (2025) *LIMFAST. IV. Learning High-Redshift Galaxy Formation from Multiline Intensity Mapping with Implicit Likelihood Inference.* submitted to Journal of Cosmology and Astroparticle Physics. preprint (arXiv:2509.07060)

[8] **Nguyen T.**, Modi C., Mishra-Sharma S., Somerville R., Yung L. Y. A (2025) *Emulating Dark Matter Halo Merger Trees with Graph Generative Models.* Monthly Notices of the Royal Astronomical Society. staf1487 (arXiv:2507.10652)

[7] **Nguyen T.**, et al. (2025) *Trial by FIRE: probing the dark matter density profile of dwarf galaxies with GraphNPE.* Monthly Notices of the Royal Astronomical Society. 541: 2707-2740 (arXiv:2503.03812)

[6] **Nguyen T.**, et al. (2024) *How DREAMS are made: Emulating Satellite Galaxy and Subhalo Populations with Diffusion Models and Point Clouds.* submitted to Astrophysics Journal. preprint (arXiv:2409.02980)

[5] **Nguyen T.**, Modi C., Yung L. Y. A, Somerville R. (2024) *FLORAH: A generative model for assembly histories of halos.* Monthly Notices of the Royal Astronomical Society. 533: 3144-3163 (arXiv:2308.05145)

[4] Yung L. Y. A, et al. (including **Nguyen T.**) (2023) *Characterising ultra-high-redshift dark matter halo demographics and assembly histories with the GUREFT simulations.* Monthly Notices of the Royal Astronomical Society. 540: 4868-4886 (arXiv:2309.14408)

[3] **Nguyen T.**, et al. (2023) *Synthetic Gaia DR3 surveys from the FIRE cosmological simulations of Milky-Way-mass galaxies.* Astrophysical Journal. 966: 108 (arXiv:2306.16475)

[2] **Nguyen T.**, Mishra-Sharma S., Williams R., Necib L. (2023) *Uncovering the dark matter density profiles of dwarf galaxies with graph neural networks.* Physics Review D. 107: 043015 (arXiv:2208.12825)

[1] Ormiston R., **Nguyen T.**, Coughlin M., Adhikari R., Katsavounidis E. (2020) *Noise reduction in gravitational-wave data via deep learning.* Physics Review Research. 2: 033066 (arXiv:2005.06534)

Selected N-th Author Papers & Collaboration Papers

[5] Rose J., et al. (including **Nguyen T.**) (2025) *Introducing the DREAMS Project: DaRk mattEr and Astrophysics with Machine learning and Simulations.* Astrophysical Journal. 982: 68 (arXiv:2405.00766)

[4] Roche C., Necib L., Lin T., Ou X., **Nguyen T.** (2024) *The Escape Velocity Profile and Dark Matter Halo of the Milky Way from Gaia DR3.* Astrophysical Journal. 972: 70 (arXiv:2402.00108)

[3] Saleem M., et al. (including **Nguyen T.**) (2024) *Demonstration of Machine Learning-assisted real-time noise regression in gravitational wave detectors.* Classical and Quantum Gravity. 41: 195024 (arXiv:2306.11366)

[2] The LIGO-Virgo-KAGRA collaboration (including **Nguyen T.**) (2023) *GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run.* Physics Review X. 13: 041039 (arXiv:2111.03606)

[1] Gunny A., et al.(including **Nguyen T.**) (2022) *Hardware-accelerated Inference for Real-Time Gravitational-Wave Astronomy.* Nature Astronomy. 6: 529-536 (arXiv:2108.12430)

White Papers & Conference Proceedings

[2] Deiana A. et al. (including **Nguyen T.**) (2022) *Applications and Techniques for Fast Machine Learning in Science.* Frontiers in Big Data. 5: 787421 (arXiv:2110.13041)

[1] Cuoco E. et al. (including **Nguyen T.**) (2021) *Enhancing Gravitational-Wave Science with Machine Learning.* Machine Learning: Science and Technology. 2: 011002 (arXiv:2005.03745)

Languages & Background

Language Proficiency: English (fluent), Vietnamese (fluent), French (basic)
Citizenship: Vietnamese citizen, Canadian permanent resident

References

Prof. Lina Necib – lnecib@mit.edu
Assistant Professor at MIT
Doctoral thesis advisor, long-term collaborator on near-field cosmology

Prof. Claude-André Faucher-Giguère – cgiguere@northwestern.edu
Professor at Northwestern University
Science advisor for the CIERA Postdoctoral Fellowship

Dr. Rachel Somerville – rsomerville@flatironinstitute.org
Group leader of the Galaxy Formation Group at the CCA, Flatiron Institute
Supervisor during the CCA Pre-Doctoral Program, long-term collaborator on galaxy formation