

Tri V. Nguyen

CIERA Postdoctoral Fellow

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Research Positions

CIERA Postdoctoral Fellow Center for Interdisciplinary Exploration and Research in Astrophysics	Sep 2024 – Present
CCA Pre-doctoral Research Analyst Center for Computational Astrophysics, Flatiron Institute Advisor: Rachel Somerville, Chirag Modi, Aaron Yung	Sep 2022 – Jan 2023

Education

Ph.D. in Physics , Massachusetts Institute of Technology Thesis: “Decoding Dark Matter Halos through the lens of Machine Learning” Advisor: Lina Necib	2019 - 2024
B.S. in Physics & Astronomy , University of Rochester Magna Cum Laude with the highest distinction in Physics Advisor: Segev BenZvi, Regina Demina	2015 – 2019

Research Interest

Astrophysics: Dark Matter; Galactic Dynamics; Galaxy Formation & Evolution; Near-field Cosmology
Machine Learning: Simulation-based Inference; Generative Models: Diffusions, Flows; Geometric Deep Learning; Multi-modal Learning

Honors and Awards

LEAdership and Professional Strategies and Skills (LEAPS) Certificate , MIT	2023
Astrophysics Division Graduate Service Award , MIT	2023
Undergraduate Teaching Award , University of Rochester	2019
Dean’s List Recognition , University of Rochester	2015 – 2019
Rush Rhees Scholarship , University of Rochester	2015 – 2019
Annual Award for Excellence in SPS Tutoring , University of Rochester	2018

Publications

Led/Co-led/Major Contributions

[6] T. Nguyen , et al. <i>How DREAMS are made: Emulating Satellite Galaxy and Subhalo Populations with Diffusion Models and Point Clouds</i>	Submitted to ApJ arXiv:2409.02980
[5] L. Y. A. Yung, R. S. Somerville, T. Nguyen , P. Behroozi, C. Modi, J. Gardner <i>Characterising ultra-high-redshift dark matter halo demographics and assembly histories with the GUREFT simulations</i>	<i>MNRAS</i> 530 , 4 arXiv:2309.14408
[4] T. Nguyen , C. Modi, L. Y. A. Yung, R. S. Somerville <i>FLORAH: A generative model for assembly histories of halos</i>	<i>MNRAS</i> 533 , 3 arXiv:2308.05145

- [3] **T. Nguyen**, X. Ou, N. Panithanpaisal, N. Shipp, L. Necib, R. Sanderson, A. Wetzel *ApJ* **966**, 108
Synthetic Gaia DR3 surveys from the FIRE cosmological simulations of Milky-Way-mass galaxies
 arXiv:2306.16475
- [2] **T. Nguyen**, S. Mishra-Sharma, R. Williams, L. Necib *Phys.Rev.D* **107**, 043015
Uncovering the dark matter density profiles of dwarf galaxies with graph neural networks
 arXiv:2208.12825
- [1] R. Ormiston, **T. Nguyen**, M. Coughlin, R. Adhikari, E. Katsavounidis *Phys.Rev.Res.* **2**, 033066
Noise reduction in gravitational-wave data via deep learning
 arXiv:2005.06534

N-th Author Papers & Collaboration Papers

- [5] J. Rose et al. (including **T. Nguyen**) Submitted to *ApJ*
Introducing the DREAMS Project: DaRk mattEr and Astrophysics with Machine learning and Simulations
 arXiv:2405.00766
- [4] C. Roche, L. Necib, T. Lin, X. Ou, **T. Nguyen** Submitted to *ApJ*
The Escape Velocity Profile and Dark Matter Halo of the Milky Way from Gaia DR3
 arXiv:2402.00108
- [3] M. Saleem et al. (including **T. Nguyen**) Submitted to *PNAS*
Demonstration of Machine Learning-assisted real-time noise regression in gravitational wave detectors
 arXiv:2306.11366
- [2] The LIGO-Virgo-KAGRA collaboration (including **T. Nguyen**) *Phys.Rev.X* **13**, 041039
GWTC-3: Compact Binary Coalescences Observed by LIGO and Virgo During the Second Part of the Third Observing Run
 arXiv:2111.03606
- [1] A. Gunny, D. Rankin, J. Krupa, M. Saleem, **T. Nguyen**, M. Coughlin, P. Harris, E. Katsavounidis, S. Timm, B. Holzman *Nat Astron* **6**, 529–536
Hardware-accelerated Inference for Real-Time Gravitational-Wave Astronomy
 arXiv:2108.12430

White Papers & Conference Proceedings

- [3] A. Deiana et al. (including **T. Nguyen**) *Front. Big Data* **5** 2022.787421
Applications and Techniques for Fast Machine Learning in Science
 arXiv:2110.13041
- [2] E. Cuoco et al. (including **T. Nguyen**) *Mach. Learn.:Sci.Tech.* **2**, 011002
Enhancing Gravitational-Wave Science with Machine Learning
 arXiv:2005.03745
- [1] S. BenZvi, R. Cross, **T. Nguyen** *Int. Cosmic Ray Conf.* 2017
Estimating the Sensitivity of IceCube to Signatures of Axion Production in a Galactic Supernova
 arXiv:1710.01201

Invited Talks

- [2] Galaxy Formation and Evolution in the Data Science Era, KITP UCSC Mar 2023
- [1] NCSA Accelerated Artificial Intelligence for Big-Data Experiments Conference, Remote Oct 2020

Contributed Talks

- [8] Galactic Frontiers: Dwarf Galaxies in the Local Volume and Beyond, CCA Flatiron Institute Jul 2023
- [7] Statistical Challenges in Modern Astronomy VIII, Penn State University Jun 2023
- [6] Cosmic Connections: A ML X Astrophysics Symposium, CCA Flatiron Institute May 2023
- [5] 241st AAS Winter Meeting, Seattle Jan 2023
- [4] ML4Astro Workshop, International Conference on Machine Learning Jul 2022
- [3] IAIFI-AIMLAC Lightning Talk, MIT Mar 2022
- [2] Fast Machine Learning Workshop, Fermilab Sep 2019
- [1] 233rd AAS Winter Meeting, Seattle Jan 2019

Seminars & Poster Presentations

- [13] CIERA Theory Group Meeting, Northwestern University Sep 2024
- [12] Journal Club, Carnegie Mellon University Jan 2024
- [11] Journal Club, University of Pittsburgh Jan 2024
- [10] Dark Cosmos Seminar, Princeton University Dec 2023
- [9] Astro Lunch Talk, University of Washington Nov 2023
- [8] KICP Seminar, University of Chicago Nov 2023
- [7] CIERA Theory Group Meeting, Northwestern University Oct 2023
- [6] ML4Astro Workshop Poster, International Conference on Machine Learning Jul 2023
- [5] Lunch Talk, CCA Flatiron Institute Dec 2022
- [4] Blackboard Lunch Talk, Columbia University Nov 2022
- [3] Galaxy Formation Group Meeting, CCA Flatiron Institute Nov 2022
- [2] Nature of Dark Matter on Small Scales Seminar, Remote Oct 2022
- [1] AI in Astronomy, University of São Paulo, Remote Sep 2021

Teaching Positions

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 2020, Jan 2021

University of Rochester

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

Mentoring and Advising

Undergraduate students

Christine Hao, MIT Undergraduate Research Opportunity Program	June 2024 – Present
Rutong Pei, Carnegie Mellon University	Aug 2023 – Present
Hanna Chen, MIT Undergraduate Research Opportunity Program	Summer 2023
Anna Orgel, MIT Undergraduate Research Opportunity Program	Summer 2023
Hang Su, MIT Summer Research Program	Summer 2022

High school students

Michael Huang, MIT Research Science Institute	Summer 2022
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Leadership Positions

Organizer , Astronomy on Tap Boston	2022 – 2024
Co-director , MIT Astrogazers Initiative	2022 – 2024
Committee Member , IAIFI Public Engagement Committee	2021 – 2024
Committee Member , MIT Physics Graduate Council Social Committee	2019 – 2020
President , The Kapitza Society for Theoretical Physics	2018 – 2019
Dance Instructor , University of Rochester Breakdance Club	2017 – 2019
Observatory Guide & Telescope Operator , C.E.K Mees Observatory	Summer 2017, 2018
Vice President , University of Rochester Astronomy Club	2017 – 2018

Public Engagement Activities

Lead organizer , Astronomy on Tap: <i>Solar System Exploration</i>	Apr 2023
Lead organizer , Astronomy on Tap: <i>AI in Astronomy</i>	Oct 2023
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: <i>Science (in) Fiction</i>	Aug 2023
Lecturer , Learning to Lead @ Accenture Boston	Jul 2023
Co-organizer , Teen Programming Council @ MIT Museum	May 2023
Co-organizer , After Dark @ MIT Museum	May 2023
Co-organizer , Astronomy on Tap	Mar 2023
Volunteer , AAS 241st Graduate School Fair	Jan 2023
Volunteer , Astrogazers Telescope Workshop @ Cambridge Science Festival	Oct 2022
Lecturer , Gaia DR3 Hackathon	Jun 2022
Volunteer , Solar Telescope for Middle Schoolers	Jul 2019
Lead organizer , Earth Hour @ University of Rochester	Mar 2018

Professional Development Activities

Panelist , IAIFI Internship & Career Panel	Oct 2023
Panelist , MIT Physics Graduate Student Council Internship & Career Panel	Apr 2023
Student Contributor , MIT Physics Graduate Student Handbook	Mar 2023

Peer Review Service

Astrophysical Journal
 Astronomy and Computing
 Physics Review D
 Physics Review Letter
 ML for Physical Sciences workshop at NeurIPS 2024
 ML for Physical Sciences workshop at NeurIPS 2023
 ML for Astrophysics workshop at ICML 2023
 ML for Physical Sciences workshop at NeurIPS 2022