Tri Nguyen

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Education

Massachusetts Institute of Technology — **Cambridge, MA**
Ph.D. in Physics, Astrophysics Division — *Expected 2024*

University of Rochester — **Rochester, NY**
B.S. in Physics & Astronomy — *Class of 2019*

- Major GPA: 3.98/4.00
- Magna Cum Laude with highest distinction

Honors and Awards

LIGO SURF Fellowship, *California Institute of Technology* — *2018*

Dean's List Recognition, *University of Rochester* — *2015-2019*

Rush Rhees Scholarship, *University of Rochester* — *2015-2019*

Research Experience

MIT Local Universe Group — *Aug 2021 – Present*
Research Advisor: Lina Necib

- Reconstructed the dark matter density profiles of dwarf galaxies from their stellar kinematics with Graph Convolutional Neural Networks and Normalizing Flows
- Estimated the mass and accretion redshift of satellite galaxies that are accreted into the Milky Way with neural networks and the Illustris-TNG and FIRE simulations
- Constructed the Ananke DR3 mock stellar catalog using the stellar isochrone, dust extinction model, error model, and selection function consistent with the Gaia DR3 survey

CCA Galaxy Formation Group — *Aug 2022 – Feb 2023*
Research Advisor: Rachel Sommerville

- Developed a generative deep learning-based model to generate galaxy merger trees consistent with N-body cosmological simulation

MIT LIGO Laboratory — *Jun 2019 – Dec 2021*
Research Advisor: Erik Katsavounidis, Philip Harris

- Developed a machine learning framework for non-linear noise subtraction using auxiliary channels in gravitational-wave detectors at LIGO
- Developed a real-time gravitational-wave data analysis pipeline using an Inference-as-a-Service model by the NVIDIA Triton Server
- Estimated the sensitivity of LIGO to binary mergers during the LIGO Third Observing Run

Publications

Led/Co-led/Major Contributions

4) **T. Nguyen**, et al. *In Preparation*
Planting better merger trees with deep generated models

3) **T. Nguyen**, X. Ou, et al. *In Preparation*
Synthetic Gaia DR3 surveys from the FIRE cosmological simulations of Milky-Way-mass galaxies

2) **T. Nguyen**, S. Mishra-Sharma, L. Necib *Phys.Rev.D (Accepted)*
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

2) The LIGO-Virgo-KAGRA collaboration (including **T. Nguyen**) *Phys.Rev.X*
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 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.Technol. **2** 011002*
Enhancing Gravitational-Wave Science with Machine Learning arXiv:2005.03745

1) S. BenZvi, R. Cross, **T. Nguyen** *International Cosmic Ray Conference 2017*
Estimating the Sensitivity of IceCube to Signatures of Axion Production in a Galactic Supernova arXiv:1710.01201

Talks

Uncovering the dark matter density profiles in dwarf galaxies with simulation-based inference and graph neural networks *Jan 2023*
Research Contributed Presentations, 241rd AAS Meeting, Seattle, WA, USA

Uncovering the dark matter density profiles in dwarf galaxies with simulation-based inference and graph neural networks *Dec 2022*
Lunch Talk, Center for Computational Astrophysics, New York, NY, USA

Uncovering the dark matter density profiles in dwarf galaxies with simulation-based inference and graph neural networks *Nov 2022*
Lunch Talk, Columbia University, New York, NY, USA

Planting better merger trees with machine learning *Nov 2022*
Galaxy Formation Meeting, Center for Computational Astrophysics, New York, NY, USA

Uncovering the dark matter density profiles in dwarf galaxies with simulation-based inference and graph neural networks — *Oct 2022*
Nature of Dark Matter on Small Scales Seminar, Online

Uncovering the dark matter density profiles in dwarf galaxies with graph neural networks — *Jul 2022*
Spotlight Talk, ICML-ML4Astro 2022, Baltimore, MD, USA

Uncovering the dark matter density profiles in dwarf galaxies with neural networks — *Mar 2022*
IAIFI-AIMLAC Lightning Talk, MIT, Cambridge, MA, USA

GWTC-3: Compact Binary Coalescences Observed During the Second Part of the Third Observing Run — *Dec 2021*
LIGO-Virgo-KAGRA Public Webinar, Panelist

Deep Cleaning for Gravitational Wave Data — *Sep 2019*
Fast Machine Learning Workshop, Fermilab, Batavia, IL, USA

Nonlinear noise regression with machine learning at LIGO — *Jan 2019*
Research Contributed Presentation, 233rd AAS Meeting, Seattle, WA, USA

Mentoring

Hang Su, Undergraduate, University of New Haven, *Summer 2022 & Fall 2022*

Michael Huang, High School, Phillips Academy, *Summer 2022 & Fall 2022*

Teaching Experience

Physics II, 8.022	*Spring 2022*
Physics I, 8.01L	*Fall 2021*
Computational Data Science in Physics, 8.S50	*Jan 2020, Jan 2021*
Classical Mechanics, PHY 235	*Fall 2018*
Mechanics Lab, PHY 121	*Spring 2017, Spring 2018*
The Solar System & Its Origin, AST 111	*Fall 2017*
Mechanics Lab, PHY 113	*Fall 2016*

Outreach

IAIFI Public Engagement Committee	*Since 2021*
MIT Astrogazers Club	*Since 2019*
GAIA DR3 Hackathon	*June 2022*
President of The Kapitza Society	*Fall 2018, Spring 2019*
Tour Guide at C.E.K Mees Observatory	*Summer 2017, Summer 2018*
Vice President of Astronomy Club	*Spring 2018*

Service

Referee for Physics Review D	*Since 2021*
Referee for Physics Review Letter	*Since 2021*
Referee for Astronomy and Computing	*Since 2021*