Dustin Nguyen

Ph.D. Candidate, Department of Physics , The Ohio State University
dnguyen.phys@gmail.com | dustindnguyen.com | in | ⟳

Expertise : Numerical Methods, Computational Physics, Data Science, Neural ODEs/Transformers/GANs
technical skills : `python`, `julia`, `pytorch`, `sci-kit learn`, `SQL`, `yt`, `c++`, `Mathematica`

Education

The Ohio State University	Columbus, OH
Ph.D, Physics, Advisor: Todd Thompson	*May 2021 – Dec. 2023*
The Ohio State University	Columbus, OH
M.Sc, Physics	*Aug. 2018 – May 2021*
Arizona State University	Tempe, AZ
B.Sc, Physics; B.Sc, Astrophysics	*Aug. 2014 – May 2018*

Professional Experience

Future Investigator in NASA Earth and Space and Technology	Columbus, OH
The Ohio State University	*Sep. 2022 – Dec. 2023*
Graduate Research Assistant	Columbus, OH
The Ohio State University	*May 2020 – Dec. 2023*
Applied Machine Learning Research Fellow	Los Alamos, NM
Los Alamos National Laboratory	*Jun. 2022 – Aug. 2022*
Graduate Teaching Assistant	Columbus, OH
The Ohio State University	*Aug. 2018 – May 2020*
NASA ASU Space Grant Undergraduate Researcher	Tempe, AZ
Arizona State University	*May 2017 – May 2018*
LOFAR-IRES Undergraduate Researcher	Hamburg, DE
Arizona State University, Ruhr-Unveristät Bochum, & Universität Hamburg	*May 2016 – May 2017*

List of Refereed Publications (Total: 9) — personal favorites ✳

Lead Author Publications (6)

6. *"Neural ODEs as a discovery tool to characterize the structure of the hot galactic wind of M82"* ✳
   Nguyen, D. D., Ting, Y., Lopez, S., Lopez, L. A.
   NeurIPS 2023 Workshop on Machine Learning and the Physical Sciences, `arxiv:2311.02057`

5. *"Neural Astrophysical Wind Models"* ✳
   Nguyen, D. D.
   ICML 2023 Workshop for Astrophysics, `arxiv:2306.11666`

4. *"Highly-mass-loaded galactic winds are unstable to cool filament formation"*
   Nguyen, D. D., Thompson, T. A., Schneider, E. E., Tarrant, A. P.
   Submitted to Monthly Notices of the Royal Astronomical Society, arxiv:2307.11930

3. *"Dynamics of hot galactic winds from spherically-stratified starburst cores"* ✳
   Nguyen, D. D., Thompson, T. A., Schneider, E. E., Lopez, S., Lopez, L. A.
   Monthly Notices of the Royal Astronomical Society Letters (2023), 518, 1, `ads:2022MNRAS.tmpL.134N`

2. *"Galactic winds and bubbles from nuclear starburst rings"*
   Nguyen, D. D., Thompson, T. A.
   The Astrophysical Journal Letters (2022), 935, 2, `ads:2022ApJ...935L..24N`

1. *"Mass-Loading and Non-Spherical Divergence in Hot Galactic Winds: Implications for X-Ray Observations"*
   Nguyen, D. D., Thompson, T. A.
   Monthly Notices of the Royal Astronomical Society (2021), 508, 4, `ads:2021MNRAS.tmp.2635N`

Co-author Publications (3)

2. *"Hot Gas Outflow Properties of the Starburst Galaxy NGC 4945"*
Porraz Barrera, N., Lopez, S., Lopez, L. A., **Nguyen, D. D.**, Thompson, T. A., Bolatto, A. D.
submitted ApJ (December 2023) `arXiv:2312.08444`

2. *"X-ray Properties of NGC 253's Starburst-Driven Outflow"*
Lopez, S., Lopez, L. A., **Nguyen, D. D.**, Thompson, T. A., Mathur, S., Bolatto, A. D., Vulic, N., Sardone, A.
The Astrophysical Journal (2023) 942, 2, `ads:2023ApJ...942..108L`

1. *"Temperature and Metallicity Gradients in the Hot Gas Outflows of M82"*
Lopez, L. A., Mathur, S., **Nguyen, D. D.**, Thompson, T. A., Olivier, G. M.
The Astrophysical Journal (2020), 904, 2, `ads:2020ApJ...904..152L`

Awards (Total: $104.4K)

- NASA 1st XRISM Workshop Travel Grant **$1.1K**   *Jan. 2023*
- American Astronomical Society International Travel Grant, **$1.6K**   *Jan. 2023*
- NASA FINESST Grant **FI** (student PI), [2022-2024],
  Physics and Phenomenology of Galactic Starburst Winds **$97.7K**   *Sep. 2022*
- First place in Oral Presentations within the Mathematical and Physical Sciences Division,
  Hayes Research Forum, Ohio State University, **$0.6K**   *Mar. 2022*
- American Physical Society Travel Award **$0.4K**   *Oct. 2018*
- NASA ASU Undergraduate Space Grant, 1 year, **$3K**   *Aug. 2017*

Machine Learning Certifications

- **DeepLearning.ai**   *2023*
  - **Generative Adversarial Networks (GANs) Specialization** *(in progress, total 3 months)*
    Courses completed so far: Build Basic Generative Adversarial Networks (GANs)
  - **Machine Learning Engineering for Production (MLOps) Specialization** *(in progress, total 4 months)*
    Courses completed so far: Introduction to Machine Learning in Production
  - **Deep Learning Specialization** *(in progress, total 6 months)*
    Courses completed so far: Neural Networks and Deep Learning
  - **Generative AI with Large Language Models Course**
    Content: PEFT/LoRA, RLHF, Toxicity reduction fine-tuning of Flan-T5 on SageMaker AWS (total 3 weeks)
  - **Machine Learning Specialization**
    Courses: Supervised Learning, Advanced Learning Algorithms, Unsupervised Learning (total 4 months)
- **Weights & Biases**   *2023*
  - **Weights & Biases 101**
    Introduction to W&B for experiment tracking.
- **The Erdos Institute:** Data Science Bootcamp   *2023*
  - Kaggle CAFA 5 project focused on developing models to predict protein functions
    Trained Ridge, Decision Tree, Multi-layer Perceptron regression models for T5, ESM2, ProtBERT embeddings
    Our project placed within the top 5 out of 33 Erdos Institute projects (total 1 months)

Referee/reviewer for:

Monthly Notices of the Royal Astronomical Society (MNRAS), Publications for the Astronomical Society of Japan (PASJ)

Presentations

- ICML 2023 *Workshop on ML for Astrophysics*, Honolulu, Hawaii, *Contributed poster*   *Jul. 2023*
- *"Modelling of Multiphase Astrophysical Media"*, Munich, Germany, *Contributed talk*   *Jun. 2023*
- *"What matter(s) around galaxies 2022"* Conference, Champoluc, Italy, *Contributed talk*   *Sep. 2022*

- Applied Machine Learning Symposium, Los Alamos National Laboratory, *Contributed talk*   *Aug. 2022*
- Astro lunch seminar, University of Pittsburgh, *Invited talk*   *May 2022*
- Hayes Research Forum, Ohio State University, *Contributed talk*   *Mar. 2022*
- Arizona NASA Space Grant Statewide Symposium, University of Arizona, *Contributed talk*   *Apr. 2018*
- NASA ASU Space Grant Poster Session, Arizona State University, *Contributed poster*   *Feb. 2018*
- APS-4CS meeting, Colorado State University, *Contributed poster*   *Oct. 2017*

Press/Features

- Ohio State News, *How galactic superwinds help drive galactic development*, url, 31 Aug. 2022

Undergraduate Advisees

- Ashley Tarrant   *Aug. 2021 – present*
  - Phenomena in multi-phase galactic winds using the `Cholla` astrophysical code
    Results: 1 co-author paper *submitted*

Outreach and Mentorship

- Polaris (OSU)   *Aug. 2020 – May 2022*
  - Peer and research mentor for first year undergraduate students:
    Celine Roulet (AU 2020, SPR 2021), Ashley Tarrant & Sierra Reis (AU 2021, SPR 2022).
- School of Earth and Space Exploration Public Engagement (ASU)   *Aug. 2017 – May 2018*
  - Volunteered at multiple Earth and Space Open Houses and Exploration Days
- Science is Fun (ASU)   *Aug. 2016 – May 2017*
  - Helped give science demonstrations at local K-12 schools in Phoenix, Arizona.

Attended Schools/Workshops

- Four Ways to GPU Computing, Ohio Supercomputer Center Workshop Series with NVIDIA & ACCESS, Apr. 2023
- The 1st XRISM Data Analysis Workshop, University of Maryland, College Park, Maryland, Feb. 2023
- Introduction to PyTorch, Los Alamos National Laboratory, Los Alamos, New Mexico, Jun. 2022