Andy Nilipour

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EDUCATION

Yale University, New Haven, CT — Expected Graduation 2025

- Bachelor of Science in Astrophysics and Mathematics, Certificate in Japanese; Cumulative GPA 4.00
- *Relevant Coursework* († - Graduate Level/Cross-listed, ‡ - In Progress):
  - *Astronomy*: Interstellar Matter and Star Formation†, Astrophysical Flows†, The Evolving Universe†, Radio Astronomy†, Research Methods in Astrophysics, Stars and Their Evolution, Expanding Ideas of Time and Space
  - *Physics*: Relativistic Astrophysics and General Relativity†‡, Nuclear and Particle Physics†, Quantum Mechanics, Electromagnetic Fields and Optics, Classical Mechanics, Quantum Information Processing and Communication, Modern Physical Measurement Laboratory, Intensive Introductory Physics
  - *Mathematics*: Senior Seminar in Math Education Topics‡, Complex Analysis‡, Classical Statistical Thermodynamics†‡, Fields and Galois Theory, Ordinary Differential Equations, Abstract Algebra, Advanced (Measure-theoretic) Probability, Discrete Mathematics, Vector Calculus and Linear Algebra
- *Honors*: Phi Beta Kappa Junior Inductee, Richard U. Light Fellow, Yale Nominee for the Churchill Scholarship (ongoing)

International Christian University, Mitaka, Tokyo, Japan — August 2023 – June 2024

- One-year study abroad program (Middlebury in Japan), funded by The Richard U. Light Fellowship for Language Study in East Asia
- *Relevant Coursework:*
  - 天文学 (Astronomy), データサイエンス概念 (Data Science Concepts), 数値解析入門 (Numerical Methods in Science)

RESEARCH EXPERIENCE

Massachusetts Institute of Technology Haystack Observatory, Westford, MA — June 2024 – Present

Research Assistant, Advisors: Drs. Kazunori Akiyama (MIT), Paul Tiede (CfA)

- Developing a Julia-based software suite of regularized maximum likelihood (RML) methods for the Event Horizon Telescope (EHT)

National Astronomical Observatory of Japan, Mitaka, Tokyo, Japan — August 2023 – Present

Research Assistant, Advisors: Drs. Kazunori Akiyama (MIT), Shiro Ikeda (ISM), Mareki Honma (NAOJ), Kotaro Moriyama (IAA)

- Investigating the effectiveness of the optimal transport distance as a regularizer for RML reconstruction of EHT movie data

National Radio Astronomy Observatory, Socorro, NM — May 2023 – November 2024

NRAO NSF REU Intern, Advisors: Drs. Juergen Ott (NRAO), Brian Svoboda (NRAO), and David Meier (NMT)

- Measured the physical and kinematic properties of molecular clouds Milky Way Galactic bar region with ALMA

Berkeley SETI Research Center, Berkeley, CA — June 2022 – July 2023

Breakthrough Listen NSF REU Intern, Advisors: Drs. James Davenport (UW) and Steve Croft (UCB)

- Constrained technosignature candidate searches in scheduled observations and archival data using geometric signaling and receiving frameworks, utilizing high-precision astrometric and photometric data from Gaia Data Release 3

Yale Department of Physics, New Haven, CT — November 2020 – Present

Research Assistant, Advisor: Dr. Nikhil Padmanabhan

- Analyzed quasar data from the SDSS eBOSS catalogue using the quadratic maximum likelihood estimator to provide a measurement of the 1D Ly-α forest power spectrum that aligns well with previous power spectrum results
- Using a neural network to learn the evolution of the linear point of the BAO feature in the two-point correlation function
- Developing new methods to reconstruct the cosmic displacement field in comparison with standard Lagrangian Perturbation Theory

University of Arizona Department of Astronomy, Tucson, AZ — May 2019 – March 2020

Research Assistant, Advisor: Dr. Daniel Apai

- Developed a program to calculate which TESS Earthlike exoplanet candidates were observable during their projected transits from nine different telescopes in order to perform follow-up analyses

University of California, San Diego Physics Department, San Diego, CA — May 2018 – March 2020

Research Assistant, Advisor: Dr. Brian Keating

- Helped design and construct affordable and easily reproducible linear and circular polarimeters

FIRST-AUTHOR PUBLICATIONS

- **Nilipour, A.**, Moriyama, K., Ikeda, S. "Optimal Transport Regularized VLBI Dynamic Reconstruction." In prep for submission to *Astronomy and Astrophysics*
- **Nilipour, A.** & Akiyama, K. "VLBISkyRegularizers: Regularized Maximum Likelihood Methods for VLBI Reconstruction in Julia." In prep for submission to the *Journal of Open Source Software*
- **Nilipour, A.**, Ott, J., Meier, D., Svoboda, B., Sormani, M., Ginsburg, A., Gramze, S., Butterfield, N., Klessen, R. "Turbulent Pressure Heats Gas and Suppresses Star Formation in Galactic Bar Molecular Clouds." Accepted by *The Astrophysical Journal.*
- **Nilipour, A.**, Davenport, J., Croft, S., Siemion, A. "Signal Synchronization Strategies and Time Domain SETI with Gaia DR3." *The Astronomical Journal* 166, 79 (2023)

OTHER PUBLICATIONS

- Davenport, J., Sheikh, S., Farah, W., **Nilipour, A.**, Cabrales, B., Croft, S., Pollak, A., Siemion, A. "Real-time Technosignature Strategies with SN 2023ixf." *Research Notes of the AAS* 7, 120 (2023)

INVITED TALKS

- **Penn State Extraterrestrial Intelligence Center Seminar (April 2024, Centre County, PA):** "Signal Synchronization Strategies and Time Domain SETI"

CONTRIBUTED TALKS

- **National Astronomical Observatory of Japan VLBI Colloquium (February 2024, Mitaka, Tokyo, Japan):** "Feeding the CMZ: Gas Accretion Flows in the Galactic Bar"
- **National Radio Astronomy Observatory Research Symposium (August 2023, Socorro, NM):** "Feeding the Central Molecular Zone"
- **241st Meeting of the American Astronomical Society (January 2023, Seattle, WA):** "Signal Synchronization Strategies and Time Domain SETI with Gaia DR3"
- **Berkeley SETI Research Center Symposium (August 2022, Berkeley, CA):** "Signal Synchronization Strategies and Time Domain SETI with Gaia DR3"

POSTER PRESENTATIONS

- **245th Meeting of the American Astronomical Society (January 2025, National Harbor, MD):** "Turbulence in Galactic Bar Molecular Clouds"
- **Black Hole Explorer Japan Workshop (June 2024, Mitaka, Tokyo, Japan):** "Optimal Transport Regularized Black Hole Movie Reconstruction"
- **242nd Meeting of the American Astronomical Society (June 2023, Albuquerque, NM):** "Linear Point Standard Ruler Estimation with Neural Networks"
- **NASA CT Space Grant Consortium Fall Grants Expo (November 2022, Hartford, CT):** "Bouchet Low-Earth Alpha/Beta Space Telescope (BLAST)"
- **240th Meeting of the American Astronomical Society (June 2022, Pasadena, CA):** "One-dimensional Lyman-α forest power spectrum estimate from eBOSS"

ACTIVITIES

NAOJ Mitaka Open House Day Volunteer August 2023 – September 2023

- Assisted with the development and presentation of an interactive Milky Way 21cm line exhibit in Japanese, including the construction of a simple horn antenna

Yale Undergraduate Aerospace Association (YUAA), Team Leader September 2021 – Present

- Leader of the cosmic ray detector team of the YUAA CubeSat project, which has a projected launch date in spring 2025 and will detect variations in the Van Allen radiation belt, with the primary objective of mapping the boundaries of the South Atlantic Anomaly

WORK EXPERIENCE

Teaching Fellow for Elementary Japanese II January 2023 – June 2023
Teaching Fellow for Intermediate Japanese I August 2024 – Present

Grader for Discrete Mathematics August 2022 – June 2023
Grader for Ordinary Differential Equations August 2024 – Present

SKILLS

- **Data Analysis Experience:** Event Horizon Telescope (EHT), Atacama Large Millimeter/sub-millimeter Array (ALMA), Cosmological N-body simulations (Quijote, HADES, AbacusSummit)
- **Astronomical Data Software:** CAMB, CLASS, Comrade, eht-imaging, CASA, CARTA, GNU Radio, Astropy
- **Computational**: Python, Julia, PyTorch, Git, Qiskit, MATLAB, C#
- **High Performance Computing Cluster Allocations**: Yale Grace, Breakthrough Listen blpc0, NRAO NMASC, MIT Engaging, EHT Cloud, NAOJ Sparse 2

MEMBERSHIP

- **Event Horizon Telescope Collaboration** 2023 – Present
- **Phi Beta Kappa** 2022 – Present
- **American Astronomical Society** 2021 – Present

PRESS

- **The Economist**: *Ideas for finding ET are getting more inventive* 18 January 2023
- **YaleNews**: *Searching for extraterrestrial life – by keeping an eye on exploding stars* 31 July 2023

REFERENCES

Nikhil Padmanabhan, Associate Professor of Physics and Astronomy, Yale University, nikhil.padmanabhan@yale.edu
Héctor Arce, Professor of Astronomy, Yale University, hector.arce@yale.edu
Juergen Ott, Research Scientist, National Radio Astronomy Observatory, jott@nrao.edu
Kazunori Akiyama, Research Scientist, Massachusetts Institute of Technology Haystack Observatory, kakiyama@mit.edu
James Davenport, Research Assistant Professor of Astronomy, University of Washington, jrad@uw.edu