

TRUNG V. HA
Pre-Doctoral Fellow – Center for Computational Astrophysics, Flatiron Institute

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Research website: https://tvh0021.github.io/Astronomy/main_site_th.html

Curriculum Vitae
(Last updated: December 6, 2023)

RESEARCH INTERESTS

Numerical simulations of supermassive black holes in cool-core clusters.
Stellar evolution and turbulent kinematics within stellar associations.
Applications of machine learning and computer vision in astrophysics research.

EDUCATION

2020 – present	University of North Texas, Denton, Texas Doctor of Philosophy (PhD.) in Physics (anticipated 2025) Master of Science in Physics – conferred May 2022 GPA: 4.00 / 4.00
2017 – 2020	University of Rochester, Rochester, New York Bachelor of Science in Physics
2015 – 2017	Central Arizona College, Coolidge, Arizona Associate of Science

RESEARCH EXPERIENCE

September 2023 – Present	Center for Computational Astrophysics, Flatiron Institute Analyze data from particle-in-cell simulations of turbulent astrophysical plasma. Develop machine learning techniques to identify and segment current sheets in 3-dimensional plasma simulations. (J. Nättilä, J. Davelaar, and L. Sironi, supervisor)
September 2020 – Present	Department of Physics, University of North Texas Perform numerical simulations of supermassive black holes in cool-core clusters with the Athena++ code. (Y. Li, supervisor) Reduce and analyze near infrared spectra of quasars to confirm the correlation between weak emission lines and accretion rates. (O. Shemmer, supervisor) Analyze data from Gaia all sky survey to measure turbulence traced by young stars in various molecular clouds in the Milky Way. Model the evolution of turbulence traced by stellar populations in giant molecular cloud simulations. (Y. Li, supervisor)
September 2018 – May 2020	Center for Computational Relativity and Gravitation, Rochester Institute of Technology Performed dynamical simulations of binary neutron stars using the Einstein Toolkit. Documented user manual for LORENE neutron stars initial data

generation code.
Generated binary neutron stars initial data.
(J. Faber and E. Blackman, supervisor)

June 2018 – August 2018 **Laboratory for Laser Energetics, University of Rochester**
Wrote MATLAB program to analyze beamspray signals from laser shots through an under-dense plasma.
Performed laser wakefield acceleration simulations in 2-D and compared results with available 3-D data.
Designed a parameter space constraint for a variable-aperture ellipsoidal plasma mirror.
(J. Shaw, supervisor)

WORK EXPERIENCE

September 2023 – January 2024 **Research Analyst, Center for Computational Astrophysics – Simons Foundation**
Apply machine learning and computer vision techniques to segment turbulent structures in plasma simulations.

June 2021 – Present **Graduate Research Assistant, University of North Texas**
Investigate accretion onto supermassive black holes and the effects of feedback onto the surrounding environment via computer simulations.
Study the turbulent spectrum of stars, H α gas, and CO gas in nearby molecular clouds.
Advise graduate students in the Artificial Intelligence program at UNT on an inter-disciplinary project to apply neural networks to identify similar star-forming regions of the Milky Way.

August 2020 – May 2021 **Graduate Teaching Assistant, University of North Texas**
Lead lab sections for introductory physics for life science majors.
Review concepts taught in lectures as pertain to the experiments, grade and provide feedback to students through exercise questions and lab reports.

September 2018 – December 2019 **Undergraduate Teaching Assistant, University of Rochester**
Lead physics workshop sessions for introductory-level physics course.
Assist course instructors with homework and exam grading, review materials taught in class.

September 2016 – May 2017 **Mathematics tutor, Mesa Community College**
Hold one-on-one tutoring sessions for students with disability at various mathematical levels, from basic arithmetic to pre-calculus.

PUBLICATIONS

1. *“Shedding New Light on Weak Emission-Line Quasars in the CIV–H β Parameter Space”*
Ha, Trung; Dix, C.; Matthews, B. M.; Shemmer, O.; et al., ([2023ApJ...950...97H](#))
2. *“The Nature of the Motions of Multiphase Filaments in the Centers of Galaxy Clusters”*
Ganguly, S.; ...; **Ha, Trung**, ([2023FrASS..1038613](#))
3. *“Turbulence in Milky Way Star-forming Regions Traced by Young Stars and Gas”*
Ha, Trung; Li, Y.; Kounkel, M.; Xu, S.; Li, H.; Zheng, Y., ([2022ApJ...934....7H](#))
4. *“Handing-Off the Outcome of Binary Neutron Star Mergers for Accurate and Long-Term Post-Merger Simulations”*
Lopez Armengol, F. G.; ...; **Ha, Trung**; et al., ([2022PhRvD.106h3015L](#))

5. *“HARM3D+NUC: A new method for simulating the post-merger phase of binary neutron star mergers with GRMHD, tabulated EOS and neutrino leakage”*
Murguia-Berthier, A.; ...; Ha, Trung, et al., ([2021ApJ...919...95M](#))
6. *“Measuring Turbulence with Young Stars in the Orion Complex”*
Ha, Trung; Li, Y.; Xu, S.; Kounkel M.; Li, H., ([2021ApJ...907L..40H](#))

TALKS

January 2024	Center for Computational Relativity and Gravitation Lunch Talk, Rochester, NY, USA (invited) Title: “Can Neural Networks Recognize Current Sheets? Using Computer Vision to Analyze Magnetized Plasma Turbulence”
January 2024	243rd Meeting of the AAS, New Orleans, LA, USA Title: “Bridging the Gap: Modeling Supermassive Black Holes Feeding and Feedback at the Meso-Scale”
December 2023	Black Holes on Broadway: The Next Generation of AGN Models in Galaxy Formation, New York, NY, USA Title: “Bridging the Gap: Modeling Supermassive Black Holes Feeding and Feedback at the Meso-Scale”
January 2023	241st Meeting of the AAS, Seattle, WA, USA Title: “Turbulence in Milky Way Star-forming Regions Traced by Young Stars and Gas”
August 2022	Star Formation in Different Environments 2022, Rencontres du Vietnam, Quy Nhon, Vietnam Title: “Turbulence in Milky Way Star-forming Regions Traced by Young Stars and Gas”
February 2021	AAS Journal Author Series with Frank Timmes, YouTube Interview on recent publication, title: “Measuring Turbulence with Young Stars in the Orion Complex” with Yuan Li.
July 2020	TCAN on Binary Neutron Stars Workshop, Rochester Institute of Technology, Rochester, NY, USA Title: “Generating Initial Data for Binary Neutron Stars using LORENE” with Joshua Faber and Tanmayee Gupte.
October 2019	Midwest Relativity Meeting, Grand Valley State University, Grand Rapids, MI, USA Title: “Generating Physically Realistic Binary Neutron Stars Initial Data” with Grace Fiacco (Rochester Institute of Technology).

AWARDS AND HONORS

Fall 2023 – Spring 2024	The Zhibing Hu Scholarship, University of North Texas, \$1000.
Spring 2023	College of Science Travel Award, University of North Texas. \$500.
Fall 2021 – Spring 2025	R. B. Toulouse Scholarship, University of North Texas. \$1000 / year.
Spring 2019 – Spring 2020	Take Five Scholar, University of Rochester. Thesis: “Exploring the Advantages and Shortcoming of French Literature in Translation”.
Spring 2018 – Spring 2020	Sigma Pi Sigma member.
Fall 2017	Dean’s List, University of Rochester.
Spring 2016 – Spring 2020	Phi Theta Kappa member.
Spring 2016	Outstanding Student in Physical Science, Central Arizona College.
Fall 2015 – Spring 2017	Dean’s List, Central Arizona College.

OTHER ACTIVITIES

Participating in the Flatiron Institute's Center for Computational Astrophysics Pre-doctoral program in New York City in fall 2023.

Participated in student exchange programs: "Cultural Exchange Program" in Arizona, USA in 2014-2015 and "French in France" in Rennes, France in summer 2019.

Other interests include computer hardware, assembling desktop computers and laptops, solving various Rubik's puzzles, and traveling.

Fluent in English and Vietnamese. Intermediate level fluency in French.