**TRUNG V. HA**
**Physics PhD. Student, University of North Texas**

Contact: trungha@my.unt.edu or tha@flatironinstitute.org (until May 2024)
Research website: https://tvh0021.github.io/Astronomy/main_site_th.html

**Curriculum Vitae**
(Last updated: April 16, 2024)

## RESEARCH INTERESTS

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

## EDUCATION

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| 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

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| 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. |

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| | 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

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| September 2023 – Present | **Research Analyst / Guest Researcher, 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, Hα 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. |

## FIRST-AUTHORED PUBLICATIONS

1. *"Shedding New Light on Weak Emission-Line Quasars in the CIV–Hβ Parameter Space"*
   **Ha, Trung;** Dix, C.; Matthews, B. M.; Shemmer, O.; et al., (2023ApJ...950...97H)
2. *"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)
3. "*Measuring Turbulence with Young Stars in the Orion Complex*"
   **Ha, Trung**; Li, Y.; Xu, S.; Kounkel M.; Li, H., (2021ApJ...907L..40H)

**OTHER PUBLICATIONS**

1. ***"Gemini Near Infrared Spectrograph - Distant Quasar Survey: Rest-Frame Ultraviolet-Optical Spectral Properties of Broad Absorption Line Quasars"***
   Ahmed, H.; …; **Ha, Trung**, et al., (ApJ, in press)
2. ***"The Nature of the Motions of Multiphase Filaments in the Centers of Galaxy Clusters"***
   Ganguly, S.; …; **Ha, Trung**, (2023FrASS..1038613)
3. ***"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)
4. ***"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)

**TALKS**

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| April 2024 | **Astronomy & Astrophysics Seminar, Columbia University, NY, USA**<br>Title: "Segmentation of Current Sheets in Magnetized Plasma Turbulence with Computer Vision" |
| April 2024 | **Center for Computational Relativity and Gravitation Lunch Talk, Rochester, NY, USA (invited)**<br>Title: "Can Neural Networks Recognize Current Sheets? Using Computer Vision to Analyze Magnetized Plasma Turbulence" |
| March 2024 | **Astronomy Lunch Talk, Department of Physics, University of California, Santa Barbara, CA, USA**<br>Title: "Tracing Turbulence with Young Stars" |
| February 2024 | **Kavli Institute for Theoretical Physics (KITP) – Turbulence in the Universe Workshop, Santa Barbara, CA, USA**<br>Title: "Segmentation of Current Sheets in Magnetized Plasma Turbulence with Computer Vision" |
| January 2024 | **243rd Meeting of the AAS, New Orleans, LA, USA**<br>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**<br>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**<br>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**<br>Title: "Turbulence in Milky Way Star-forming Regions Traced by Young Stars and Gas" |
| February 2021 | **AAS Journal Author Series with Frank Timmes, YouTube**<br>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** |

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| | 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**<br>Title: "Generating Physically Realistic Binary Neutron Stars Initial Data" with Grace Fiacco. |

## SUPERCOMPUTING AWARD

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| March 2024 | **P.I., National Science Foundation ACCESS Explore allocation**<br>Award: 400,000 ACCESS credits (equiv. 6000 node-hours or $1400) |

## AWARDS AND HONORS

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| 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.<br>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

Participated 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.