Raghav Chari

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Citizenship

United States & Canada

Education

The University of Tennessee, Knoxville - College of Natural Sciences & Mathematics *2021–2025*

- **B.S., Physics (Hons.)**
  - Thesis Advisor: Prof. Mike Guidry
- **B.A., College Scholars: Philosophy of Physics (Hons.)**
  - Thesis Advisors: Prof. Mariam Thalos (Philosophy), Prof. Sean Lindsay (Physics), & Prof. Larry Lee (Physics)

Publications

h-index — As of February 17, 2025: 1, Citations: 9, Peer-Reviewed Journal Papers: 2 Google Scholar

Refereed Journal Papers

- Miroshnichenko, A.S., **Chari, R.**, *et al.* (2023). *Searching for Phase-Locked Variations of the Emission-Line Profiles in Binary Be Stars.* **Galaxies**, 11, 83. [DOI:10.3390/galaxies11040083].
- Lackey-Stewart, A., **Chari, R.**, *et al.* (2024). *Fast Explicit Solutions for Neutrino-Electron Scattering: Explicit Asymptotic Methods.* **Phys. Rev. D**, [DOI:10.1103/PhysRevD.109.103019].

B.S. Thesis

- **Raghav Chari** (2024). *Explicit Asymptotic Solutions of ν_e+e^- Neutrino Networks for Large Sets of Partial Differential Equations in Core-Collapse Supernovae.* **Defended April 19, 2024** [arXiv:2409.03133].

B.A. Thesis

- **Raghav Chari** (2024). *Foundations of Time.* **Thesis in Progress**.

First Author Conference Proceedings

- **Chari, R.**, et al. (2024). *Advancing Astrophysical Models through FENN: Algebraically Stabilized Explicit Integration for Neutrino Electron Scattering in Stellar Explosions and Mergers.* Bulletin of the AAS. [Abstract].
- **Chari, R.**, et al. (2023). *Neutrino Electron Scattering in Dense Astrophysical Environments: A New Frontier in Neutrino Transport.* Frontiers in Nuclear Astrophysics Book of Abstracts (pp. 22). [Abstract].
- **Chari, R.**, et al. (2024). *Modeling the Meteoric Flux and Accretion of Silica (SiO2) and Gases into Exoplanetary Atmospheres using 3-D Monte Carlo Simulations.* 91st Annual Meeting of the Southeastern Section of the APS [Abstract].

Grants and Fellowships

Successfully secured **$12,750** in research funding through the following grants and fellowships.

- *Dwight R. and Katie Reagan Wade Scholarship Grant: Study of Philosophy of Physics in Poland*, Funding Body: College Scholars Program, University of Tennessee, Knoxville, **$4000**, 2025
- *Enhancing Astrophysical Modeling: Integrating WEAKLIB with Fast Explicit Neutrino Networks for Advanced Large Scale Neutrino Electron Scattering*, Faculty Mentor: Prof. Mike Guidry, Advanced Undergraduate Research Activity (AURA), **$1750**, 2024

- *New Approaches to Astrophysical Nucleosynthesis and Neutrino Transport*, Fellowship, Faculty Mentor: Prof. Mike Guidry, University of Tennessee, Knoxville Department of Physics and Astronomy, **$5500**, 2021
- Department of Undergraduate Research & Fellowships *Travel Grant* (x3), **$1500**, 2023

Research Experience

Research Assistant and Fellow, The University of Tennessee, Knoxville, TN
Professor Guidry & UT/ORNL Computational Astrophysics Group September 2021 - Present

- Developed new computational algorithms for solving large sets of partial differential equations related to hydrodynamics, radiation transport, and thermonuclear reactions.
- Awarded the Department Summer Fellowship in 2022 and played a pivotal role in the development of "FENN," a computational framework.
- Awarded AURA grant Spring 2024 to integrate FENN with WEAKLIB for demonstrating scalability to sets of large Neutrino Networks for arbitrary ρ, T, Ye.

Research Assistant, Duke University, Durham, NC
Professor Kannawadi & LSST Collaboration May 2024 - August 2024

- Summer Research internship under the mentorship of Dr. Arun Kannawadi research Dark Matter through Gravitational lensing.
- Working on python based pixel analysis code for the Rubin Observatory.

Research Assistant, California Institute of Technology, Pasadena, CA
Dr. Oza Group November 2022 - Present

- Formulated advanced computational models focusing on stellar pollution, accretion disk dynamics, and spallation reactions.
- Performed calculations using SERPENS to innovate extended models for Black Hole Pollution dynamics.

Research Assistant, The University of Tennessee, Knoxville, TN
Professor Thalos/Department of Philosophy February 2023 - Present

- Conducted Philosophy research under the mentorship of Professor Mariam Thalos, primarily as it relates to the philosophy of physics.
- Working on a research project studying literature and investigating space (time) from a philosophical perspective.

Research Assistant, The University of North Carolina, Greensboro, NC
Professor Miroshnichenko September 2020 - July 2023

- Conducted spectral analysis to analyze the binarity of Be stars, contributing to the detection of orbital periods.
- Used IRAF data software to analyze data to contribute to the observation of phase-locked peak intensity variations.

Teaching Experience

Undergraduate Teaching Assistant, University of Tennessee, Knoxville

- Astronomy 151: Journey through the Solar System *Springs 2023-2025, Falls 2022-2024*
- Astronomy 152: Stars, Galaxies, and Cosmology *Springs 2023-2025, Falls 2022-2024*
- Astronomy 153 Lab I *Springs 2023-2025, Falls 2022-2024*
- Astronomy 154 Lab II *Springs 2023-2025, Falls 2022-2024*
- Physics 221: Elements of Physics I *Spring 2023*
- Physics 222: Elements of Physics II *Spring 2023*

Professional Activities, Outreach, and Service

People of Color in Physics, Founder and President *2023–2024*

- Established a People of Color in Physics society within the Physics Department at the University of Tennessee. This included recruitment and retention of diversity within the Physics program as well as advocacy.
- Led efforts including hosting many guests to speak on issues relating to diversity in physics, as well as assisting in the National Society of Black Physists Conference which the University of Tennessee hosted.

University Provost Advisory Council *2023–2024*

- Selected by the Dean to serve on the University Provost Council and serve as the Representative of the College of Arts & Sciences on the University level. Council term is 2 years.
- Emphasized on diversity in Science during my term and focusing university admissions on broader ranges of socio-economic status's across Tennessee, with an emphasis on Science and Physics.

Computer Skills

Expert in C/C++. Proficient in Matlab, Python, Bash, Experience in HPC (Frontier Supercomputer). Markup languages: LaTeX, HTML, CSS, Markdown. **Software**—Most contributions can be found at https://github.com/Rchari1. Author of **Fast Explicit Neutrino Networks (FENN)**

Awards

2024 EUReCA Achievement Award, Undergraduate Research & Fellowships *May 2024*

SPS National Leadership Scholarship, Society of Physics Students (AIP) *May 2023*

Outstanding First-Year Physics Student, University of Tennessee, Knoxville *May 2022*

Robert Talley Physics Scholarship, University of Tennessee, Knoxville *August 2021*

Tennessee Explore Scholarship, University of Tennessee, Knoxville *August 2021*

Distinguished District Governor, Key Club International *May 2021*

Eagle Scout, Boy Scouts of America *Oct 2020*