

Charles STAPLEFORD

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EDUCATION

- Aug. 2014-Oct. 2020 **Ph.D. in Physics**, North Carolina State University, Raleigh, NC.
Thesis : Investigations of Neutrino Oscillations in Core-Collapse Supernovae
- Aug. 2014– May 2016 **M.S. Physics**, North Carolina State University, Raleigh, NC.
- Aug. 2010- May 2014 **B.S. Physics, Astronomy, and Mathematics**, *French Minor*, University of Iowa, Iowa City, IA

APPOINTMENTS

- Aug. 2024 - Present** **Staff Engineer, SOAR DIVISION, Applied Research Associates**
- > Supervisor : James Pearson
 - > Projects : Nuclear Capability Services (NuCS) Demonstration Environment for Model Output (DEMO)
 - > Integrated 3rd-party FORTRAN and C++ applications into the (NuCS) framework, developing C++ and Java wrapper layers to enable cross-language interoperability.
 - > Applied Agile development practices to improve software functionality, and maintain multi-disciplinary simulation tools.
 - > Authored technical reports validating physical model accuracy and integration reliability, supporting verification and documentation of the NuCS framework.
- Java C++ FORTRAN RUST Code Review Technical Documentation
- Oct. 2020 - Dec. 2023** **Post Doctoral Researcher, ORNL LEADERSHIP COMPUTING FACILITY, Oak Ridge National Lab**
- > Advisor : Bronson Messer
 - > Supervisor : Balint, Joo
 - > Projects : Agile-BOLTZTRAN update & expansion, development of FLASH5
- Parallel Computing High Performance Computing MPI CUDA GPU coding
- Dec. 2015 - Oct. 2020** **Research Assistant, DEPARTMENT OF PHYSICS, North Carolina State University**
- > Advisors : Jim Kneller & Carla Fröhlich
 - > Research Topics : Neutrino Flavor Oscillation, Core-Collapse Supernovae, and Beyond the Standard Model Neutrino Physics
- Core-Collapse Supernovae Neutrino Oscillations Neutrino Transport 1D Supernova Simulations C++ Fortran
- Jan - May 2019** **Physics Instructor, DEPARTMENT OF PHYSICS, North Carolina State University**
- > PY 208 Physics for Engineers & Scientists II
- E&M Lecture
- Aug - Dec 2015** **Teaching Assistant, DEPARTMENT OF PHYSICS, North Carolina State University**
- > PY209 Physics lab for Engineers (E&M Semester)
- E&M laboratory

SKILLS

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|-------------------|--|
| Languages | FORTRAN, C, C++, Java, Bash, Python, RUST |
| Practices | Agile Development, Code Integration & Optimization, Software Validation, Technical documentation |
| Development Tools | MPI, OpenMP, Eclipse, Visual Studio Code, Ant, git |
| Platforms | Windows, Linux/Unix, GPU programming |
| Other Software | LaTeX (Beamer), Mathematica, Microsoft Office |

PUBLICATIONS

- [3] D. Calvert, M. Redle, B. Bautam, **C. Stapleford**, C. Fröhlich, J. Kneller, and M. Liebendorfer. Turbulence in Core-Collapse Supernovae. *Accepted for publication in the Astrophysics Journal*
- [2] **C. Stapleford**, C. Fröhlich, and J. Kneller. Coupling Neutrino Oscillations and Simulations of Core-Collapse Supernovae. *Phys. Rev. D.* **102** 081301(R) (2020) [arXiv :1910.04172]
- [1] **C. Stapleford**, D. Väänänen, J. Kneller, G. McLaughlin, B. Shapiro. Nonstandard Neutrino Interactions in Supernovae. *Phys. Rev. D.* **90** 093007 (2016) [arXiv :1605.04903]

CONTRIBUTED TALKS AND POSTERS

- Oct 2022 Neutrinos in core-Collapse Supernovae
Seminar, OLCF Whiteboard Seminar, Oak Ridge, TN
- Oct. 2019 The Effects of Neutrino Oscillations on Core-Collapse Supernova Explosions
Contributed Talk, APS DNP Meeting, Arlington, VA
- Aug. 2019 The Effects of Neutrino Oscillations on Core-Collapse Supernova Explosions
Contributed Talk, MICRA, Jena, Germany
- May 2019 The Effects of Neutrino Oscillations on Core-Collapse Supernova Explosions
Poster Presentation, Fifty-One Ergs, NCSU, Raleigh, NC
- May 2019 The Effects of Neutrino Oscillations on Core-Collapse Supernova Explosions
Contributed Talk, Supernova Neutrinos at the Crossroads, ECT*, Trento, Italy
- Mar. 2017 Nonstandard Neutrino Interactions in Supernovae
Poster Presentation, Graduate Research Symposium, NCSU, Raleigh, NC

SERVICE & LEADERSHIP

- Aug - Sep 2022 **SESAPS Nominating Committee**
Served on the Nominating Committee for the South East Section of APS in Fall 2022
- Oct. 2019 **Astronomy On Tap**, Durham, NC
Gave a public talk on Neutrinos & Supernovae at the October Event
- Aug. 2015- June 2019 **Co-Organizer for Astronomy Outreach Events**, North Carolina State University
Organize and coordinate for the (NC State Astronomy Open House) and other public observing events around the Research Triangle (Raleigh, Durham, & Chapel Hill)
- July 2015- June 2017 **Officer for the Graduate Physics Student Association**, North Carolina State University
Served on the executive board for the GPSA as the Secretary and Vice-President
- June 2013- May 2014 **Treasurer for the Society of Physics Students**, University of Iowa
Maintained financial records for the organization
- Dec. 2012- May 2014 **Volunteer for Clear Skies Patrol**, University of Iowa
Public observing nights hosted by the Physics Department