Sara R.J. Wilson

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Education

University of Pittsburgh — Pittsburgh, PA
Bachelor of Philosophy in Mathematics — May 2026
Advisor: Prof. William Layton
Thesis Title TBD

Honors & Awards

Dean's List, Edna M. Heck Scholarship, SWE Certificate of Merit in Math and Science

Publications & Preprints

Computational Methods in Plasma Physics — Pending
S.R. Wilson

An Analysis of a 2×2 Keyfitz-Kranzer Type Balance System with Varying Generalized Chaplygin Gas *Physics of Fluids* — Sept 2024

J. Frew, N. Keyser, E. Kim, G. Paddock, C. Toumbleston, **S. Wilson**, C. Tsikkou
10.1063/5.0231413 ↗

Research Experience

University of Pittsburgh — Pittsburgh, PA
Bachelor of Philosophy Research — Nov 2025 – Current

- Analyzing the error and stability of finite element methods for liquid metals, which are governed by the incompressible MHD equations
- Used FreeFEM++ to verify results

Carnegie Mellon University — Pittsburgh, PA
CMU-Pitt Mathematics Directed Reading Program — Sept 2025 – Dec 2025

- Studied graduate-level text in computational plasma physics, investigating numerical methods, including finite difference, spectral, finite element techniques

Semiconductor Research Corporation — Tuscaloosa, AL
Engineering Researcher — Jun 2025 – Jul 2025

- Analyzed mutual and self-inductance, resonant transfer, and electromagnetic far-field behavior in one and two coil wireless power transfer systems contained in a metal enclosure
- Evaluated design modifications to optimize power via simulation, computation, and analysis

West Virginia University — Morgantown, WV
Applied Analysis Researcher — Jun 2024 – Jul 2024

- Expanded work involving a 2×2 Keyfitz-Kranzer type balance system with varying Chaplygin gas, a model for dark energy and dark matter
- Adapted implementation of the local Lax-Friedrichs scheme to account for time-dependent wave speeds and analyzing system dynamics

Relevant Coursework & Studies

Graduate: Computational Fluid Dynamics, Advanced Calculus, Data Science & Statistical Learning

Undergraduate: Numerical Analysis & Linear Algebra, Real Analysis, Partial Differential Equations, Probability, Honors Physics, Astrophysics, Space Flight, Algorithms & Data Structures

Independent: Numerical Methods for Astrophysics

Skills

Programming: MATLAB, Java, Python, R

Software: FreeFEM++, Ansys Maxwell, LaTeX, Git, VS Code, Paraview

Projects

Finite Element Solvers in FreeFEM++ *(in progress)*
Implementing Poisson and Stokes problems via Galerkin FEM

Professional Development

Carnegie Mellon University — Pittsburgh, PA
CMU-Pitt DRP Presentation — Dec 2025

- Talk on the culmination of my studies in computational plasma physics, with an emphasis on finite element methods for eigenvalue problems present in modeling plasma columns

Princeton University — Princeton, NJ
Summer School in Fluids and Computer Assisted Proofs — Aug 2025

- Attended lectures on numerical methods for fluid equations, neural networks, computer-assisted proofs, and career development

University of Alabama — Tuscaloosa, AL
Summer Research Symposium — Jul 2025

- Wireless Power Transfer for Monolithic and Heterogenous Integration of 3D Integrated Devices

Texas A&M University — College Station, TX
Summer School in Modeling and Simulation of PDEs — May 2025

- Developed a 2D FDTD solver for Maxwell's equations on a graphene sheet with both a Uniform PML and Split PML as an absorbing boundary layer

Joint Mathematics Meetings — Seattle, WA
Pi Mu Epsilon Poster Session — Jan 2025

- Numerical Analysis of the Riemann Problem for a Cosmological 2×2 Balance System

West Virginia University — Morgantown, WV
Summer Research Symposium — Jul 2024

- Numerical Analysis of the Riemann Problem for a Cosmological 2×2 Balance System

Teaching Experience

University of Pittsburgh — Pittsburgh, PA
Teaching Assistant — Aug 2024 – Current

- Instructed recitation sessions to reinforce material and facilitate engagement in business calculus and algebra

University of Pittsburgh — Pittsburgh, PA
Mathematics Tutor — Jan 2023 – Current

- Held individualized sessions for students in mathematics, from college algebra through differential equations. Tutored students with extenuating circumstances remotely to optimize learning opportunities

West Virginia University — Remote
REU Mentor — Jun 2025 - Jul 2025

- Supported new REU cohort through mentorship in numerical analysis of systems of balance laws and MATLAB programming