

# Matthew C. Pharr

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matthew.pharr@columbia.edu  
(410) 375-9882

## EDUCATION

Columbia University, New York, NY      Rensselaer Polytechnic Institute, Troy, NY  
Ph.D. Plasma Physics, Expected 2026      B.S. Physics & Mathematics, 2021  
M.Phil. Plasma Physics, Expected 2025      *Summa Cum Laude.*  
M.S. Applied Physics, 2023

## RESEARCH & PROJECTS

*Graduate Research Assistant*      August 2021 - Present  
Columbia University Plasma Physics Lab, New York, NY  
Advisor: Dr. Carlos Paz-Soldan, Dr. Nikolas Logan

- M. Pharr, N. C. Logan, C. Paz-Soldan, J. K. Park, and C. Hansen, *Error field predictability and consequences for ITER*, [Nucl. Fusion 64, 126025 \(2024\)](#).
- The MANTA Collaboration et al., *MANTA: a negative-triangularity NASEM-compliant fusion pilot plant*, [Plasma Phys. Control. Fusion 66, 105006 \(2024\)](#).
- C. J. Hansen, I. G. Stewart, D. Burgess, M. Pharr, S. Guizzo, F. Logak, A. O. Nelson, and C. Paz-Soldan, *TokaMaker: An open-source time-dependent Grad-Shafranov tool for the design and modeling of axisymmetric fusion devices*, [Computer Physics Communications 298, 109111 \(2024\)](#).
- C. Paz-Soldan et al., *Simultaneous access to high normalized density, current, pressure, and confinement in strongly-shaped diverted negative triangularity plasmas*, [Nucl. Fusion 64, 094002 \(2024\)](#).
- C. T. Holcomb et al., *DIII-D research to provide solutions for ITER and fusion energy*, [Nucl. Fusion 64, 112003 \(2024\)](#).
- M. Pharr, S. Frank, O. Nelson, R. Nies, and T. Rubin, [hansec/OpenPOPCON](#), (2024).

- M. Pharr et al. *Expected Error Fields in ITER: A full-device source model and strategies for stable operation*. American Physical Society, Division of Plasma Physics 2024 Annual Meeting: Atlanta, GA. Section PP11.00050: Research in Support of ITER.
- M. Pharr et al. *Error Field Predictability and Consequences for ITER*. American Physical Society, Division of Plasma Physics 2023 Annual Meeting: Denver, Co. Section PP11.00050: Poster Session VI: MHD and Stability.
- M. Pharr et al. *Error field source identification in early ITER plasmas*. American Physical Society, Division of Plasma Physics 2022 Annual Meeting: Spokane, Wa. Section PP11.00044: Poster Session VI: Diagnostics; Edge and Pedestal; Stability; Heating; Transport, Turbulence.

*U.S. Department of Energy Research Intern*      Fall 2020, Summer 2021  
Princeton Plasma Physics Lab, Princeton, NJ  
Advisor: Dr. Fatima Ebrahimi

- F. Ebrahimi and M. Pharr, *A Nonlocal Magneto-curvature Instability in a Differentially Rotating Disk*, [ApJ 936, 145 \(2022\)](#).
- M. Pharr, F. Ebrahimi, *A nonlocal Curvature-Driven Flow-Shear Instability in Low-Field Plasmas* Sherwood Fusion Theory 2023 Conference: Knoxville, TN.
- M. Pharr, F. Ebrahimi, E. Blackman, *Large Scale Magnetic Field Growth and Stability in Hall-MHD Simulations of Quasi-Keplerian Flows*. American Physical Society, Division of Plasma Physics 2021 Annual Meeting: Pittsburgh, PA. Section UO06.00014: Astrophysical Turbulence and Dynamos.

*Undergraduate Research in Computational Molecular Biophysics* Summer 2020, Spring 2021  
Rensselaer Polytechnic Institute, Department of Mathematical Sciences, Troy, NY  
Supervisor: Dr. Peter Kramer

## PEDAGOGY

*Graduate Teaching Assistant, Intro Physics Lab Sequence* August 2022 - Present  
Barnard College of Columbia University, Physics and Astronomy, New York, NY

*Graduate Teaching Assistant, Complex Analysis/Linear Algebra* Fall 2021 - May 2022  
Columbia University, Applied Physics and Applied Mathematics, New York, NY

*Undergraduate Facilitator* Fall 2019 - Summer 2020, Spring 2021  
Rensselaer Polytechnic Institute, Physics Department, Troy, NY

- Facilitate Honors Physics I/II Lab, Electromagnetic Theory, Intro to Quantum Mech.

*I-PERSIST Mentor* Fall 2019  
Rensselaer Polytechnic Institute, Physics Department, Troy, NY

*ALAC Introductory Physics Tutor* Fall 2019 - Spring 2020  
Rensselaer Polytechnic Institute, Physics Department, Troy, NY

*Private Tutor, Math/Physics* Spring 2018 - Spring 2020  
Self-employed. Took 2-4 hours per week of university-level tutoring.

## HONORS & AWARDS

*ORFEAS Fusion Design Contest Award*; Columbia University, 2022

For contributions to the Columbia/MIT team's project on negative triangularity reactor pilot plant design scoping. Awarded \$22,000 as a group.

*Max Hirsch Prize in Mathematics*; Rensselaer Polytechnic Institute, 2021

This prize is awarded to a Senior in the Department of Mathematical Sciences who has demonstrated outstanding ability in his or her academic work and also gives promise of outstanding success in a career in mathematical sciences.

*J. Lawrence and Gertrude Katz Award in Physics*; Rensselaer Polytechnic Institute, 2021

This award is presented to the student selected as the outstanding graduating senior receiving a Bachelor of Science in Physics.

ΣΠΣ, Physics Honor Society

Rensselaer Archimedian Society (4.0 award)

Honorable Mention for Research Paper, Mathematical Competition in Modeling

Rensselaer Leadership Award

## SKILLS

Python, Java, Fortran, Matlab, Linux, L<sup>A</sup>T<sub>E</sub>X

Use of vacuum technology and other plasma physics related lab equipment

Use of high voltage lab equipment

Conversational in French