Matthew Mitchell

Curriculum Vitae

+1 (208) 859 9766
matthew.s.mitchell@colorado.edu
https://msmitchell.org

Education

2020–present **Yale University**.
Physics PhD student

2016–2020 **University of Colorado Boulder**.
BA in Physics
BA in Computer Science

Research Experience

2021–present **Graduate Research Assistant**, *Department of Physics*, Yale University.
Research advisor: Prof. David Poland
- Developed bootstrap code for $O(N)$ and Gross-Neveu-Yukawa models

2016–2020 **Undergraduate Research Assistant**, *Department of Physics*, University of Colorado Boulder.
Research advisor: Prof. Scott Parker
- Developed novel plasma simulation algorithms, with symmetry properties that allow significant improvements over the energy conservation of standard particle-in-cell methods (see "Publications" section).
- Developed numerical Schrodinger equation solver for investigating nonlinear dynamics in quantum systems.
- Optimized a massively parallel gyrokinetic simulation code (GEM) for toroidally confined plasmas and helped port it to new architectures.
- Developed visualizations for tokamak simulation data.

Publications

[1] Matthew S. Mitchell, Matthew T. Miecnikowski, Gregory Beylkin, and Scott E. Parker. Efficient Fourier basis particle simulation. *Journal of Computational Physics*, 396:837–847, November 2019.

Conference Presentations

[2] Matthew S. Mitchell. Particle Simulation in Fourier Space, June 2018. 2018 IEEE International Conference on Plasma Science.

[3] Matthew S. Mitchell. Particle Simulation in Fourier Space, November 2018. 60th Annual Meeting of the APS Division of Plasma Physics.

[4] Matthew S. Mitchell. Efficient Electromagnetic Fourier Basis Particle Simulation, September 2019. 2019 International Conference on Numerical Simulation of Plasmas.

Skills

- **Programming languages:** C/C++, Fortran, Java, Haskell, Mathematica, MATLAB, Python.
- **Parallel computing frameworks:** CUDA, MPI, OpenACC, OpenMP.
- Basic electronic circuit design and fabrication.

Community Involvement & Service Work

2018–2020 **Member**, CU-Prime and CU Boulder Society of Physics Students.
- Engaged in mentorship activities in an attempt to make research more accessible to first-year physics undergraduates, with an eye toward lowering barriers for underrepresented groups in physics.
- In November 2019, delivered an expository lecture on computational plasma physics entitled "How to Simulate a Plasma" to first-year physics students.

2017–2020 **President**, CU Boulder Academic Quizbowl Club.

Honors & Awards

2020 Raul A. and Ruth Stern Plasma Physics Scholarship

2016 University of Colorado Boulder Presidential Scholarship