William S. Parker

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EDUCATION

University of Oregon (Benjamin J. McMorran) — Eugene, Oregon
Doctor of Philosophy: Physics — GPA: 3.880
Fall 2024

Chapman University — Orange, California
Bachelor of Science *Magna Cum Laude,* May 2018 — GPA: 3.729
Major: Physics
Major: Mathematics
Minor: General Music

RESEARCH

PhD Candidate – Prof. Benjamin McMorran — Eugene, Oregon
University of Oregon — Spring 2020 - present
Study the 3D structure of skyrmions in magnetic multilayer thin films experimentally, theoretically, and computationally.

Graduate Research Assistant – Prof. Benjamin McMorran — Eugene, Oregon
University of Oregon — Summer 2018 - Winter 2020
Investigated techniques to investigate chirality using the orbital angular momentum of fast electron beams within commercial transmission electron microscopes.

Undergraduate Researcher – Prof. Jerry LaRue — Orange, California
Chapman University — Spring 2017 - Spring 2018
Created vortex optical states using a digital micromirror device with the goal of measuring surface adsorption and desorption energies by torquing adsorbed molecules into an unstable configuration.

Undergraduate Researcher (NSF REU) – Prof. Joseph Eberly — Rochester, New York
University of Rochester — Summer 2017
Investigated fundamental limitations to mode-locked lasers, focusing on phase noise, lasing cavity length, and novel frequency distributions.

RELEVANT EXPERTISE

Primary Programming Languages	**Experience**
Python	2014 - present
LaTeX	2014 - present
JavaScript/HTML/CSS	2019 - present

Programming expertise

Numerical physics simulation
Lorentz TEM phase reconstructions | *Electron Fourier optics* | *Micromagnetic simulations (MuMax3)*

Image processing
OpenCV | *2D signal processing* | *FIJI*

Python package development, with Git version control
`ltempy` - *tools for the analysis, simulation, and presentation of LTEM data*

`ovf2io` - *a lightweight I/O package for the OOMMF Vector Field format*

SSH | *nix command line | High-Performance Computing

Micromagnetic simulations on University of Oregon's HPC cluster Talapas.

3D modeling and computer graphics

Blender for 3D scientific figures

Web development

`frctl` | `frctl (GitHub)` - *An interactive fractal explorer*

Experimental expertise

Transmission Electron Microscopy (Lorentz TEM & STEM Holography)
SEM/FIB Dual Beam sample preparation
Ultra-high vacuum systems

HONORS & SCHOLARSHIPS

Best Student Presentation - Finalist — October 2023
Magnetism and Magnetic Materials

Honorable Mention — April 2020
NSF Graduate Research Fellowship Program

Student Scholar Award — Aug 2019
Microscopy and Microanalysis

Graduate First Year Fellowship — Fall 2018 - Spring 2019
University of Oregon

OMQ Director's Fellowship — Fall 2018
University of Oregon

Outstanding Senior in Physics — Spring 2018
Chapman University

Chancellor's Scholarship — Fall 2014 - Spring 2018
Chapman University

Chapman Celebrates - Music — Fall 2014 - Spring 2018
Chapman University

Golden Ears Award — May 2016
Chapman University

PUBLICATIONS

Published Manuscripts

1. **Parker, W. S.**; Reddinger, J.; McMorran, B. M. Hybrid Skyrmions in Magnetic Multilayer Thin Films are Half-Integer Hopfions. *Phys. Rev. B.* **2024.** DOI: 10.1103/PhysRevB.110.224420
2. **Parker, W. S.**; Montoya, S. A.; Fullerton, E. E.; McMorran, B. J. Combining Lorentz TEM and SEM with Polarization Analysis to Uncover Fractional Topological Spin Textures in Fe/Gd Multilayer Thin Films. *Microscopy and Microanalysis* **2024**, *30* (Supplement_1), ozae044.507. DOI.
3. Ducharme, A.; **Parker, W.**; Yasin, F. S.; Yu, X.; McMorran, B. Lorentz Scanning Transmission Electron Microscopy Holography (LSTEMH) Measurement of Domain Walls in Fe/Gd Multilayers. *Microscopy and Microanalysis* **2024**, *30* (Supplement_1), ozae044.510. DOI.

4. **Parker, W. S.**; Montoya, S. A.; Fullerton, E. E.; McMorran, B. Evolution of Novel Chiral Spin Textures in Fe/Gd Based Multilayer Thin Films. *Microscopy and Microanalysis* **2022**, *28* (S1), 2336–2337. DOI.
5. Reddinger, J.; **Parker, W.** Micromagnetics Simulation as a Supplement to and Diagnostic for Lorentz Transmission Electron Microscopy. *Microscopy and Microanalysis* **2022**, *28* (S1), 1694–1696. DOI.
6. **Parker, W.**; Montoya, S.; Fullerton, E.; McMorran, B. Chiral Spin Textures in Fe/Gd Based Multilayer Thin Films. *Microsc Microanal* **2021**, *27* (S1), 2404–2407. DOI.
7. Johnson, C. W.; Pierce, J. S.; Moraski, R. C.; Turner, A. E.; Greenberg, A. T.; **Parker, W. S.**; McMorran, B. J. Exact Design of Complex Amplitude Holograms for Producing Arbitrary Scalar Fields. *Opt. Express* **2020**, *28* (12), 17334. DOI.
8. **Parker, W.**; McMorran, B. Feasibility of an Electron Orbital Angular Momentum Sorter. *Microsc Microanal* **2019**, *25* (S2), 90–91. DOI.

Manuscripts in Preparation

1. **Parker, W. S.**; Reddinger, J.; Montoya, S. A.; Fullerton, E. E.; McMorran, B. J. Real Space Imaging of Hybrid Skyrmion Textures in Magnetic Multilayer Thin Films. *In preparation.* **2024.**
2. **Parker, W. S.**; Ducharme, A.; Yasin, F. S.; Montoya, S. A.; Yu, X.; Fullerton, E. E.; McMorran, B. J. STEM Holographic Imaging of Magnetic Domains in Fe/Gd Multilayer Thin Films. *In preparation.* **2024.**

CONFERENCES & WORKSHOPS

Poster Presenter July 2024
Microscopy and Microanalysis Cleveland, Ohio
Combining Lorentz TEM and SEM with Polarization Analysis to Uncover Fractional Topological Spin Textures in Fe/Gd Multilayer Thin Films

Oral Presenter - Featured Student Award Finalist October 2023
Magnetism and Magnetic Materials Dallas, Texas
Skyrmions in Magnetic Multilayer Thin Films Are Half-Integer Hopfions

Poster Presenter September 2023
OMQ Fall Research Symposium Eugene, Oregon
STEM Holographic Imaging of Magnetic Domains in Fe/Gd Magnetic Thin Films

Oral Presenter August 2022
Microscopy and Microanalysis Portland, Oregon
Evolution of novel chiral spin textures in Fe/Gd based multilayer thin films

Oral Presenter January 2022
Magnetism and Magnetic Materials - Intermag Attended Virtual
Evolution of novel chiral spin textures in Fe/Gd multilayer thin films

Poster Presenter August 2021
Microscopy and Microanalysis Attended virtual
Chiral spin textures in non-trivial geometries in FeGd multilayer thin films

Poster Presenter August 2019
Microscopy and Microanalysis Portland, Oregon
Feasibility of an Electron Orbital Angular Momentum Sorter

Poster Presenter September 2018

OMQ Fall Research Symposium — Eugene, Oregon
Characterization of an Orbital Angular Momentum Sorter

STUDENT MENTORING

Kay Brown: Summer 2024 (MASTERIt summer undergraduate)
Talia Ruehr: Summer 2024 (MASTERIt summer undergraduate)
Aaron Casserly: Fall 2022 - Fall 2023 (UO Undergraduate. Now AI Trainer at Data Annotations, admitted to Northwestern University for an MSc in Electrical Engineering)
Grant Osmon: Summer 2022 (REU student)
Paige Richey: Summer 2022 (REU student)
Samuel Pabst: Summer 2021 (ESPRIT scholar)
Bart Rosenzweig: Summer 2019 (REU student. Now PhD candidate at Ohio State University Department of Mathematics)

OUTREACH ENGAGEMENT

Coordinator and Student Assistant — Eugene, Oregon
Mad Duck Science Fridays, University of Oregon — Spring 2021
Led middle school students through a variety of STEM activities on days when school was cancelled due to budget restraints.

Undergraduate Panelist — Orange, California
Discover Chapman Day, Chapman University — Fall 2017
Acted as a panelist to answer questions about being a STEM undergraduate at Chapman university from prospective students.

Guitarist — Orange, California
Discover Chapman Day, Chapman University — Fall 2017
Played guitar in Chapman's Tesla Coil band for a combined audience of prospective students and middle school students.

Onsite Activity Lead — Cypress, California
Egg drop competition, Cypress High School — Fall 2017
Helped high school students design and test egg drop apparatus.

Material Preparations — Orange, California
Physics Bootcamp, Chapman University — Fall 2017
Prepared materials to help incoming physics students learn the mathematics required for physics courses to help boost student retention in physics.

TEACHING EXPERIENCE

Graduate Teaching Assistant — University of Oregon
PHYS 152 (Physics of Sound & Music) — Fall 2022
Teaching Assistant for undergraduate students, primarily non-STEM.
PHYS 201 (General Physics) — Fall 2019
Teaching Assistant for undergraduate students. Led lab sections.

Supplemental Instructor — Chapman University
PHYS 102 (General Physics 2) — Fall 2017
Led additional weekly instruction sessions for undergraduate students.
PHYS 101 (General Physics 1) — Spring 2017
Led additional weekly instruction sessions for undergraduate students.