Damyn **Chipman**

Computational Physicist · Scientific Software Developer

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Summary

Computational physicist and software engineer nearing completion of a Ph.D. in Computing. Developer of scientific software packages targeting CPU/GPU based supercomputers. Published author with research papers and contributions to open-source scientific software. Experience with ML/AI for science applications. Passionate about tackling complex challenges through technical problem solving skills and effective project management.

Programming Languages	C/C++ (8 years), Python (7 years), MATLAB (7 years), Mathematica (7 years), FORTRAN (3 years)
Technical Experience	ML/AI for Science, High Performance Computing, Finite Volume/Element Methods, Software Design
Software Technologies	Git, GitHub CI, MPI, OpenMP, CUDA, Kokkos, CMake, PETSc, TensorFlow, Microsoft Office Suite

Education

Boise State University
Expected: August 2024

Doctor of Philosophy in Computing — *Boise, ID*

- Emphasis: Computational Sciences and Engineering
- Current Research: Fast and Scalable Direct Elliptic Solvers on Adaptive Meshes

Brigham Young University
April 2019

Bachelor of Science in Applied Physics — *Provo, UT*

- Emphasis: Computational Physics and Engineering
- Senior Thesis: Aerodynamics Modeling Using a Mesh-Free Approach

Work and Research Experience

Lawrence Livermore National Laboratory
May 2022 - August 2022

Defense Science and Technology Intern — *Livermore, CA*

- Developed scientific software for lab-wide physics applications.
- Implemented a new material interface reconstruction method into the multi-physics code `Kull`.
- Presented results during end of summer SLAM presentations to lab directorate.

Boise State University Geophysics Department
January 2022 - May 2022

Adjunct Faculty — *Boise, ID*

- Taught GEOS357/597: Computation in the Geosciences.
- Prepared course content and developed curriculum.
- Delivered class lectures with in-person and online options.
- Received highly positive reviews from students.

Lawrence Livermore National Laboratory
May 2021 - August 2021

High Energy Density Physics Intern — *Livermore, CA*

- Aligned LLNL's nuclear data codes FUDGE and GIDI+ for improved productivity and accuracy.
- Contributed several new features across multiple programming APIs.
- Presented results during end of summer SLAM presentations to lab directorate.

Nevada National Security Site (Mission Support and Test Services, LLC)
June 2019 - August 2020

Associate in Science — *Las Vegas, NV and Livermore, CA*

- Supported multiple projects with a computational emphasis to develop tools for mission critical diagnostic equipment.
- Implemented an axis correction algorithm using machine learning techniques.
- Developed an image processing software package for neutron image data analysis.

Boise State University Mathematics Department
August 2019 - December 2019

Graduate Assistant — *Boise, ID*

- Teaching assistant for MATH365: Intro to Computational Mathematics.
- Assisted professor in teaching, guiding students, and grading.
- Generated new course materials for students and faculty.

Flight, Optimization and Wind Lab (BYU Mechanical Engineering)

April 2018 - May 2019

Research Assistant — *Provo, UT*

- Assisted in research for computational fluid dynamics software.
- Designed and developed a vortex sheet boundary package `VSB.jl` for vortex particle method integration.
- Modeled propeller-wing interaction using the novel vortex particle method.

Advanced Power Cycles Lab (BYU Chemical Engineering)

June 2016 - April 2018

Research Assistant — *Provo, UT*

- Assisted in research for nuclear power cycles.
- Developed a 1, 2, and 3-stage optimized Rankine power cycle model for nuclear power application.
- Assisted in formulation, testing, and verification of water-ammonia thermodynamic property package code.

Brigham Young University Physics Department

August 2016 - April 2018

Teaching Assistant — *Provo, UT*

- Assisted professors in teaching and grading for introductory to advanced physics classes, including computational physics lab sequence.
- Implemented new teaching program for 150+ students.
- Oversaw sections of 20-30 students as Recitation Section Leader.

Publications

2024 **D. Chipman**, D. Calhoun, C. Burstedde. *A Fast Direct Solver for Elliptic PDEs on a Hierarchy of Adaptively Refined Quadtrees.* `arXiv:2402.14936 [math.NA]`.

2024 **D. Chipman**. *EllipticForest: A Direct Solver Library for Elliptic Partial Differential Equations on Adaptive Meshes.* Journal of Open Source Software. (In Review).

2022 **D. Chipman**. *Overview of Solution Methods for Elliptic Partial Differential Equations on Cartesian and Hierarchical Grids.* Boise State University. Comprehensive Exam Paper. `arXiv:2205.03356 [cs.CE]`.

2020 A. Durand, R. Freeman, **D. Chipman**, B. Garcia, M. Wallace, J. Bundgaard, D. Smalley, M. Raphaelian, D. Max, D. Lowe, et al. *High-fidelity dynamic neutron imaging and radiography for subcritical experiments and other applications.* Technical report, Nevada National Security Site/Mission Support and Test Services LLC. July 2020. `DOI: 1741025`

2019 **D. Chipman**. *Viscous Aerodynamics Modeling Using a Mesh-Free Approach*. Brigham Young University. Senior Thesis.

Conferences and Presentations

2024 **D. Chipman**, D. Calhoun. *A Coupled Elliptic/Hyperbolic Adaptive Finite Volume Solver for High-Performance Heterogeneous Architectures.* SIAM Parallel Processing 2024 Conference. Baltimore, MD.

2023 **D. Chipman**, D. Calhoun. *A Coupled Elliptic/Hyperbolic Adaptive Finite Volume Solver for High-Performance Heterogeneous Architectures.* SIAM Pacific Northwest 2023 Conference. Bellingham, WA.

2023 **D. Chipman**, D. Calhoun. *A Fast, Adaptive, Matrix-Free Direct Elliptic Solver on Quadtree Meshes*. SIAM CSE2023 Conference. Amsterdam, The Netherlands.

2022 **D. Chipman**, B. Stephens. *A New Material Interface Reconstruction (MIR) Implementation in KULL*. LLNL SLAM Presentation. Livermore, CA.

2022 **D. Chipman**. *Higher Order Tsunami Simulations and Novel Solution Methods.* Boise State University Graduate Student Showcase Poster. Boise, ID.

2021 **D. Chipman**, et al. *FUDGE and GIDI+: Aligning LLNL's Nuclear Data Codes and API.* LLNL SLAM Presentation. Livermore, CA.

2021 **D. Chipman**, D. Calhoun. *Progress Towards a Fast, Scalable, and Direct Elliptic PDE Solver for Adaptive Meshes.* SIAM CSE 2021 Conference Presentation.

2020 A. Durand, **et al.**. *High-Fidelity Dynamic Neutron Imaging and Radiography for Subcritical Experiments and Other Applications.* No. DOE/NV/03624-0829. FY2020 Annual SDRD Conference. Nevada National Secruity Site/Mission Support and Test Services LLC. Las Vegas, NV.

2020 **D. Chipman**, et al. *Characterizing On-Axis X-Ray Spectra with Off-Avis Detectors.* Mission Directorate Presentation. Las Vegas, NV.

2019 **D. Chipman** et al. *Image Processing and Reconstruction of Neutron and X-Ray Images.* Senior Leadership Team Presentation. Las Veags, NV.

2019 **D. Chipman** et al. *Aerodynamics Modeling Using a Mesh-Free Approach.* Utah Conference for Undergraduate Research Presentation. Ogden, UT.

Honors, Awards, and Trainings

2024	**Participant**, Training on AI-Driven Science on Supercomputers (Argonne National Laboratory)	*Remote*
2023	**Participant**, Argonne Training Program for Exascale Computing	*Chicago, IL*
2023	**Semi-Finalist**, SIAM Computational Science and Engineering 2023 Hackathon	*Amsterdam, NL*
2020	**Hot Shot Award**, Nevada National Security Site	*Las Vegas, NV*
2019	**Graduate Assistant Fellow**, Boise State University	*Boise, ID*
2013	**Eagle Scout Award**, Boy Scouts of America	*Las Vegas, NV*

Clubs and Societies

SIAM	Society of Industrial and Applied Mathematics (Boise State Chapter)
BSUA	Boise State University Alpine Club
ANS	American Nuclear Society (Brigham Young University Chapter) (past)

Volunteer Work

The Church of Jesus Christ of Latter-day Saints

January 2020 - May 2022

Youth Leader — *Boise, Idaho*

- Assisted in overseeing youth activities and teaching.
- Planned and organized events for youth.

The Church of Jesus Christ of Latter-day Saints

August 2013 - August 2015

Volunteer Missionary — *Mexico City, Mexico*

- Served as religious representative in the Mexico City Northwest Mission, providing large and small scale community service.
- Oversaw 20-30 other volunteers through training in communication, problem solving, and volunteer strategy.