

JOANNA PIPER MORGAN

(she/her)

Corvallis, OR

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<https://jpmorgan98.github.io/>

Seeking employment beginning on or after July 25th 2025

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Education

- **Ph.D., Mechanical Engineering** September 2020 - June 2025
Oregon State University (OSU); School of Mechanical Industrial and Manufacturing Engineering, Corvallis, Oregon
Minor: Nuclear Engineering, **Emphasis:** Thermal Fluid Sciences (TFS), **GPA:** 3.84
Prospective Dissertation Title: *On algorithms and software engineering schemes for radiation transport on heterogeneous compute architectures.*
Academic Advisor: Kyle E. Niemeyer **Minor Advisor:** Todd S. Palmer
- **M.S., Mechanical Engineering**, September 2020 - March 2022
Oregon State University (OSU); School of Mechanical Industrial and Manufacturing Engineering, Corvallis, Oregon
Emphasis: Thermal Fluid Sciences (TFS), **GPA:** 3.83
Project Report: *Explorations of Monte Carlo Solution and Implementation Methods for Thermal Radiation and Neutron Transport*
Academic Advisor: Kyle E. Niemeyer
- **B.S., Mechanical Engineering**, *magna cum laude*, September 2016 - June 2020
Oregon Institute of Technology (OIT); Dept. of Mechanical and Manufacturing Engineering Technology, Klamath Falls, Oregon
Minors: Applied Physics; Applied Mathematics

Research Experience

- **Graduate Research Assistant**
Oregon State University, *School of MIME*, June 2020 - Present
Subject (1): Python based acceleration and abstraction of compute kernels for dynamic Monte Carlo in a rapid methods development code MC/DC¹ as part of the Center for Exascale Monte Carlo Neutron Transport² (CEMeNT)
Subject (2): Investigation of the one cell inversion method as an alternative to transport sweeps for deterministic dynamic neutron transport on GPUs
Mentors: Kyle E. Niemeyer & Todd S. Palmer

¹ <https://github.com/CEMeNT-PSAAP/MCDC>

² <https://cement-psaap.github.io/>

- **Co-Op Research Intern**
Advanced Micro Devices (AMD), HPC GPU Apps Support Group, September 2023 - May 2024
Mentors: Damon McDougall, Christopher Kime
- **Graduate Research Intern**
Los Alamos National Laboratory, XCP-3, June 2022 - May 2023
Subject: Implementing Woodcock delta tracking on a structured mesh within the production code MCATK. *This work was pushed to a production version release.*
Mentors: Travis J. Trehan, Timothy P. Burke, & Collin J. Josey
- **Graduate Research Intern**
Los Alamos National Laboratory, CCS-2, June 2021 - June 2022
Subject: Novel methods exploration in vectorizable variance reduction for thermal radiation transport (TRT)
Mentors: Kendra Long & Alex Long
- **Lee Teng Undergraduate Research Fellow**
Argonne National Laboratory, June 2019 - September 2019
Subject: Cancer radiotherapy scanner magnet design & analysis
Mentors: Brahim Mustapha
- **Science Undergraduate Laboratory Intern (SULI)**
Thomas Jefferson National Accelerator Facility, June 2018 - August 2018
Subject: Superconducting quadrupole magnet optimization
Mentors: Renuka Rajput-Ghoshal

Publications

- J. P. Morgan, B. Cuneo, I. Variansyah, K. E. Niemeyer. Enabling GPU portability into the Numba-JITed Monte Carlo particle transport code MC/DC. (2025). To appear in the *International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (ANS M&C 2025)*. Denver, CO, USA. Preprint DOI [10.48550/arXiv.2501.05440](https://doi.org/10.48550/arXiv.2501.05440).
- B Cuneo, J. P. Morgan, I. Variansyah, K. E. Niemeyer. Comparing the Performance of MC/DC's on-GPU Event-based Processing Methods in Multigroup and Continuous-energy Problems. To appear in the *International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (ANS M&C 2025)*. Denver, CO, USA.
- J. P. Morgan, I. Variansyah, S. Pasmann, K. B. Clements, B. Cuneo, A. Mote, C. Goodman, C. Shaw, J. Northrop, R. Pankaj, E. Lame, B. Whewell, R. McClarren, T. Palmer, L. Chen, D. Anistratov, C. T. Kelley, C. Palmer, and K. E. Niemeyer. Monte Carlo / Dynamic Code (MC/DC): An accelerated Python package for fully transient neutron

transport and rapid methods development. *Journal of Open Source Software*. **9(96)**, 6415.

- **J. P. Morgan**, A. Mote, S. Pasmann, G. Ridley, T. S. Palmer, K. E. Niemeyer, R. G. McClarren. The Monte Carlo Computational Summit - October 25 & 26, 2023 - Notre Dame, Indiana, USA. *Journal of Computational and Theoretical Transport*. 53(5), 361-382.
- **J. P. Morgan**, I. Variansyah, T. S. Palmer, and K. E. Niemeyer. "Exploring One-Cell Inversion Method for Transient Transport on GPU." In *Proceedings International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering*. Niagara Falls, Ontario, Canada (2023).
- **J. P. Morgan**, T. J. Trahan, T. P. Burke, C. J. Josey, and K. E. Niemeyer. (2023) "Hybrid-Delta Tracking on a Structured Mesh in MCATK." In *Proceedings International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering*. Niagara Falls, Ontario, Canada.
- I. Variansyah, **J. P. Morgan**, K. E. Niemeyer, and R. G. McClarren. (2023). "Development of MC/DC: a performant, scalable, and portable Python-based Monte Carlo neutron transport code." In *Proceedings International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering*. Niagara Falls, Ontario, Canada.
- **J. P. Morgan**, A. Long, K. Long, and K. E. Niemeyer. (2022). "Novel MC TRT Method: Vectorizable Variance Reduction for Energy Spectra" In *Transactions of the American Nuclear Society*, volume 126, pp. 276-278. Anaheim, California, USA.
- **J. P. Morgan**, T. S. Palmer, and K. E. Niemeyer. (2022). "Explorations of Python-Based Automatic Hardware Code Generation for Neutron Transport Applications." In *Transactions of the American Nuclear Society*, volume 126, pp. 318-320. Anaheim, California, USA.

Publications in Preparation

- **J. P. Morgan**, I. Variansyah, B. Cuneo, T. S. Palmer, and K. E. Niemeyer. "Performant and Portable Monte Carlo Neutron Transport via Numba." *in review*
- **J. P. Morgan**, I. Variansyah, T. S. Palmer, and K. E. Niemeyer. "One-cell inversions on modern GPUs for transient transport with higher order discretization." *in preparation*

Conference and Poster Presentations

- **J. P. Morgan**. "Exploring One-Cell Inversions for Transient Transport on GPUs." Copper Mountain Conference on Iterative Methods (SIAM). April 2024.

- **J. P. Morgan.** “High Performance Python for Rapid Methods Development in Monte Carlo / Dynamic Code.” Sustainable Scientific Software Conference. April 2024.
- **J. P. Morgan,** I. Variansyah, T. S. Palmer, and K. E. Niemeyer. “Exploring One-Cell Inversion Method for Transient Transport on GPU.” High Energy Density Summer School, San Diego, California. July 2023
- **J. P. Morgan,** I. Variansyah, T. S. Palmer, and K. E. Niemeyer. “Exploring One-Cell Inversion Method for Transient Transport on GPU.” International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering. Niagara Falls, Ontario, Canada (2023).
- **J. P. Morgan,** T. J. Trahan, T. P. Burke, C. J. Josey, and K. E. Niemeyer. “Hybrid-Delta Tracking on a Structured Mesh in MCATK.” International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering. Niagara Falls, Ontario, Canada (2023).
- **J. P. Morgan,** T. S. Palmer, & K. E. Niemeyer, “Hardware Code Generation Techniques for Accelerating Python.”, Scientific Python, Austin, Texas, USA, July 2022
- **J. P. Morgan,** T. S. Palmer, & K. E. Niemeyer, “Hardware Code Generation Techniques for Accelerating Python”, Annual Meeting of the American Nuclear Society, Anaheim, California, USA, June 2022
- **J. P. Morgan,** A. Long, K. Long & K. E. Niemeyer, “A novel MC TRT method: vectorizable variance reduction for the energy spectra”, Annual Meeting of the American Nuclear Society, Anaheim, California, USA, June 2022
- **J. P. Morgan** and B. Mustapha, "Carbon therapy X-Y scanner magnet analysis," in Lee Teng Internship - Posters and Final Report Presentations, Fermi National Accelerator Facility, Batavia, Illinois. August 2019.
- **J. P. Morgan** and R. Rajput-Ghoshal, “Jefferson lab electron ion collider interaction region quadrupole magnet optimization,” in Undergraduate Research Poster Presentations, Thomas Jefferson National Accelerator Facility, Newport News, Virginia, August, 2018.

Conference Attendance and Professional Development

- July 2024, Scientific Computing in Python (SciPy), Tacoma, WA*
- May 2024, NEA Workshop for Radiation Transport Simulation Developers (RTS 2024), Frascati, Italy
- April 2024, 18th Copper Mountain Conference on Iterative Methods (SIAM), Copper Mountain, CO*
- April 2024, Sustainable Scientific Software Conference (S3C), Seattle, WA*

- January 2024, NUWEST, Albuquerque, NM
unable to attend due to weather
- January 2024 US Research Software Sustainability Institute (URSSI), Portland, OR
Hosted at Oregon State University Portland Center
Attended as a teaching assistant
- August 2023, International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (ANS M&C International), Niagara Falls, Ontario, Canada*
- July 2023, High Energy Density Science (HEDS) Summer School, San Diego, CA
at University of California San Diego
- July 2022, Scientific Computing in Python (SciPy), Austin, TX*
- June 2022, American Nuclear Society Annual Conference, Anaheim, CA*
- October 2021, Conference on Mathematics and Computational Methods Applied to Nuclear Science (ANS M&C), Raleigh, North Carolina (*virtual*)
- June 2018, United States Particle Accelerator School (USPAS), Albuquerque, NM
Fundamentals of Accelerator Physics and Technology with Simulations and Measurements Lab

* presented at

TEACHING EXPERIENCE

- Supplemental Instructor, *Student Services & Dept. Natural Sciences*
Oregon Institute of Technology, September 2017 - March 2020
Class: Physics for medical imaging
Directed by: Robyn Wilde
- Peer Consultant, *Student Services*
Oregon Institute of Technology, January 2018 - June 2020
Subjects: Numerical methods, differential & integral calculus, linear algebra, intro to algebra, trigonometry, college algebra, statistics, heat transfer, statics, thermodynamics, fluid dynamics, strengths of materials, physics with calculus.
- Mathematics Grader, *Dept. Mathematics*
Oregon Institute of Technology, January 2018 - March 2020
Subjects: Numerical methods (in MATLAB), differential & integral calculus, linear algebra, intro to algebra, trigonometry, college algebra, statistics.
Directed by: Cristina Negoita and Terri Torres

PROFESSIONAL AFFILIATIONS

- Member, American Nuclear Society (ANS)
- Member, Out in Science Technology Engineering and Mathematics (oSTEM)
- Member, Tau Beta Pi, Oregon Delta 2018 (Engineering Honors Society)

OTHER ACTIVITIES

- Volunteer; Whiteside Theater, Corvallis, OR (March 2023 - Present)
- Student Commissioner; Library Recourse Commission (October 2017 - June 2020).
- Committee Member; University Librarian Search Committee (March 2018 - June 2018).
- Student Building Manager; Oregon Institute of Technology College Union (February 2017 - March 2020).
- President; Oregon Institute of Technology Chapter of Circle K International Community Service Club (May 2019 - June 2020)
- Treasurer; Oregon Delta - Tau Beta Pi (May 2019 - May 2020)
- Notary Public; State of Oregon (November 17th, 2016 - November 16th, 2020)

AWARDS and FELLOWSHIPS

- Illinois Accelerator Institute; *Lee Teng Undergraduate Research Fellowship in Accelerator Science* (2019).
- ASME; *Irma and Robert Bennett Scholarship* (2019).
- Pride Foundation; *Lenahan-Warn Technical Education Scholarship* (2017).

SKILLS

Languages and Language Adjecents

- C/C++ (OpenMP, C-CUDA, HIPCC/ROCm, Kokkos, AVX/SIMD, MPI, Intel MKL, LAPACK) (beginner-intermediate)
- Python (Numba, mpi4py, Numpy, Scipy, Matplotlib, CuPy, CProfiler) (intermediate)
- Matlab (intermediate), VBA in Excel
- FORTRAN (beginner)
- LLVM (beginner-intermediate)
- Compilers: Numba (LLVM bindings for Python), Intel Compilers, HIP and ROCm (Clang) compilers, GCC, CRAY Compilers

Software Development Tools

- Profilers: Intel Vtune, NVIDIA N-Sight, TotalView
- Debuggers: valgrind, gdb

Engineering Design and Simulation Tools

- CAD/CAE: Creo, SolidWorks, AutoCAD, Inventor, NX, CST Studio Suite (Electromagnetic Field Simulation), Opera (Electromagnetic and Electromechanical Simulation), FEMM
- Nuclear Engineering Codes: MCNP, MCATK (developed in), MC/DC (developed in), Shift (developed in)
- Visualization Toolkits: Paraview, Visit

MISC Development Tools:

- Services: Git(hub), Gitlab, Bitbucket,
- Terminal: Bash, z-shell, ssh & X-11 forwarding
- Package Publishing: Conda, PyPi, Sphinx, Read the Docs
- Continuous Integration: Github actions, Jakamar runners
- Website Builders: Sphinx, Read the Docs, Jekyll, Ruby

REFERENCES

available upon request
