

JOANNA PIPER MORGAN

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~ in somnis veritas ~

EDUCATION

- **Ph.D., Mechanical Engineering** September 2020 - June 2025
Oregon State University (OSU); School of Mechanical Industrial and Manufacturing Engineering, Corvallis, Oregon
Emphasis: Thermal Fluid Sciences (TFS)
GPA: 3.84
Minor: Nuclear Engineering
Academic Advisor: Kyle E. Niemeyer
Minor Advisor: Todd S. Palmer
- **M.S., Mechanical Engineering** (non-thesis), 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; Dept. of Mechanical and Manufacturing Engineering Technology, Klamath Falls, Oregon
Minors: Applied Physics; Applied Mathematics
Academic Advisor: Hong Yee (Randy) Shih
- **High School Diploma** September 2012 - June 2016
Sisters High School, Sisters, Oregon

PUBLICATIONS

- 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. “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 (2023).
- I. Variansyah, J. P. Morgan, K. E. Niemeyer, and R. G. McClarren. “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 (2023)
- J. P. Morgan, A. Long, K. Long, and K. E. Niemeyer, “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 (2022).
- J. P. Morgan, T. S. Palmer, and K. E. Niemeyer. “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 (2022).
- J. P. Morgan & B. Mustpaha, "Analysis of an X-Y Scanner magnet for Use in Cancer Radiotherapy Treatment," 23 August 2019.
<https://indico.fnal.gov/event/21420/session/4/material/3/0.pdf>.

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): Explorations 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
- **Co-Op Research Intern**
Advanced Micro Devices (AMD), September 2023 - May 2024
- **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

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

² <https://cement-psaap.github.io/>

- **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

POSTER PRESENTATIONS

- 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, 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, T. S. Palmer, and K. E. Niemeyer "Exploring One-Cell Inversion as a Transport Solver", CEMeNT AST Meeting, Corvallis, Oregon. October 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.

SUMMER SCHOOLS

- High Energy Density Science (HEDS) Summer School, July 2023, San Diego, California at University of California San Diego
- United States Particle Accelerator School (USPAS), June 2018, Albuquerque, New Mexico
Course: *Fundamentals of Accelerator Physics and Technology with Simulations and Measurements Lab*
Credit provided by University of New Mexico

CONFERENCE ATTENDANCE

- International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (ANS M&C International), August 2023, Niagara Falls, Ontario, Canada*
- Scientific Computing in Python, July 2022, Austin, Texas*
- American Nuclear Society Annual Conference, June 2022, Anaheim, California*
- Conference on Mathematics and Computational Methods Applied to Nuclear Science (ANS M&C), October 2021, Raleigh, North Carolina (*virtual*)

* presented at

CONFERENCE PRESENTATIONS

- 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. S. Palmer, & K. E. Niemeyer, “Hardware Code Generation Techniques for Accelerating Python.”, Scientific Python, Austin, Texas, USA, July 2020
- 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 2020
- 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 2020

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, Tau Beta Pi (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

- C/C++ (OpenMP, C-CUDA, Kokkos, AVX, SIMD, MPI)
- Intel Vtune, NVIDIA N-Sight, TotalView
- Python (Numba, mpi4py, Numpy, Scipy, Matplotlib, CuPy, CProfiler)
- Matlab
- CAD/CAE: Creo, SolidWorks, AutoCAD, Inventor, NX, CST, OperaOptimizer, EES, FEMM
- Nuclear Engineering Codes: MCNP, MCATK
- MISC Development Tools: Git(hub)/Gitlab/Bitbucket, Slurm, Bash, LSF, z-shell, ssh, Linux terminal, valgrind

REFERENCES

Available upon request
