

# JOANNA PIPER MORGAN

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## EDUCATION

- **Ph.D., Mechanical Engineering** September 2020 – June 2025  
School of Mechanical Industrial and Manufacturing Engineering; Oregon State University (OSU), Corvallis, Oregon  
**Emphasis:** Thermal Fluid Sciences (TFS)  
**Minor:** Nuclear Engineering  
**Academic Advisor:** Kyle E. Niemeyer  
**Minor Advisor:** Todd S. Palmer
- **M.S., Mechanical Engineering** (non-thesis), September 2020 – March 2022  
School of Mechanical Industrial and Manufacturing Engineering; Oregon State University (OSU), Corvallis, Oregon  
**Emphasis:** Thermal Fluid Sciences (TFS)  
**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  
Dept. of Mechanical and Manufacturing Engineering Technology; Oregon Institute of Technology (OIT), 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

## 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/DC<sup>1</sup> as part of the Center for Exascale Monte Carlo Neutron Transport<sup>2</sup> (CEMeNT)

**Subject (2):** Explorations of deterministic dynamic neutron transport methods for use on parallelized hardware

**Mentors:** Kyle E. Niemeyer & Todd S. Palmer

- **Co-Op Research Intern**

Advanced Micro Devices (AMD), DIVISION, September 2023 - December 2023

**Subject:**

**Mentors:**

- **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

**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)

**Mentor:** Kendra Long & Alex Long

- **Lee Teng Undergraduate Research Fellow**

Argonne National Laboratory, June 2019 – September 2019

**Subject:** Cancer radiotherapy scanner magnet design & analysis

**Mentor:** Brahim Mustapha

- **Science Undergraduate Laboratory Intern (SULI)**

Thomas Jefferson National Accelerator Facility, June 2018 – August 2018

**Subject:** Superconducting quadrupole magnet optimization

**Mentor:** Renuka Rajput-Ghoshal

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

<sup>2</sup> <https://cement-psaap.github.io/>



## PUBLICATIONS

- J. P. Morgan, I. Variansyah, T. S. Palmer, and K. E. Niemeyer. "Exploring One-Cell Inversion Method for Transient Transport on GPU." In *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 *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 *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, CA, 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, CA, USA (2022).
- J. P. Morgan & B. Mustpaha, "Analysis of an X-Y scanner magnet for Use in cancer radio therapy treatment," 23 August 2019. [Online]. Available: <https://indico.fnal.gov/event/21420/session/4/material/3/0.pdf>.

## CONFERENCE PRESENTATIONS

- J. P. Morgan, T. S. Palmer, & K. E. Niemeyer, "Hardware Code Generation Techniques for Accelerating Python", Scientific Python, Austin, TX, 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, CA, 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, CA, USA, June 2020

## POSTER PRESENTATIONS

- J. P. Morgan, T. S. Palmer, and K. E. Niemeyer "Exploring One-Cell Inversion as a Transport Solver", 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 Summer School (HEDS), July 2023, San Diego, CA  
Credit provided by University of California San Deigo
- United States Particle Accelerator School (USPAS), June 2018, Albuquerque, NM  
**Course:** *Fundamentals of Accelerator Physics and Technology with Simulations and Measurements Lab*  
Credit provided by University of New Mexico

## 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

## ENGINEERING DESIGN EXPERIENCE

- Project Manager  
**Senior Project** Daimler Trucks North America (DTNA) and Oregon Institute of Technology May 2019 – present  
**Project Goals:** To design and prototype a robotic and ergonomic mechanic's chair for use by DTNA's on their under-chassis portion of their assembly lines.  
**Project Outcome:** Incomplete, ended prematurely due to COVID-19 pandemic  
**Advisor:** Dongbin (Don) Lee
- Project Member  
Oregon Tech Rocketry and Aeronautics Club, September 2017 – June 2018  
**Project Goal:** To design and manufacture and test a liquid fueled bi-propellant rocket engine.  
**Project Outcome:** Successful design and production of rocket engines.  
**Advisor:** Sean Sloan

## PROFESSIONAL AFFILIATIONS

- Member, American Nuclear Society (ANS)
- Member, Tau Beta Pi (Engineering Honors Society)

## OTHER ACTIVITIES

- 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 17<sup>th</sup>, 2016 – November 16<sup>th</sup>, 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, SERPENT, MCATK, Jayenne, Simulate
- MISC Development Tools: Git(hub)/Gitlab/Bitbucket, Slurm, Bash, LSF, z-shell, ssh, Linux terminal, valgrind

## REFERENCES

- Kyle E. Niemeyer  
Associate Professor, Oregon State University  
**Relation:** Academic advisor for MS and PhD and mentor  
**Email:** kyleniemeyer@fastmail.com
  - Todd S. Palmer  
Professor, Oregon State University  
**Relation:** Minor advisor for PhD and mentor  
**Email:** Todd.Palmer@oregonstate.edu
  - Travis Trahan  
Staff Scientist, XCP-3, Los Alamos National Laboratory  
**Relation:** Supervising mentor  
**Email:** tjtrahan@lanl.gov
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