MELEK DERMAN

Curriculum Vitae

Nuclear Science and Engineering
Oregon State University
✉ *melekdermanusa@gmail.com*
/melekderman *in/melekderman*

Research Interests

Radiation Transport; Charged-Particle Transport; Deterministic Transport Methods;
Monte Carlo Methods; High-Performance Computing (HPC);
Parallel Computing & Performance Optimization; Computational Physics;
Scientific Software Development; Quantum Computing Applications in Nuclear Engineering

Education

Sept 2024 – Present **Ph.D., Nuclear Engineering**, *Oregon State University*, Corvallis, OR.
- Center for Advancing the Radiation Resilience of Electronics (CARRE), DOE PSAAP IV Project (Grant No. DE-NA0004268)
- Center for Exascale Monte Carlo Neutron Transport (CEMeNT), DOE PSAAP III Project (Grant No. DE-NA003967)
- Radiation Transport and Reactor Physics Research Group

May 2024 **MS, Nuclear Engineering**, *Texas A&M University*, College Station, TX.
- Center for Nuclear Security Science and Policy Initiatives (NSSPI)

June 2013 **BS, Physics with Honors** , *Akdeniz University*, Antalya, Turkey.
- Nuclear Research and Application Center (NUBA)

Additional Education

June 2021 **AA, Justice**, *Anadolu University*, Eskisehir, Turkey.

June 2015 **BA, Business Administration**, *Anadolu University*, Eskisehir, Turkey.

Research Experience

Oregon State University, School of Nuclear Science and Engineering, Corvallis, OR

Sept 2025 – Present ***Graduate Research Assistant***.
- Implementing the single-scattering electron transport capability in MC/DC to enable the code's first charged-particle transport functionality
- Designing and implementing the verification and validation (V&V) suite to support the electron transport module

June 2025 – Sept 2025 ***Graduate Project Assistant***.
- Enabled CAD-based geometry input in MC/DC by integrating MC/DC support into GEOUNED, an external CAD converter for Monte Carlo codes
- Developed and now maintain PyEEDL, a Python tool for converting ENDF-6-formatted EEDL datasets into MC/DC-compatible libraries (https://doi.org/10.5281/zenodo.18425379)
- Contributed to the research, implementation, and validation of the single-scattering electron transport capability

Sept 2024 – June 2025 ***Graduate Research Assistant***.

- Implemented and verified analytical and literature benchmark problems in the MC/DC code, including asymmetric supercritical transients and multigroup reactor-physics cases
- Configured and deployed AMD's Omnitrace profiling tool on CEMeNT's AMD CPU/GPU systems to support performance analysis and optimization of MC/DC workloads
- Executed and profiled large-scale MC/DC simulations on HPC clusters, developing automated challenge-problem workflows and performance profiling pipelines
- Developed and analyzed numerical methods for deterministic transport, including a novel, Dynamic Mode Decomposition–based spectral analysis approach and a PyMFEM/MFEM-based Boltzmann transport solver* using iterative methods (GMRES, Block-Jacobi) on parallel architectures (*https://doi.org/10.5281/zenodo.15107101)

Texas A&M University, Department of Nuclear Engineering, College Station, TX

Jan 2023 – May 2024 ***MS Thesis - Nuclear Safeguards Feasibility Study for a Theoretical Molten Salt Reactor (MSR)***.

- Developed an MCNP model for the MSR designed at Texas A&M University
- Established a comprehensive neutronics model by analyzing the buildup of actinides and fission products
- Designed and developed a nuclear safeguards monitoring approach to ensure the peaceful use of special nuclear material (SNM)

Selected Graduate Level Coursework

2025 **Parallel Programming**, *Oregon State University*.

2025 **Software Development for Research**, *Oregon State University*.

2024 **Introduction to Data Science for Engineers**, *Oregon State University*.

2024 **Machine Learning**, *Oregon State University*.

2023 **Monte Carlo Methods for Particle Transport**, *Texas A&M University*.

2022 **Directed Study (Neutron Transport Theory and Computer Applications in Nuclear Engineering**, *Texas A&M University*.

Selected Selected Academic & Research Projects Projects

Feb 2025 **Team Member - High-Performance Neutron Transport on Heterogeneous Architectures (AMD Tools Workshop, Eugene, OR)**.

Optimized the MC/DC neutron transport code on AMD MI300A APUs using Python and Numba; integrated AMD profiling tools to identify execution hotspots in LLVM-IR compiled kernels; and worked on porting Harmonize runtime's asynchronous scheduling logic to AMD hardware to minimize thread divergence

Nov 2023 **Team Leader - Multi-Purpose Canister (MPC) Modelling and Simulations (Texas A&M University, College Station, TX)**.

Developed MCNP models of an MPC; and performed Columbia River full-submersion radiation transport simulations to evaluate dose fields, shielding behavior, and potential radionuclide release

May 2023 **Team Leader - Fast Breeder Reactor (FBR) Core Modeling & Safeguards Analysis (Texas A&M University, College Station, TX)**.

Led MCNP-based neutronic modeling of an FBR core; and developed a preliminary safeguards assessment to evaluate diversion pathways and SNM monitoring signatures

Technical Skills

Nuclear Engineering Software: MCNP6, Visual Editor for MCNP6, OpenMC, SCALE6 (basic), INCC, GENIE, InterSpec

Programming Languages: Python (NumPy, SciPy, pandas, Qiskit, scikit-learn, PyMFEM, Numba), C++ (basic), MATLAB, Mathematica

Scientific Computing & HPC: Linux HPC systems; Bash; parallel computing (OpenMP, CUDA, OpenCL, MPI/mpi4py); job scheduling (Slurm, Flux)

Other Tools: LaTeX, Git/GitHub, Microsoft Office, Visio, Adobe Photoshop, Adobe Illustrator, Windows/Linux/macOS

Publications

2026 **M. Derman,** J. P. Morgan, K. E. Niemeyer, T. S. Palmer, Dynamic Spectral Analysis of Time-Dependent One-Cell Inversion Transport Method Using Windowed DMD, **Manuscript to be submitted to** *Nuclear Science and Engineering*.

2013 I. Boztosun, H. Djapo, S.F. Ozmen, Y. Cecen, M. Karakoc, A. Coban, A. Cesur, T. Caner, E. Bayram, G.B. Keller, B. Kucuk, A. Guvendi, **M. Derman,** D. Kaya, The Results of the First Photonuclear Reaction Performed in Turkey: The Zinc Example, In *Turkish Journal of Physics*.

Scholarships, & Awards

Sept 2024 ***Provost's Distinguished Graduate Scholarship***, Oregon State University

Jan 2022 ***Graduate Scholarship***, Ministry of National Education of the Republic of Turkey

Mar 2013 ***1st Place Award*** - Ion Optics and Gamma-Ray Detection Experiment, Heavy Ion Laboratory, University of Warsaw, Poland

National Laboratory Trainings

Apr 2024 **Office of International Nuclear Safeguards Nonproliferation Workshop**, Oak Ridge National Laboratory, Oak Ridge, TN.

Mar 2024 **SEE LANL Nondestructive Assay Training Course**, Los Alamos National Laboratory, NM.

Memberships

2023 - Present **Student Member**, American Nuclear Society (ANS).

2024 - Present **Student Member**, World Institute for Nuclear Security (WINS).

2023 - 2024 **Student Member**, Institute of Nuclear Materials Management (INMM).

2022 - 2024 **Student Member**, Nuclear Security Science & Policy Institute (NSSPI) at Texas A&M University.

Other Professional Experience

Turkish Statistical Institute, Ankara, Turkey

June 2021 – Sept 2021 ***HSE Specialist***.
Advised management on Occupational Health and Safety (OHS) regulations in response to Covid-19; prepared risk assessment reports; and delivered safety training programs

Aug 2016 – Jan 2022 ***HR Specialist***.
Assisted in managing the $50M+ annual budget operations by monitoring expenses, preparing financial tables, and reporting variances

Muratpasa Anatolian High School, Antalya, Turkey

Jan 2015 – Nov 2015 ***Teaching Intern***.
Instructed high school physics courses in adherence to the curriculum; administered exams and prepared progress reports; and conducted parent-teacher meetings to discuss academic performance

Freelance, Antalya, Turkey

May 2008 – Jan 2015 ***Private Tutor***.
Delivered private tutoring in Physics and Mathematics to students ranging from primary to high school; prepared customized lesson plans; supported exam preparation; and reinforced fundamental problem-solving skills for competitive exams

Akdeniz University, Department of Health, Culture and Sports, Antalya, Turkey

Jan 2008 – Nov 2008 ***Graphic Design Assistant (Part-Time)***.
Designed promotional materials (banners, posters, brochures) for university events using Adobe Photoshop and CorelDRAW.

Other Certifications

May 2017 **Occupational Health and Safety Specialist Certification**, The Turkish Ministry of Labor and Social Security.

Jan 2016 **Pedagogical Formation Certificate in Physics Teaching**, *One-year teacher education and practicum program for qualification as a high-school teacher*, School of Education, Akdeniz University, Antalya, Turkey.