Matthew Louis

Nuclear Engineer

Boston, MA
(502) 902-0276
matthewlouis31@gmail.com
https://gitlab-matthew-louis-code.com

About Me

A driven nuclear engineering student trying to make a positive impact through good science and new ideas. Interested in methods development, advanced computing, and multiphysics modeling for next-generation nuclear.

Skills

Proficiency Key:
■ Advanced ■ Intermediate ■ Basic

Programming Languages

Python	■	Julia	■
C++			

Dev Tools/Computing

Git	■	Linux	■
HPC	■	Docker	■

Monte Carlo Reactor Physics

MCNP		Serpent	■
OpenMC	■	KENO VI	■
TSUNAMI	■	MAVRIC	

Core sim/CFD/Thermochem

VERA		PARCS	
Griffin		Pronghorn	
Paraview	■	OpenFOAM	
Thermochimica	■	MSTDB	■

Misc

PHITS	■	LAMMPS	
CP2K			

Nuclear Engineering

- Core design calculations
- Computational fluid dynamics
- Molten salt reactor modsim

Data Analysis

- Machine learning using pytorch: SVM, random forest, FCNN, CNN

Publications

- Investigating a fast static-fueled molten salt reactor for wasteburning
- Radiation Protection Considerations for Cancer Patients with End-stage Renal Disease Receiving 131I Treatment
- VERA Integration in the NEAMS Workbench

Awards

- ANS Reactor Physics Division Scholarship (2023,2024)
- NEUP 4-year Institution Scholarship (2022, 2023, 2024)
- National Merit Scholar

EDUCATION

2025 - present **PhD. in Nuclear Science and Engineering | MIT**

2021 - 2025 **BS in Nuclear and Radiological Engineering | GPA 3.72/4 Georgia Tech**

INTERNSHIPS

Summer 2025 **Intern | Undergraduate Internship** Idaho National Lab
- Developed an engineering-scale multiphysics calculation sequence for source term analysis of the **Molten Chloride Reactor Experiment** in **MOOSE**
- Published open source models on GitHub

Summer 2024 **Intern | SULI** Oak Ridge National Lab
- Created visualization tools for interpreting similarity indices in criticality safety
- Developed a fully featured open source project

Summer 2023 **Intern | SULI** Oak Ridge National Lab
- Integrated **VERA** into the **NEAMS Workbench**
- Integrated runtime features, postprocessing, plotting, and syntax highlighting/input grammar

Summer 2022 **Student | Nuclear Chemistry Summer School** Brookhaven National Lab
- 6-week intensive course on nuclear chemistry
- Completed dispersible radioactivity training and performed laboratory experiments in radiochemistry

PROJECTS

2025 **Neural Net Domain Decomposition for Core Neutronics | Georgia Tech**
- Explored the use of data-driven techniques for implementing the incident flux response expansion for core neutronics calculations with simple FCNNs and symmetry equivariant architectures here

2025 **AIMD Molten Salt Structure Calculations | Georgia Tech**
- Used an Ab Initio Molecular Dynamics code (**CP2K**) to compute partial radial distribution functions for a UCl_3 salt here

2024 **Block Methods for Functional Trace Estimation | Georgia Tech**
- Evaluated the block Lanczos iteration as a preconditioner for functional trace estimation for an iterative methods (in linear algebra) class. Code is here

2024 **Molten Static Salt Reactor Senior Design Project | Georgia Tech**
- Did basic feasibility calculations for a static-fueled molten salt reactor design. First of a kind in the open literature (code, paper)

RESEARCH

2025 - present **ARPA-E Newton: Nanofluid-based Accelerator-driven TransmUtation REcycler | Computational Reactor Physics Group MIT**
- Helping design a first-of-a-kind 30 MW spallation target and nanofluid-based fission blanket for a novel accelerator-driven nuclear waste transmutation system

2025 - present **Sparse Physics Informed Discovery of Equations for Rarefied Gas Dynamics | Dynamics and Control Group Georgia Tech**
- Used **SPIDER** to discover new PDE models of rarefied gas flows using data generated from molecular dynamics simulations with LAMMPS

2022 - 2024 **LEU+ Core Design/Fuel Cycle | Computational Reactor Engineering Lab Georgia Tech**
- Assembly-level and full core (nodal diffusion) calculations to optimize and investigate the feasibility of a 24 month operational cycle length for LWRs
- Also developed capability for calculating transport correction ratios

2022 - 2024 **I-131 biokinetic modeling for ESRD patients | Radiological Engineering, Detection, and Dosimetry Lab Georgia Tech**
- Created a novel biokinetic model for radioiodine in End Stage Renal Disease (ESRD) patients
- Coupled biokinetics with radiation transport calculations for patient-release exposure calculations