# Samuel Olivier

samolivier.net

## Education

**University of California, Berkeley** Fall 2017 – Present
Applied Science and Technology, PhD (expected May 2021)
Advisor: Rachel Slaybaugh

**Texas A&M University** 2013–2017
B.S., Nuclear Engineering with Minor in Applied Mathematics. Magna Cum Laude

## Research Experience

**University of California, Berkeley** – Graduate Student Researcher Fall 2017 – Present

**Lawrence Livermore National Laboratory** – High Energy Density Physics Intern Summer 2018

- Developed a high order finite element discretization for the Variable Eddington Factor equations in 2/3D.
- Implemented Variable Eddington Factor acceleration in an LLNL laboratory directed research code for investigating high order FEM methods for thermal radiative transfer on curved meshes.

**Lawrence Livermore National Laboratory** – High Energy Density Physics Intern Summer 2017

- Created a generalized nuclear reaction network framework capable of simulating the evolution of an arbitrary number of isotopes for Cosmos++, an LLNL astrophysics code.
- Created a massively parallel nucleosynthesis post processor to regain isotopic resolution from simulations run with small networks.
- Used the generalized network and post processor to investigate the effect of tidal disruption on a white dwarf's composition.

**Center for Exascale Radiation Transport** – Undergraduate Researcher Spring 2017

- Developed a mixed finite element discretization for the Variable Eddington Equations in 1D.
- Created a 1D Lumped Linear Discontinuous Galerkin Discrete Ordinates solver in Python to compare source iteration accelerators ($S_2$SA, DSA, VEF).
- Showed that VEF acceleration was as effective as $S_2$SA and that the thick diffusion limit was preserved with the inconsistent mixed FEM discretization.

**Lawrence Livermore National Laboratory** – High Energy Density Physics Intern Summer 2016

- Implemented a 19 isotope nuclear reaction network into Cosmos++.
- Verified the network with hydrostatic test problems and showed that the 19 isotope network is an inexpensive method for modeling stellar evolution.

**Fuel Cycle and Materials Laboratory** – Undergraduate Researcher/Lab Technician Fall 2014 – Spring 2016

- Designed an electrorefiner to purify depleted uranium metal with non-aqueous electrolysis.

## Skills

*Programming*

- Languages: C/C++, Python, Julia, R
- Platforms: Linux
- Parallel Programming: MPI, OpenMP, CUDA, UPC++ on HPC platforms (LLNL, NERSC, OLCF, TAMU)
- Code Development: git, Make, CMake, Doxygen, Jira, Unix

- Software: MFEM, Gmsh, SuperLU, Eigen, VisIt, Paraview, MCNP, OpenFOAM, scikit-learn, MESA, TotalView, LaTeX
- Hardware: administrate a three-node, "home cluster"/file server

*Numerical Methods*

- Finite Elements: Lagrange, Raviart Thomas, mixed methods, Discontinuous Galerkin. Solving the resulting linear system with direct (LU, Schur complement) and iterative methods (CG, GMRES). Efficient implementation procedures.
- Spectral Methods: Fourier and Chebyshev solution techniques for Navier Stokes and Euler's equations.
- Time Integrators: Fractional step methods, Implicit Runge Kutta, nonlinear Newton iteration.

*Nuclear Engineering*

- Neutron Transport: diffusion, $S_N$, preconditioning (DSA, $S_2$SA, VEF)

## Research Interests

- Algorithm development for efficiently solving Deterministic Radiation Transport on high performance computers
- Methods development for computational multiphysics
- High order finite element spatial discretizations
- Discontinuous Galerkin spatial discretizations
- GPU computing
- To a lesser extent: Direct Numeric Simulation of Navier Stokes, machine learning on HPC

## Awards and Recognitions

- Department of Energy Computation Science Graduate Fellowship (2018–Present)
- Nuclear Regulatory Commission Fellowship (2017–2018)
- Alpha Nu Sigma National Honor Society Member (2015–Present)
- Bill R. Teer '55 Scholarship – Nuclear Engineering Dept. TAMU (2016–2017)
- Harold Joe Giroir Jr. Memorial Scholarship – Nuclear Engineering Dept. TAMU (2015–2016)
- Lechner Scholarship – Texas A&M University (2013–2017)

## Publications

1. Peter Anninos, **Samuel S. Olivier**, P. Chris Fragile, Bhupendra Mishra, Robert Hoffman, and Karen Camarda. Tidal Disruption and Nucleosynthesis from Near Encounters of White Dwarfs with Intermediate Mass Black Holes. In progress.
2. **Samuel S. Olivier** and Jim E. Morel. Variable Eddington Factor Method for the $S_N$ Equations with Lumped Discontinuous Galerkin Spatial Discretization Coupled to a Drift-Diffusion Acceleration Equation with Mixed Finite-Element Discretization. *Journal of Computational and Theoretical Transport*, 46:6-7, 480-496. January 2018.