

As a freshman entering the University of Florida, I had never even heard of Nuclear Engineering. Five years later, I am hoping to be pursuing a PhD in it. I, like so many others, found myself in the beginning gravitating towards engineering as a promised combination of math and science. The final rotation of UF's Introduction to Engineering course brought the freshmen to the nuclear engineering department, and my interests were piqued. As I continued in the major, I kept waiting for a sign that I had chosen correctly, an epiphanous moment where my whole future fell into place and I would realize I was meant for nuclear engineering all along.

My junior year, as part of a Reactor Analysis and Computations course, we were assigned an MCNP project based on the C5G7 benchmark. At the time, it was the most involved project I had been assigned. It was a slow build of successes and failures, culminating in feeling that I had found a part of nuclear engineering that I was truly passionate about. While everything I had learned up to that point was, of course, interesting, I loved being able to combine my interest in programming and computing with my interest in nuclear engineering. Both subjects have allowed me to evolve and marry different problem solving skills and ways of analytical thinking, and this is what I began to actively pursue.

That summer, I worked as a National Nuclear Data Center intern at Brookhaven National Laboratory and learned more about scripting and nuclear analysis using high power computing systems. I developed a script to automate runs for EMPIRE, a nuclear reaction code, as an infrastructure for global model oriented nuclear data library. The program streamlined the EMPIRE input process, and therefore the generation and analysis of nuclear data. It also allowed me my first foray into presenting research I had conducted, both at the lab's poster session and at the American Physical Society's Division of Nuclear Physics 2018 Annual Conference as part of the Conference Experience for Undergraduates put together by the University of Wisconsin La Crosse.

Determining how I could continue along this path led me to join a research group my senior year in the Nuclear Engineering department at UF focused on advanced modeling and simulation, criticality safety, neutron and photon cross section processing methods and tools, and reactor physics applications and methods development. While I had worked with other research groups in the past, this was the first time I felt I was doing something I could truly see myself having a long-term career in. I worked with another undergraduate student to acquire and process the ENDF/BVIII.0 evaluated cross section libraries to produce continuous energy and multigroup neutron and gamma cross section libraries for release with SCALE

using SCALE's AMPX system. I also used verification and validation tests to compare the performance of the current library with that of the previous library. This project was where I had hammered home that a lot of research is troubleshooting, and working to find solutions to problems you never could have anticipated arising.

This past summer, I worked at Idaho National Laboratory as a Reactor Physics Intern modeling upgrade fuel designed for the Transient Reactor Test Facility (TREAT). Using technical specification documents from the original upgrade design project in the 1970s and 80s, I modeled all of the unique upgrade fuel assemblies. I then implemented them in various arrangements in a model of TREAT's current layout to find a critical geometry and various reactivity results, with the goal of shortening the transient pulse and hardening its neutron spectrum in order to simulate more severe accident conditions.

After graduating in December 2019, I will be returning to Idaho National Laboratory as a Nuclear Experiment Analyst to continue working on simulations and modeling of TREAT Upgrade Fuel and begin assisting with TREAT benchmark work. Since my interest in computing for nuclear analysis was first piqued, my time at national laboratories and doing research as an undergraduate student has allowed me to develop my skills as a researcher and find the subject matter that I am most passionate about. I want to pursue a PhD in Nuclear Engineering at the University of Tennessee because advancing my studies in reactor physics, with a particular focus in modeling and simulations for criticality safety, will prepare me to perform research at the forefront of reactor optimization. Continuing to develop my skills and contribute to the work being performed at UT will prepare me to go on to work in national labs or universities and pursue work to further the field.

The University of Tennessee's breadth of research in modeling and simulations for core design and neutronics would allow me to explore my research interests further. I am interested in the work performed by both Ondrej Chvala and Ronald E. Pevey, both in Advanced Modeling and Simulation research area at UT. My experience working with both MCNP and SCALE as well as high powered computing systems would make me a valuable asset in these groups. Pursuing a PhD to work towards becoming an expert in using computational nuclear methods and analysis would help me towards my goal of further optimizing the current generation of reactors and move toward the next generation's fleet of reactors.

That epiphanous, climactic moment I was hoping for is neither reflective of reality nor what I actively strive for any longer. It's a long series of decisions, sometimes easy and sometimes not, leading me toward my goal of being a researcher.