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CARLY WEVER '20 WINS JLAB CAPSTONE AWARD

MIXING BIOCHEMISTRY WITH PHYSICS LEADS TO VALUABLE EXPERIENCE AND NEW OPPORTUNITIES FOR ALUM.

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Above: Carly Weaver (photo courtesy Jefferson Lab)

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As a high school student, Carly Weaver would not have seen herself exploring a career in physics. “In high school, my worst class was physics,” says Weaver, and so she began her college career at Christopher Newport University as a biochemistry major. But a circuitous route led to an opportunity that combined her interest in the life sciences with physics.

Her interest in physics was piqued when she took an Honors seminar, The Evolution of Physics, a class for non-physics majors.

“I remember being so surprised and intrigued that physics could help me understand things like what light really was and reconcile the conflicting descriptions I had learned over the years: some classes called it a wave, some classes (like in my biology class at CNU) described it as more particle-like,” says Weaver.

David Heddle, a CNU professor who taught Weaver in that class, recognized her capability.

“I immediately saw that she would be a fantastic physics student with all the necessary skills, more than the academic capability, which she clearly possessed,” says Heddle. “She also demonstrated the equally important

quality of intellectual curiosity which teachers love to see.”

Ultimately, Wever chose to transition her major to physics, with an ultimate goal to combine her biology background with physics. A research opportunity came when she went to another CNU professor’s office for help with a homework question. That professor, Ed Brash, asked her if she might be interested in working at the U.S. Department of Energy’s Thomas Jefferson National Accelerator Facility with a Jefferson Lab staff scientist, Brad Sawatzky, as part of DOE’s Science Undergraduate Laboratory Internships program.

The project entailed repairing and recommissioning a large set of detectors that will be used for experiments coming up in Jefferson Lab’s Experimental Hall A.

“Carly became quite proficient with photomultiplier tubes, scintillators, and our data acquisition system, working "down in the weeds" looking at raw signals with an oscilloscope and building a trigger circuit necessary to collect cosmics data,” says Sawatzky. “She really performed at the level of a graduate student, it was great to have her on my team.”

At the start of her senior year, Wever approached Peter Monaghan, a CNU associate professor, to discuss possible Capstone physics projects. After learning about Wever’s interest in biophysics, and remembering a talk given by Drew Weisenberger at the American Physical Society annual meeting earlier that year on a plant imaging system his group was working on, Monaghan approached the Radiation Detector & Imaging group to inquire about having Wever work on one of their projects, for her physics Capstone.

It turned out that the group had a project that was a perfect fit, advancing their work on PhytoPET, a plant imaging system they developed based on nuclear medicine techniques. The object of Wever’s Capstone project was to simulate a simplified configuration for the PhytoPET detector system in GATE, a software tool designed to model and simulate detectors pertaining to nuclear medicine, to verify its results with available experimental data. The project determined that GATE was a suitable tool for the group in their research and design of future detector systems.

The GATE macros and Python code written for this project can be used as a template for the Radiation Detector & Imaging group for further modeling of detector system components. This project advanced the integration of GATE into the group’s R&D process to analyze designs and evaluate results in a more cost-effective and innovative way.

Besides benefitting the Jefferson Lab’s Radiation Detector and Imaging Group, Wever’s project was recognized as the outstanding physics Capstone project at Christopher Newport University in 2020.

Wever’s Jefferson Lab experience also provided her practical benefit.

“It definitely helped me find a job - I learned a lot of Python and worked at a national lab for more than a year- it was impressive experience for employers,” says Wever, who is starting a new job at Systems Planning and Analysis, Inc. where she will use many of the skills she developed during her experience at Jefferson Lab.

Wever is quick to express her gratitude to her professors at CNU who helped her through her research experience – Dave Heddle, Ed Brash, Peter Monaghan (who was her Capstone supervisor), as well as Brad Sawatzky and Drew Weisenberger and his colleagues in the Jefferson Lab Radiation Detector and Imaging Group.

So what is her advice to young people, particularly young women who might be considering the opportunities in physics and the sciences?

“Go talk to people and don’t be intimidated if you are the only girl in the room,” says Wever. “Don’t be afraid, most of them are really excited when you ask and are interested in helping you.”