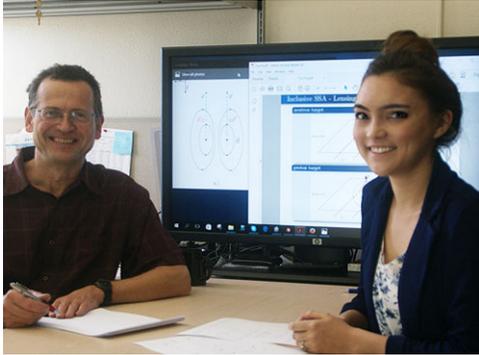


NMSU Undergrad Tackles 3D Particle Scattering Animations After Receiving JSA Research Assistantship



Waverly Gorman (right), a New Mexico State University junior, is the latest recipient of the JSA Minority/Female Undergraduate Research Assistantship. Here, Gorman reviews her project with her advisor and NMSU Physics Professor, Matthias Burkardt.

Waverly Gorman didn't always want to study physics.

She began her college career as a mechanical engineering major. Then she took a class on quantum mechanics, and she was hooked. Now, the 21-year-old New Mexico State University junior is the latest recipient of the Jefferson Science Associates (JSA) Minority/Female Undergraduate Research Assistantship (MFURA) at Jefferson Lab.

"I'm honored," Gorman said recently about the assistantship from her home in Las Cruces, N.M. "It's a big deal. I feel really lucky."

The JSA MFURA program offers opportunities to minority and female students who are pursuing undergraduate degrees in physics, giving them a chance to turn their studies into real-world research applications. Over the course of the year-long assistantship, the student demonstrates how her research ties into Jefferson Lab's nuclear physics program.

Gorman's project focuses on two parts: Using computer animation, she is creating 3-dimensional visualizations for electron-hadron scattering processes. In addition, she's modelling quark-gluon correlations, with the intent of publishing the estimates along with her advisor, Matthias Burkardt, a physics professor at NMSU.

The 3D simulations are essentially movies that will bring to life the intuitive pictures of electron-hadron scattering experiments that Burkardt has developed over past years.

"While Dr. Burkardt's pictures have been helpful for many researchers in the field, they are still difficult to visualize for broader audiences since they rely mostly on 2-dimensional static images," Gorman wrote in her project description. "The goal is to enable the viewer to repeatedly look at the same microscopic mechanism for a specific reaction, while being able to change the viewpoint of the observer."

Gorman said the 3D animations are intended to help those who aren't familiar with various reactions to better understand them. She and Burkardt plan to make the movie clips publicly available to Jefferson Lab after they're completed. Burkardt said the hope is that Gorman's animations can be used by people who give talks about Jefferson Lab experiments.

"A lot of people, when they give talks, use cartoons to show what happens," Burkardt said. "What Waverly's making is a movie clip, so it's not just a snapshot. It makes it easier to visualize."

Burkardt called Gorman a "highly qualified student" who is really excited about her work. During the past year, he's brought her up to speed on quantum-field theory, to help her be able to do needed calculations. Gorman plans to pursue a Ph.D. in physics after she gets her bachelor's degree at NMSU. "I'm pretty sure she'll go far," Burkardt said.

Gorman's proficiency at computer animation can be partially credited to her father, Mark, a computer scientist, she said. She grew up using computers, making websites when she was as young as 6 or 7 years old. Her dad taught her math, and was her tutor.

"My parents never pushed me toward anything in particular, but my dad really inspired me," Gorman said. "He would talk about physics all the time. Now I'm a physicist. I love it, and it's fun for me. People don't believe me that I love what I do."

The assistantship, which began in August, gives Gorman a stipend for a year and travel money, which she hopes will allow her to attend an upcoming conference on QCD evolution in Amsterdam. She also hopes to visit Jefferson Lab in the near future.

The assistantship is supported by the JSA Initiatives Fund Program, funded annually by the JSA owners, SURA and PAE Applied Technologies. Initiatives Funds are awarded every year to support activities that further the scientific outreach, and promote the science, education and technology missions of Jefferson Lab, according to Elizabeth Lawson, JSA Initiatives Fund program manager. “The Minority/Female Undergraduate Research Assistantship has provided opportunities for recipients to gain valuable experience with the lab's physics research program while they are pursuing their undergraduate education,” Lawson said.

With her assistantship, Gorman said she hopes she can contribute to “the most-cutting edge of what we know with things like quantum-field theories.” And, she added, she’s having fun in the process.

Jefferson Lab is a world-leading nuclear physics research facility devoted to the study of quarks and gluons – the building blocks of matter inside the atom's nucleus that make up 99 percent of the mass of our visible universe. Jefferson Science Associates, LLC, a joint venture of the Southeastern Universities Research Association, Inc. and PAE Applied Technologies, manages and operates Jefferson Lab, for the U.S. Department of Energy's Office of Science.

DOE’s Office of Science is the single largest supporter of basic research in the physical sciences in the United States, and is working to address some of the most pressing challenges of our time. For more information, visit science.energy.gov.

By Kim O’Brien Root, Jefferson Lab feature writer
Submitted: Wednesday, March 2, 2016 - 10:28am