Physics/Honors Freshman Selected for Prestigious TREND REU

BY: ROBIN LEE

Ariel Nicastro, a Physics major and Honors student at MTSU, was selected from about 200 applicants to participate in the 2023 Training and Research Experiences in Nonlinear Dynamics (TREND) summer research program, also known as a research experience for undergraduates (REU).

TREND is a 10-week undergraduate summer research program in nonlinear dynamics at the University of Maryland (UMD) College Park, funded by the National Science Foundation (NSF). This year's program will take place from May 30 to August 4.

"When I first got the acceptance email, I was in class, but that didn't stop my immediate reaction of excitement! After my class ended, I told my family, friends, and faculty members who supported me throughout the application process," exclaimed Nicastro. "This offers me the opportunity to learn about an increasingly applicable side of physics I would not have formerly thought to explore."

A Buchanan Fellow, Nicastro's achievement is remarkable because she is currently a freshman.

"She is the first freshman who I know of to be offered an REU in the 15 years I have been here," said Laura Clippard, international fellowships and Honors College coordinator at MTSU. "She is very motivated and organized; this is an incredible opportunity for her."

"She is diligent and eager to learn," said Dr. William Robertson, physics and astronomy professor at MTSU. "I am pleased that she has this opportunity. I believe she will represent MTSU well."

Nicastro will be among 12 other undergraduate researchers from across the country. This REU gives students a taste of graduate school and research to help them choose their career path. Students receive professional development training, including outreach and communication, while participating in summer-long dialogues about social justice in science.

According to Daniel Serrano, program director for TREND, participants receive hands-on exposure to science outreach and science communication activities. After the program, they will receive continued career and professional development support.

"We are very proud to be able to positively shape the careers of future physicists!" exclaimed Serrano.

Nicastro learned about the TREND opportunity on the NSF website. She said she decided to apply because of the broad range of computational, experimental, and theoretical programs available at UMD.

"The ability to list my top four program choices in my application allowed me to leave my comfort zone and find programs that would help develop technical research skills that I otherwise may not have encountered," she said.

Ariel Nicastro

For the duration of the REU, Nicastro has been assigned a project mentor, Wolfgang Losert, who is a professor of physics at UMD. Nicastro's biophysics research project will focus on the dynamics of living systems.

"An interdisciplinary project, it studies the dynamical, electrical, biomechanical, and biochemical rhythms of cells and tissues," Nicastro explained. "As a physics major, I expect to be studying and modeling cell motion using the programming platform MATLAB."

MATLAB is a programming and numeric computing platform used by engineers and scientists to analyze data, develop algorithms, and create models.

"There are also options to conduct cell motility experiments and develop devices that can manipulate these cells," she added.

Upon completion of the program, she will present her research at a formal conference. Additionally, the benefits of participation in the program include a $6,000 stipend, travel costs, and free on-campus housing for the summer at UMD.

This isn't Nicastro's first achievement as a physics student. She presented a poster earlier this year at the annual Tennessee Collegiate Honors Council (TCHC) Conference hosted at Austin Peay State University. During her first semester at MTSU, she worked with another student, senior Luke Gormsen, in Fall 2022. They conducted research manipulating electromagnetic waves in coaxial cables to create dips in transmission at regular frequency intervals.

"Although the waves being controlled here are electrical, the project's involvement in the field of metamaterials is beneficial in the further understanding of wave manipulation in the optical and acoustic realms," Nicastro explained. She primarily experimented with configuring the ring resonators in the lap and graphing the data, while Gormsen created a program to predict the characteristics of various configurations that were more difficult to create in their lab setting.

Additionally, prior to attending TREND in the summer, Nicastro will be presenting at the National Conference of Undergraduate Research in Wisconsin in April.

Students do not need to be Honors College students to apply for REU opportunities. Learn more at mtsu.edu/honors/ufo, or contact Laura Clippard with the MTSU Undergraduate Fellowships Office for more information, laura.clippard@mtsu.edu.