

Understanding a Physicist’s Work to Explore the Stars and His Community: An Interview with Dr. Jorge Lopez from the University of Texas at El Paso

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The work of a nuclear physicist requires continued dedication to unravel the secrets of the universe, and Dr. Jorge Lopez from the University of Texas at El Paso exemplifies these qualities, demonstrated through his reception of the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. Lopez, an expert in the field of nuclear physics who specializes in the molecular composition of stars and the geometric formation of nucleons upon cooling, sees this award as a testament to his future work in advancing the field of physics, both in research and in the classroom.

Lopez’s path to such an award began with the exploration of physics in middle school.

“Growing up in Juarez, Mexico, I was advised by my teachers to explore mechanical engineering instead of physics as an academic career because of the afforded opportunities in the region,” said Lopez.

After moving to the U.S., however, Lopez attended the University of Texas at El Paso with a scholarship, earning a bachelor’s in physics. He then attended Texas A&M University where he received his doctorate.

Following his education, Lopez pursued various post-graduate opportunities, including conducting research at the Niels Bohr Institute in Copenhagen, the Lawrence Berkeley Lab, and the Texas A&M Cyclotron Institute. Lopez began to focus his time on publishing articles about the structure of the crust of neutron stars, gravity waves, and the radio telescope built at UTEP. Now, he is intent on studying the “nature of neutron stars,” which includes utilizing a machine learning program to compute Minkowski functionals.

“Minkowski functionals can be thought of as values that characterize the geometric formation of nucleons in neutron stars,” says Lopez.

As part of this study, Lopez is working with different faculty members and undergraduate students to collect data from stimulations that involve firing nucleons through an apparatus that measures three-dimensional positions, velocities, and particle charge. Data from these stimulations are then run through code that computes the values of the Minkowski functionals. These functionals are a series of numbers that provides characteristics for the “nuclear pasta” that is formed in neutron stars. A complex formation of nucleons that mimics the physical composition of actual pasta, the work on nuclear pasta ultimately serves as a



study of the origin of clustering in the early universe, a path for understanding the beginning of the universe.

Beyond his research, Dr. Lopez’s work is also founded on his dedication to helping students understand their academic interests and decide what area of physics they should explore.

“Studying physics is something that takes passion and dedication,” says Lopez. “A career that is so obscure prior to entering college that it requires a serious self-contemplation on behalf of the student before he or she declares their major.”

Lopez uses this advice to help undergraduates decide what major they should choose, and whether physics is a pathway they’d like to pursue. Accordingly, Lopez strives to provide them with as much advice as possible early in their academic careers so that they have enough time to deliberate their true academic passions before declaring their major.

As both a researcher and a professor, Lopez also dedicates much of his time to addressing his students’ questions in his office.

“Really, any time that I am in my office is an office hour for them,” says Lopez.

A man dedicated to helping his students, Dr. Jorge Lopez doesn’t stray from helping those around him and making UTEP

a more inviting environment through his provision of advice and his work to provide a diverse selection of courses for students to explore their interests.

“As a professor for 30 years, I’ve taught every course that’s in the catalog for the physics department at UTEP, from introductory physics to quantum mechanics,” says Lopez. “Ultimately, I’ve grown to see the physics department as something of a department that serves students, where I’ve invented courses for education majors, pre-med students, and engineering majors.”

These courses act as branches to other academic departments in order to enhance the overall academic life at UTEP.

Alongside his passion for mentoring, Dr. Lopez feels the greatest advice to give undergraduates is to remind them to be attentive to the truth behind a life in research.

“If you have a strong will and dedication to the understanding of life’s most widely-recognized mysteries, then you should go for it,” says Lopez.