An Astronomer’s Marathon from the LA Valley to Beyond our Galaxy

Loraine Sandoval Ascencio didn’t grow up imagining a future in astronomy. Now, she’s running to the stars and opening doors for others along the way.

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Sandoval Ascencio studies galaxies that behave in very un-galactic kinds of ways.

Picture Credit:

Kate Kragness

Loraine ran. It was a cool California morning in 2024, and a thick marine layer muffled her family's distant cheers.

She kept running. Her breath was steady, her muscles ached and sweat drenched her temples. But she kept telling herself one thing: "*keep going*."

Much like the marathon she finished last year, UC Irvine Department of Physics & Astronomy's Ph.D. candidate Loraine Sandoval Ascencio's long path to becoming an astronomer took many turns. In both cases, there were times when the finish line seemed hopelessly out of reach – but Sandoval Ascencio pushed forward, crossed the finish line and is now a proud first-generation Latina scientist researching extragalactic astrophysics at UC Irvine.

Her academic journey began in Los Angeles's San Fernando Valley, where Sandoval Ascencio remembers pouring over astronomy books as a child, captivated by images of Saturn's rings and distant nebulae.

But at the time she thought of herself as an average student who disliked math as a child and didn't envision a future as a scientist.

"I didn't grow up thinking being an astronomer was a career," Sandoval Ascencio said. "I didn't know any scientists, and as a first-generation college student, I struggled to figure out what I wanted to study. It took me a long time to realize that I could belong in academia."

After high school, Sandoval Ascencio studied at Los Angeles Mission College, unsure of her path. She dabbled in a variety of majors, including biology and pathology, and one day spotted a flyer for a NASA JPL internship and applied for it on a whim. She got in, and as an intern Sandoval Ascencio met a Latina astronomer, Farisa Morales, who had walked a path similar to hers.

Suddenly, a future in science suddenly felt like a possibility.

The internship gave Sandoval Ascencio the burst of inspiration she needed to pursue her long-held interest in astronomy. "I find it really important to see people like yourself in these spaces that you wouldn't normally see them in," she said. "Seeing that representation was pivotal for my career trajectory."

After the NASA internship, Sandoval Ascencio transferred to UCLA, where she earned her bachelor's in astrophysics followed by a master's in physics at Cal State LA.

Then, being the marathoner she is, Sandoval Ascencio kept pushing herself until, eventually, she landed at UC Irvine, where today she researches galaxies alongside Professor Mike Cooper.

At UCI, Sandoval Ascencio studies ultra-diffuse galaxies (UDGs), which are systems beyond our own Milky Way Galaxy that challenge our understanding of how galaxies form and evolve over time. These galaxies may be as big as the Milky Way, but they're very dim, making them difficult to observe. UDGs can vary widely in their properties. Some actively form stars, while others appear dormant.

"What makes them so fascinating is that they don't behave like typical galaxies. We don't fully understand how they formed, and they seem to exist in all sorts of environments," said Sandoval Ascencio.

Drawing on high-resolution data from the Keck Cosmic Web Imager (KCWI), she and Cooper recently discovered a large sample of UDGs. In the sample, Sandoval Ascencio identified a rare population of UDGs that appears to be "in the act of quenching," meaning these systems are in the process of shutting down their star formation.

What's more is that a significant fraction of these UDGs were not located within galaxy clusters or near massive galactic neighbors. Instead, they were found in relative isolation, which is notable because galaxies usually stop forming stars, or "quench," when they interact with larger systems. For example, when a smaller galaxy interacts with a more massive neighboring galaxy, gravitational forces can strip away the smaller galaxy's gas, draining it of the raw material needed to form new stars.

The UDGs Sandoval Ascencio discovered had no massive neighbors, meaning they were quenching in isolation. Their existence raised a puzzling question for the extragalactic astrophysics community: How can a galaxy shut down star formation if there are no larger neighbors around to trigger it?

"That was the most exciting part. We found UDGs that were isolated, with no more massive neighbors, and also on the brink of transitioning to quenched, or non-star forming, systems," Sandoval Acenscio said. "That's what made this discovery so

important and unexpected.”

Sandoval Ascencio’s influence reaches far beyond the telescope. In addition to her astronomical discoveries, she strives to make a difference right here on her home planet as the current president of UC Irvine’s chapter of the Society for Advancement of Chicanos and Native Americans in Science (SACNAS), and as a facilitator of Rising Stargirls – a program for middle school girls from underrepresented backgrounds that encourages them to pursue the sciences through a combination of art and astronomy lessons.

Sandoval Ascencio has committed herself to supporting the next generation of underrepresented students in STEM.

“Representation was key in my journey,” she said “I want to take up space in places where I’ve historically been a minority. I want others like me to see that what I’ve done is possible.”

In recognition of her academic accomplishments and her extensive community contributions, Sandoval Ascencio received the José Flores-Velázquez Endowed Scholarship, named in honor of a late UC Irvine astrophysics Ph.D. candidate whose life was tragically cut short in 2019. Flores-Velázquez was widely known not only for his work on star formation in galaxies, but also for his deep commitment to heritage and community. The scholarship, established by faculty and donors to honor his legacy, supports graduate students who follow his example, leading with compassion and community involvement.

“I didn’t expect it. I froze for a moment, and then got emotional after learning I’d received it,” said Sandoval Ascencio. “It meant that my efforts, outside of just research, were seen. It reminded me that the work we do for our community matters.”

And her journey isn’t ending here. Sandoval Ascencio is still running; sometimes she’s running a marathon, and sometimes she’s darting towards a mysterious galaxy at the edge of the universe.

Wherever she is, she’ll always keep one eye out for the next eager mind who just needs to see someone like her cross the finish line.

“Don’t let anyone tell you that you can’t,” she said. “Take up space. You deserve to follow your dreams. And remember: *keep going*.”

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