Tré Willingham rockets to the stars

With the help of Cal-Bridge, Willingham is starting a Ph.D. as a new UC Irvine Physics & Astronomy graduate student. But it didn’t start out that way.

Monday, September 30, 2024

Lucas Van Wyk Joel
UCI Physical Sciences Communications



Tré Willingham at the start of his UC Irvine doctoral journey, eyes fixed on the stars.

Picture Credit:
Lucas Van Wyk Joel

It was 2016, and Tré Willingham sat in a hotel room. He was experiencing homelessness, and he was trying to find his way while working any odd job he could find.

Sitting there, Willingham remembered something his father taught him: if he decided to do something – anything – he needed to commit himself to the task completely.

“He never let me do something 50 percent,” said Willingham, who just enrolled as a new doctoral student in the UC Irvine Department of Physics & Astronomy. “And I knew that if I didn’t do something – if I didn’t make some kind of change or take action – then whatever the situation was, I knew it was going to be like that the rest of my life. I knew I didn’t want to be in that situation.”

Willingham was experiencing homelessness, but his eyes were on the stars, and the memory of his father’s lesson was the fuel that he needed to reach them. He started making one decision after another, and each decision was, in hindsight, a guiding star that helped him find his way to UC Irvine. One of the final stars on his path was Cal-Bridge, a program that helps historically underrepresented students in California gain the experience and know-how they need to become competitive candidates for Ph.D. programs in the University of California system.

Willingham started his higher education journey at El Camino College in Torrance, California. There, he met Evan Haze Nuñez, a student and the president of the college’s mathematical physics club. Willingham was convinced to join the club after he saw Nuñez and the other members deriving Maxwell’s equations that describe the behavior of light.

Until then, Willingham wasn’t sure which direction to take his studies. “I was more on the artistic side of things at first,” he said. “Engineering was low on my list, and physics wasn’t even on the list. I didn’t even have a complete understanding of what physics even was.”

But something about Maxwell’s equations shifted something in him. “I was hooked from that moment,” said Willingham. “There was so much beauty in it. I felt like I was watching an artist at their canvas, and when they got to the final result of Maxwell’s condensed versions of the equations in differential form, I remember thinking to myself that I never realized there was elegance and beauty in the mathematical expression.”

Willingham’s journey into physics had begun. From El Camino, Willingham enrolled at Compton College, where he started tutoring students in math and science. One of his students told him about the college’s STEM club, and about something called the

Compton Comet. “‘You should come to our meeting. We’re building a rocket called the Compton Comet,’” the student said.

Willingham became the chief engineer for the project, and, leading the team for five years, he helped design and finish the rocket, which is now ready for liftoff. The Compton Comet is the only functioning rocket that Willingham knows of completely designed and built by a team of community college students, and which rivals rockets built by larger universities with more resources.

“We had a single chamber from an old XRL-11 engine, which was originally part of a four-chamber rocket engine from the 1940s used in experimental airplanes, and we were able to get our hands on the engine because we’re all surplus junkies,” said Willingham. “We all go to surplus aerospace yards and see what we can come up with.”

Building the Compton Comet, as well as being a Cal-Bridge scholar, helped Willingham land a Research Experience for Undergraduates (REU) position at Stanford University, which is where he discovered a love for material physics research.

“I think that anyone who takes advantage of Cal-Bridge can achieve their dreams,” said Willingham, whose Cal-Bridge advisor is UC Irvine’s Professor Mu-Chun Chen, Associate Dean of Diversity, Equity and Inclusion. “Anything can happen.”

Now, at UC Irvine, Willingham is exploring material research in the lab of Professor Javier Sanchez-Yamagishi, and he’s ready to keep blazing a path to the stars, far from that hotel room and with his father’s lesson close to his heart.

“I’m living my dream in this moment,” Willingham said.

Read more: UC Irvine becomes host campus for Cal-Bridge program

Feature Stories
Physics & Astronomy
Diversity, Equity and Inclusion
The Future of Fundamental Science
View PDF