

Title: Always Grow the Tower

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Interviewee: Dr. Robyn M. Millan

“Math is a tool that allows you to think about problems in a more careful and precise way,” states Dr. Robyn Millan, a professor of physics at Dartmouth College. This perspective, a lens through which she views reality, propelled Professor Millan toward a career in physics. Dr. Millan approaches mathematics from a unique perspective, using it not just in its pure form. Unlike some who may prioritize more abstract thinking, Dr. Millan connects physics and math with real-world scenarios, weaving formulas into the fabric of her understanding and connecting astrophysics to everyday life.

Dr. Millan earned both her undergraduate and doctoral degrees in physics from the University of California, Berkeley. She arrived at Dartmouth in 2002 as a visiting scientist and joined the faculty in 2005. Her research specializes in space physics with a particular focus on advancing the use of balloons and small satellites for space science and observation. She specifically uses high-altitude scientific balloons to investigate charged particles near Earth and the effect of space weather on satellites. Dr. Millan is also passionate about investigating other space particles and Earth’s magnetosphere, and her groundbreaking research is reflected by her renowned publications in this area. Her work on Earth’s radiation belt significantly impacted the study of energetic particles in space environments and inspired many to pursue research in this area.

Growing up, Dr. Millan often had to move because her father served in the Coast Guard. She was born in Maryland and moved from there to New Jersey to Hawaii to California. Instead of seeing it as a disruption to her childhood, Millan embraced these frequent moves, saying they gave her valuable people skills. This helped her grow accustomed to frequent changes, including transitioning into university.

Because he often tinkered with and engineered various things at home, Dr. Millan’s father strongly influenced her love of math as a child. At the age of six, she was taught to count and perform operations in binary, because she was interested in why her father was making a computer. At age eight, she learned to graph functions. Later during her schooling, she worked with accounting and finances at a video store. While her father grew her love of science and math, Millan’s mother, an avid reader, nurtured a love of the arts. Both her parents pushed her to join sports alongside academics to diversify her schedule and live a healthy lifestyle. So in high school, she joined the track team, where her coach always set a high bar, pushing his students to strive to be the best possible versions of themselves. Millan always keeps this in mind when she tries new things.

When beginning college, Dr. Millan felt ready for the numerous changes that were about to come her way. These, she says, mirrored the changes she had grown accustomed to when moving homes as a child. Because of how quickly she adapted, Millan found she was ready to focus on her studies and do her best: a critically important skill. However, Millan noticed that in almost all of her undergraduate classes, there was a very obvious difference in the number of men compared to women. “This was really clear in my introductory physics class,” she says, “where of the three or four hundred students, just a couple were girls.” In that same physics class, Dr. Millan often felt that the men thought that she and other women in the class were not prepared for the complex math covered, demonstrated by their dismissive attitudes. This led Millan to start questioning if physics was even the right path for her. When she talked to others about wanting to pursue geology, astronomy, or physics, she was often just left with “Oh, that’s not for women like you.” Such remarks led to some self-doubt, but nevertheless, Dr. Millan viewed these negative experiences as opportunities for personal growth.

However, this discouraging environment shifted noticeably with the mentorship of a highly influential female astronomy professor at Berkeley who provided a safe and supportive space for Dr. Millan to discuss her career aspirations, promoting a genuine and open dialogue. This professor’s mentorship profoundly shaped Dr. Millan’s own teaching style and ultimately solidified her commitment to pursuing a career in

astrophysics. This supportive relationship encouraged her to explore new avenues of research and embrace experimentation that continues to define her work today.

Looking back at her development through her education, Dr. Millan notices that she has some favorite teachers. “I think I like the teachers who were really excited about what they were teaching,” she said. One of Millan’s favorite teachers was a high school history teacher. Before her, Millan found history extremely monotonous, but this teacher described historical events as stories, captivating her and the rest of her class. To this day, Dr. Millan remembers her teaching style and often uses ideas paralleling hers while explaining complex astrophysics and electromagnetism to her students.

As a child, Dr. Millan had to adapt to new environments quickly, a skill she often used in college, both with professors and fellow students. She feels that sometimes she *did* work harder than her male counterparts, but sees these as times when she grew to become resilient. During these times, she also strengthened many foundational skills and topics, setting herself up for success. Dr. Millan firmly believes that education is like a delicately balanced tower: each idea learned helps build the next. “I spent a lot of time with students in my class re-teaching them things that they should have learned in high school because they just memorized for the test and forgot later.” But instead of covering these concepts quickly, Dr. Millan carefully and deliberately rebuilds the lower blocks of the tower, ensuring a more sturdy base, leading to a more thorough understanding of physics as a whole. She knows that when one of the lower blocks breaks, everything falls. At every opportunity, grow the tower.

About the Author:

I am Agastya Chakrabarti, a seventh grader at Frances C. Richmond Middle School. I love competition, so when I first heard about opportunities like MATHCOUNTS and Quiz Bowl at my school, I immediately joined both. Now I regularly participate in tournaments in each, and have qualified for Quiz Bowl nationals. I particularly enjoy the problem-solving aspect of mathematics, as seen in competitions. I am also taking Geometry at school, and aspire to take Algebra 2 Honors next year. Outside of school, I am nearing black belt in TaeKwonDo, where I enjoy sparring. I also play the violin, a passion of mine since kindergarten, and will be touring in Washington, D.C. this spring.