Science & Technology

Janet Conrad and the Joy of Physics: When Experiment Pushes Theory

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For someone who spends so much of her time thinking about neutrinos, Janet Conrad is surprisingly down-to-earth.

She found her way to physics through an early interest in astronomy—as a sixth grader, she watched Star Trek and gazed at the stars through a friend's telescope. Her father, an agricultural scientist, advised that she would need to learn physics to be an astronomer. Then in her first class on quantum mechanics at Swarthmore College, she became enthralled by trying to imagine what's going on in the physical world at "these little tiny scales." But it was the accelerator facility at Fermilab (in Batavia, Illinois), which she first visited in her junior year, that truly won her over. From the heights of her scientific knowledge she says: "The detectors are just awesome."

Whether at home in Nyack, teaching at Columbia, or working at Fermilab, Conrad is thinking physics at the highest level. Yet she has an extraordinary ability to explain her work to the intimidated layperson. "It's not the way many people imagine," she says. "Somehow when you think about being a scientist you think about people who work in very small groups, maybe by themselves, in lab coats, in sterile environments with black tables. But if you like to work with people, this is a very good field. And it's messy, which is good for someone who likes to make a mess like I do."

Along the way she has had to teach herself everything from electronics to plumbing. "Every year I'm doing something different," she says. "I will be designing a detector and doing a lot of computer work or I will actually be trying to build the detector and

install it. Then we'll get the data and analyze it, which is actually the most fun time, and then we'll take it out and present it to the world."

Conrad clearly delights in her decision to be an experimentalist rather than a theoretician. "There's this cycle in physics," she says, "where experiment pushes theory and then theory pushes experiment, and I really like the moment in which experiment is pushing theory"—which is what is happening now in the area of neutrinos. "We have the data; we have it first. We can play with it as much as we like before we give it to them. That's what I like about experimental physics—I want to be the first to get my hands on what nature tells us. I want to find out that secret for a little while. For a moment in my life only I know this one thing about nature—which is totally amazing."

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