JANET CONRAD: So I really love teaching Junior Lab. And I really like it the way that it is. I like its structure and so forth. But you cannot sit in that lab and not come up with new ideas for experiments. And I have one that I would really love to do.

I am on a neutrino experiment. I was the head of the neutrino experiment for a while, which was called MiniBooNE. MiniBooNE stands for Booster Neutrino Experiment. So MiniBooNE was a small Booster Neutrino Experiment. And in neutrino physics, small is 800 tons. It's [CHUCKLES] 40 feet high. It's a big detector.

And inside of it, it had all of these photo detectors that lined the inside and when a neutrino interaction occurred, you got a little bit of light that came out from the charged particle that the neutrino produced. It turns out that charged particle was traveling faster than the speed of light in a medium, in the oil that was in the detector. Nothing goes faster than the speed of light in a vacuum, but things can go faster than the speed of light in material.

When that happens, you get the equivalent of a sonic boom, a kind of photonic boom. Bam, out come a whole bunch of photons. And people love this idea that things can go faster than the speed of light. And it's really so neat to see that light. It's called shrink of light.

And so, what I would like to do, is I would like to build a small version of my experiment MiniBooNE, which we would call TinyBooNE. [CHUCKLES] And TinyBooNE would be about one meter across. And it would have photo detectors, tiny little photo detectors. They're called silicon photo-multipliers. All along one side. And we would put a beta source in the middle of it. And out would come in electron.

That electron, if you choose the right beta source, is actually high enough energy that it will actually produce a little bit of Cherenkov light. And you can actually see the Cherenkov light. And so as with any of the Junior Lab experiments, we have to have two things you can measure. All the Junior Lab experiments are designed so there's two things you can measure. One which one partner focuses on and one which the other partner focuses on.

And so the things that you would measure in TinyBooNE, one of them would be how the Cherenkov light turns on with energy, given the source, which would be a strontium to yttrium source. And then the other would be to use that beta decay spectrum to set a mass limit. Not a very good mass limit, but a mass limit on the mass of the neutrino. And I think it would be

really fun. I would just love to build this. It's just not possible to sit in there and not dream up what experiment you would like to do.