Evelyn Lamb:	00:11	Hello and welcome to the Lathisms podcast. I'm Evelyn Lamb. In each episode we talk with a Hispanic or Latinx mathematician about their journey in mathematics. Today I'm very happy to be talking to Luis Sordo Viera. Hi. Can you tell us a little bit about yourself?
Luis Sordo Viera:	00:28	Hi, thank you for having me on the podcast today. Like you said, my name is Luis Sordo Viera. I was born in Venezuela. I moved when I was 12 years old to the United States, and I started doing mathematics in college actually because I was actually really interested in physics, and it sort of led me into studying mathematics. Now I am a postdoctoral associate at the Jackson Laboratory for Genomic Medicine working on modeling of disease and trying to find mechanisms in how disease progress.
Evelyn Lamb:	01:08	You said that you started doing mathematics in college, but do you remember as a child, did you have early experiences that might have made you think you might be interested in math?
Luis Sordo Viera:	01:21	Yeah. So actually my first memory of me getting really excited about math, and I remember this very vividly, I was in a doctor's office and I was just nagging my mom because I was really bored. My mom handed to me this game from a magazine. It's essentially what is the next number in the sequence. I had so much fun playing around with those particular games, and that's really when I knew that I had a passion for mathematics and I fell in love with these puzzles. Another really fun memory that I have is my grandfather would teach me new tricks on how to multiply and how to do arithmetic. My grandfather actually didn't complete primary school, but just his way of solving these problems were very different from what I was learning at school. So I absolutely loved his creative thinking and his creative ways of solving problems. So I think those two really gave me an understanding that I had a passion for math.
Evelyn Lamb:	02:25	Were you encouraged by your teachers or other people as you went through school to pursue math or other sciences?
Luis Sordo Viera:	02:35	I was neither encouraged nor discouraged I guess until college. I had a mentor, I was a tutor at Wayne State University, and I had a mentor Jim Veneri, who passed away recently, but he asked me to apply for a research experience for undergraduates because he saw that I had a talent and a knack for math, and that was really the first time that somebody really pushed me to go into mathematics.

Evelyn Lamb:	03:05	Was it hard for him to push you, or do you think you were pretty ready to go that direction?
Luis Sordo Viera:	03:13	It was not hard. I was not really ready. I didn't really know what I wanted to do. I knew that I really loved physics at that point, but I didn't know that I wanted to go to a graduate school. But at the same time I was open to trying out new things. I've always been open to trying new experiences and trying new ideas, so it was not very difficult.
Evelyn Lamb:	03:36	Was he the one who encouraged you to apply for graduate school and got you familiar with what to expect there?
Luis Sordo Viera:	03:44	It was actually a few people, so after I did my REU, that's when I really started getting encouraged to go to graduate school. One of the people that really encouraged me to go to graduate school was my topology professor at Wayne State University, Dan Isaacson. Also my REU advisor, Frank Morgan really pushed me. He sat down with me and started discussing what sorts of graduate schools I should apply for and why I should go to graduate school. Jim also really pushed me into graduate school, so I think it was at NSF REU that really drove me to finish that transition into graduate school.
Evelyn Lamb:	04:22	When you got to graduate school, what kinds of topics did you focus on?
Luis Sordo Viera:	04:30	In graduate school I worked in number theory, so I was working on a conjecture of Artin that dates back all the way to the 1930s, it's on finding series of polynomials over p-adic fields. The question is actually pretty neat and it's a really nice question to state. So the question goes like this, given a diagonal form with coefficients over a p-adic field of degree d in more than these square variables, are we guaranteed to have a non trivial zero over the p-adic field? So the conjecture is known to be true for the QPs, for the base p-adic fields. This was proved by Davenport and Lewis in the 1960s, but no other case was known. So essentially what I worked in graduate school was on extending this conjecture to extension of QPs.
Evelyn Lamb:	05:20	Number theory sounds a little different from genomic medicine. How did you get from doing research, doing your graduate work in number theory to working at a medical research place?
Luis Sordo Viera:	05:35	In graduate school there was a professor, David Murrugarra at the University of Kentucky, who used tools from computational algebra to study questions about how a cell processes signals

from their environment or how they respond from certain cues. I absolutely fell in love with it. I really liked it a mixture of biology and mathematics, and I was not really experienced in this, but immediately I knew that this was a new passion that I wanted to pursue. I always liked the idea of mixing different fields. So in undergraduate I was really in love with mathematical physics, but it turns out that actually my true passion and love falls in the realm of mathematical biology.

Evelyn Lamb: 06:21 What exactly does the Jackson Laboratory study?

Luis Sordo Viera: 06:25 So the Jackson Laboratory is a non-profit institution. We have different branches, but the one that I work in is in Farmington, Connecticut. We essentially study human disease. One of our ultimate goals is to find cures for human diseases, and to study the connection between the genetics and the genetics of patients and diseases, for example. So I work in the laboratory of Reinhard Laubenbacher, and what we're trying to do is essentially create a mathematical model of how a human would respond to a fungus. So essentially, it's a fungus that we breathe in and we're constantly exposed to it. But if you happen to have a weakened immune system because of cancer, cancer therapies or transplantations, essentially you're not able to respond properly. So what we're trying to create is a mathematical model that will predict the outcome of the disease.

Evelyn Lamb: 07:26 Is there a name for this fungus?

Luis Sordo Viera: 07:29 Yes, the fungus is called Aspirgillus Fumigatus.

Evelyn Lamb: 07:32 So that's something that certain people are more sensitive to, and so you're trying to look at how the fungus mechanism works, and then maybe how you could help people who are sensitive to it?

Luis Sordo Viera: 07:48 So we're actually trying to study how the immune system responds to the fungus. Most therapies targeting this fungus are based on, essentially most drugs that are used for this particular fungus target the fungus itself. But what we're trying to study is how can we use the person's immune system to attack the fungus more properly?

Evelyn Lamb: 08:13 Oh, okay. That sounds really interesting. I guess taking the other direction, I guess if you're trying to attack this problem, you attack it from both the fungus side and the immune system side.

Luis Sordo Viera:	08:27	Yes, that's absolutely right. Actually we're a little bit more specialized than the immune system because the immune system is a very complex system. So we're actually focused essentially on how our immune system in our body tries to starve the fungus from its needed iron. So the fungus itself needs iron to grow, and essentially certain cells in our immune system, they take away the iron from the fungus to starve it. So we're essentially trying to find, figure out ways how this happens and how to manipulate the immune system to do this more efficiently.
Evelyn Lamb:	09:07	Okay. Very cool. So changing tracks a little bit, how do you overcome challenges that you've had in either specifically the mathematics you're looking at or other larger career related issues?
Luis Sordo Viera:	09:23	That's a great question, and I've actually thought about this quite often, but I guess at the end of the day, I really absolutely love what I do. I love thinking about difficult problems. So I do get frustrated a lot of times, but ultimately I love thinking hard about my research. So I simply just persist and keep at it until the particular problem is solved. Alternatively, sometimes I get distracted by a new problem, but overall I would think like everything in life, it's a lot of hard work and persistence.
Evelyn Lamb:	10:01	I know that you recently joined the, I don't know the right word for it, board of directors, or set of people who are organizers for Lathisms. Can you talk a little bit about how you ended up working on this project?
Luis Sordo Viera:	10:20	Yeah. That's a good question. As you might be familiar with Pam Harris and Alicia, are part of the leaderships and they were actually some of the founders, and they knew me and they knew I was passionate about increasing diversity and representation. So they got in touch with me to see if I wanted to get involved in some way. I was really excited because I was featured in the 2018 calendar, and this had a big impact on my self-esteem and my capabilities of being able to expose my math to other people. So for a young scientist as myself, as a young mathematician, it was really impactful. Right? It was mathematicians of the caliber of Alicia and Pam reaching out to me and asking me, "Do you want to be in our calendar so people can see what your work is all about?" It was really exciting, so I really wanted to take part of this project.

Evelyn Lamb:	11:17	I guess kind of a related question, is things like Hispanic Heritage Month and other things like that, can you talk a little bit about your thoughts on that?
Luis Sordo Viera:	11:27	Yeah, so Hispanic Heritage Month, to me, it's a beautiful way to celebrate our community and what we have achieved. I see it as a celebration to thank the people that have helped me be where I am today. Especially my family. But I also take this as a personal challenge for me to improve the experience of all minority mathematicians in the future. Essentially I see it as a way to look back and see what we have all achieved as a community, but also as a current challenge that there are still several problems that we have to address and think together as a community to improve how minority mathematicians experience mathematics.
Evelyn Lamb:	12:20	I guess maybe to close, is there any advice you would give to mathematicians or maybe students who aren't sure if they want to do math or something like that, about how to move forward in math?
Luis Sordo Viera:	12:34	That's a great question. So what advice? I guess especially when you're young and you have not developed your self-esteem or your persona, it's really important to realize that mathematics is really hard. It's extremely difficult. Every time that you tackle a new problem, you're going to get frustrated. But you have to realize that all the people that you see, all the people that you see that have succeeded, all the professors, they have gone through this process themselves. Most likely than not, they struggle with the same things that you have. So it's always good to look back and see what you have learned. Take a step back and be like, "This was really hard when I first learned it. This particular problem was really difficult, but now I can solve it in a couple of minutes."
Luis Sordo Viera:	13:27	So it's always look to reflect back and then put yourself in that situation in the present. Everything that you succeed at, it always looks easy in retrospect, so make sure that you remind yourself how much you have learned in the little time that you have been in this career.
Evelyn Lamb:	13:47	Wow. I think that's so true. I'm just thinking about when I was in college, probably the peak of when I thought I knew the most math was my junior year of college. Ever since then, I guess I've understood more how little I know. Even though I definitely know more now, at that time I guess I kind of felt like, oh, math

is so small, there's only this much that could be known. Now I realize how much more there is.

Luis Sordo Viera: 14:20 Yeah, that's absolutely true. The more you learn, the more that you realize that you know absolutely nothing. This can actually be sort of frustrating in the beginning, but you have to realize that that's actually a blessing in disguise, right? We're in a position that our job essentially is to learn and to discover new mathematics, and discover new ways of applying mathematics to improve the world. Right? I see it as a beautiful thing, right? The fact that the more that you learn, the more that you realize that there are so many open questions that you can actually have an impact in.

Evelyn Lamb: 14:58 That's a great message to leave with. Well, thanks a lot for talking with me today.

Luis Sordo Viera: 15:03 Thank you Evelyn.

Evelyn Lamb: 15:06 Thank you for listening to the Lathisms podcast. It's produced by me, Evelyn Lamb, and made possible by a Tensor-SUMMA grant from the Mathematical Association of America. Our music is Volvere by La Floresta. Lathisms is an initiative to celebrate the accomplishments of Hispanic and LatinX mathematicians. It was founded in 2016 by Alexander Diaz Lopez, Pamela Harris, Alicia Prieto-Langarica, and Gabriel Sosa. You can find more information about the project at lathisms.org. That's L-A-T-H-I-S-M-S.O-R-G. Join us next time to hear from another inspiring mathematician.