Joey Pasterski:

There's a side of it though too, where maybe that person is going to be kind of a jerk, and if they are, then you don't want to work with them, and that's even better, because then you know right away like, oh, actually I don't want to work with that person.Michael Holtz:

Nevermind.

Joey Pasterski:

Exactly. Actually, I don't think your paper is so special.

Speaker 3:

You are listening to Further Together, the ORAU podcast. Join Michael Holtz and his guests for conversations about all things ORAU. They'll talk about ORAU's story history, our impact on an ever-changing world, our innovative scientific and technical solutions for our customers and our commitment to the communities where we do business. Welcome to Further Together, the ORAU podcast.

Michael Holtz:

Welcome to Further Together, the ORAU podcast. As ever, it is me, your host, Michael Holtz in the communications and marketing department at ORAU. I am in the midst of a series of conversations with NASA Postdoctoral Fellows. ORAU manages the NASA Postdoctoral Fellowship program for NASA, and I get the opportunity once a year to kind of do a bunch of interviews in a row with a number of the fellows. Joey Pasterski is one of those people. Joey, I am so glad to have you, I'm looking forward to our conversation. Welcome to Further Together.

Joey Pasterski:

Thank you for having me.

Michael Holtz:

Absolutely happy to have you here. Joey, where are you in your fellowship, first of all?

Joey Pasterski:

I am about a year and a half into my fellowship at this point.

Michael Holtz:

Okay. What is your research focus?

Joey Pasterski:

My research focus is doing laser desorption, mass spectrometry for the Dragonfly mission, which is going to Titan, which is the moon of Saturn. The Dragonfly mission is going to use laser desorption mass spectrometry specifically to sample diverse organic matter that's across the surface and to characterize that organic matter. One of my research focuses is to analyze analogs of the organic matter on Titan using similar instruments that will actually fly on the lander in order to understand what that signal on Titan is actually going to look like.

Michael Holtz:

Cool. Joey, why is it important for us, speaking as a lay person, to understand what's going on on Titan?

Joey Pasterski:

Titan is one of the most unique bodies in our solar system, because Titan, if you land on Titan and you were standing there, you would see a giant sand dune, you could see potentially rain, you could see lakes, maybe not all in the same place, but you could see all these features that we think of as being very terrestrial, but it's completely flipped from what actually is on earth, so instead of the sand dunes being made of silica, which is on earth like sand, what do you think of as normal sand is silica. There, the sand dunes are actually made of complex organic matter that is hypothesized to kind of fall out of the atmosphere. There's rain and there's snow, but instead of it being water, it's actually with methane and ethane.

Michael Holtz:

Oh, wow.

Joey Pasterski:

It's so cold that it actually rains methane and ethane, and so Titan actually hosts a pseudo hydrologic cycle, kind of what we think of as organic solvents on earth. One of the wildest things is, Titan also has bedrock, but the bedrock is actually water ice.

Michael Holtz:

Interesting.

Joey Pasterski:

Everything you'd see would look very terrestrial, very earth-like, but when you'd actually investigate the composition of it, it would be completely different. The most interesting things about Titan is that laboratory analysis have actually showed that if you take the kind of organic matter that you find in those dune material, in those dunes, and you mix that with liquid water, you can actually form prebiotic compounds like amino acids and nucleobases and things that we think of as the building blocks of life.

One of the big questions for the Dragonfly mission is, when we go to Titan, what kind of prebiotic chemistry is there and how far does that prebiotic chemistry go, potentially in the absence of life? If there is life, we wouldn't be able to detect it, but even if there is no life, really, how far does that prebiotic chemistry go in such an alien world? The ways we are going to do that is by using master spectrometry primarily on the Dragonfly mission. Dragonfly has two modes of mass spectrometry. There's the laser desorption side, which I work on, and then there's the paralysis GCMS side. They both work as complementary analysis to do a characterization of what are those doom material composed of, what is the doom material composed of, and what are the prebiotic compounds that are present on Titan so that we can better understand evolution of life in the solar system, evolution of life on earth, and that bigger question of how we all got here.

Michael Holtz:

That's really cool. Titan sounds sort of like a bizarro earth, right? Backwards.

Joey Pasterski:

Totally. Exactly that.

Michael Holtz:

I love it. Joey, what was your trajectory to get to NASA? Was science always an interest for you? Was it something that you discovered in college? Where does that process begin for you?

Joey Pasterski:

Yeah, it was in college, but I'm actually a non-traditional student. In high school, I went to community college, I did not care for science at all. I was fully musician, fully artistic, didn't want to be in school, I took piano and voice and anything I could do to stay out of science, really up until I went back to school when I was in my later twenties.

At that point I decided to try science because I really liked being out in nature, I liked the woods, I figured I might as well learn more about it. I was living in Chicago at the time, so I went to the University of Illinois in Chicago. I started taking classes, I realized that I had been missing out on this very beautiful world in the more deep ways, because in geology you really connect with not just the beauty of a rock, but you understand where that rock came from, which makes you understand the history of the earth and the history of life on earth, which then when you start to delve deeper, really connects pretty beautifully to outer space. I came to NASA through geology, but just by happenstance happened to go to a college that had a good geology department and a professor that was very enthusiastic about space. Yeah, it was pretty much by happenstance, but I can't imagine what else I'd rather be doing at this point.

Michael Holtz:

That's so cool. Is there a link in your mind between the creative side and the scientific side?

Joey Pasterski:

Absolutely. I think that science is itself very creative. I think that in order to take a lot of data and see what's important and synthesize those things out in your mind and your every day, it's very similar to seeing a landscape and finding the picture in it, or hearing a million chords and finding the song. A lot of people who are in the arts think that they can't do science or that they are not science-brained, I used to be one of those people and I now fully push against that because I think that anyone can apply themselves to science and learn the general nomenclature.

I would even argue that the skills that I used in music... In music you spend a lot of time by yourself practicing an instrument so that you can eventually collaborate with other people, and science is the exact same way where you have to be really good at practicing, working on your own, studying and then collaborating with other people to make something that's bigger and more comprehensive and more meaningful than the initial piece that you would have by yourself, so I don't think they are that different at all.

Michael Holtz:

Okay. I'm going to have to let down my barrier, because I'm one of those people. I'm a writer by background, but I do love talking to scientists about their work and their research and helping people understand that, but I'm one of those people who says, I'm not a scientist, I don't get it, but clearly, if you give yourself permission-

Joey Pasterski:

Exactly,

Michael Holtz:

You can change that.

Joey Pasterski:

Exactly, because I was a non-traditional student, a part of it for me was competitiveness, because in classes, I was in my late twenties, I had worked jobs, I had been on tour, I had lived a life up until that point, and I was like, these 18-year-old kids are not going to be better than me.

Michael Holtz:

They don't know anything they haven't-

Joey Pasterski:

Exactly. No, it was an adjustment, but once you start getting into it, I mean, science is beautiful. The first project I worked on was, I was looking through a microscope at rocks from Antarctica, a very specific type of sand that is from there, but in these microscopes, when you have the certain kind of polarized light, they become very colorful so you get really beautiful greens and yellows and blues and these wild colors.

That was my actual job for a summer, was to go through these sands and look at these beautiful colors and basically count how many blues I had and how many greens I had, but it's all very beautiful, and even my PhD work, I did a lot of mass spectrometry imaging, which is taking pictures and overlaying, basically you take a mass spectrum from across the surface of a sample and you overlay it with the picture of the sample itself, so you kind of have this stacked image quality. It's real science, it also looks really beautiful and there's a real tie there. For all of that analysis, a lot of it I use Illustrator and Photoshop and these things that I learned because I did design. Well, it's one. I don't know how to explain it, but-

Michael Holtz:

No, that makes perfect sense. Joey, as a non-traditional student, I have to imagine that there were some obstacles that you had to overcome to get to where you are, because like you said, you came to science late, you are competing with youngsters, all of those things. Right?

Joey Pasterski:

Yeah, absolutely. Those obstacles were folded over too, because there was nowhere for me to lean on for extra income, if that makes sense. For me, things like summer programs weren't always an option if I wasn't going to be paid for those programs. I also had to work. I worked all the way through my undergrad and PhD, so I always had a job the whole time. It's hard to get through school when you have to pay your own way. It's hard when you have to pay your own rent, and if you don't pay your own rent, it's not going to come from anywhere. It's a hard balance, and you see people go away to different summer camps because they can afford to. Even in college, it's still an issue, and so people who don't have that support, it's always a little bit more of a struggle-

Michael Holtz:

You are like, okay, I'll be over here waiting tables-

Joey Pasterski:

I was a bartender, yeah, I bartended, yeah. I had to bartend till two in the morning and then wake up at seven and go to the lab and make sure I had enough sleep to still be able to function and run a GCMS. Yeah, it's tough. It's tough for everybody though, everyone has their own struggles.

Michael Holtz:

Sure, absolutely, no question about it. Given that, is there an element of science that is particularly empowering for you?

Joey Pasterski:

To me, it's understanding instruments so deeply that you can kind of see how everything is working in your mind. In your undergrad, you kind of start with, you inject something into instrument and you get some data back and you start to feel like you understand it and you kind of get the data and you progress and progress and progress, but I've kind of found this niche world, even here at NASA specifically actually, a group of people that build instruments to go into outer space and to be able to build an instrument and use these kind of prototypes that we use, you have to be able to visualize every step of the process and you build these kind of pretty intricate models and views in your mind of how things work.

It's really powerful to not only have the data and produce the data, but really understand where it's coming from, at the most atomic fundamental level. There's something really powerful about watching, in your mind, you are watching ions be produced and how they get detected in mass spectrometer and how they interact with each other and what causes them to get pushed one way or the other, that I find to be extremely powerful and beautiful.

Michael Holtz:

That has to be awe-inspiring in a lot of ways to you-

Joey Pasterski:

And humbling.

Michael Holtz:

Yeah.

Joey Pasterski:

Super humbling.

Michael Holtz:

Wow, I love that. I know that science is a collaborative sport, especially at NASA, right? You don't do anything in a vacuum, you don't do anything really by yourself. What's that process like for you? I'm wondering, again, sort of tying back to your past, if it's a lot like being a musician, because when you are playing with a group, it's not about the solo entirely, right?

Joey Pasterski:

Absolutely, it's the same exact. That's a great way to bring it back together. In our lab, everyone has roles to play and everyone plays multiple roles, but it really is about getting the most science done with the tools that we have. In our lab, it's highly collaborative. We have weekly meetings on running the instruments and what's going on with the instruments and communicating with who is doing what and who needs to do what, and what deadlines are there, but it's also extremely fun. I don't think our lab is specifically special, but there are some special components to it.

One, a lot of the people actually are musicians in our lab. It's pretty surprising. We have a drummer, a couple of guitar players, bass players, singers, a lot of people do play, and that also means that there is music going on in the lab, so it's pretty fun. We have a pretty nice stereo and it's pretty fun to be able to collect data and do things for real mission science while you are having a nice time with these people who are... In our lab, it's the greatest group of people you could imagine, where everyone is extremely friendly, always willing to help figure out a problem if there is one, always willing to share information. Our lab operates in a way of, we all win when anyone does well. It's highly collaborative and, no joke, extremely fun. Coming to work is a total joy.

Michael Holtz:

That sounds amazing, I want to come work where you are.

Joey Pasterski:

It's pretty fun, honestly.

Michael Holtz:

It sounds really cool. Joey, as a non-traditional student, what advice do you give to someone who may be listening to this and hear that a non-traditional student is a NASA fellow? But even for younger folks who might be listening, what advice do you have for them?

Joey Pasterski:

I have two pieces of advice that I always give. I give these same pieces of advice because if I would have gotten them earlier, I think I would have started doing science earlier. It's finding the right mentor, finding someone to guide you through those moments that seem like are impossible to figure out, because some aspects of science are sort of impossible to figure out without someone telling you what to do. Having a mentor is critical, but how you get that mentor is the second piece of advice I give, which is, reach out to everybody.

If you think you are interested in something, email that person, even if you see their name on the paper and you think they are never going to email me back, they probably will. Most scientists love to talk about what they are doing. Not a lot of people actually show interest, most of us are kind of cooped up in a lab by ourselves most of the time, so if you reach out to somebody and say, I'm interested in your work, can you please help me get involved or point me in a direction of a way to actually work in your lab or work with someone alongside in your lab, most people will point you in that direction.

The other important component of that is, once you start reaching out to people and trying to do internships and trying to work with specific individuals, you'll have the ability to find a mentor to guide you in the right direction. You are also going to find the areas of science that you actually don't like. It's not that if you think something is neat, you are going to love actually doing it, because there's the science of reading and then there's the science of doing.

Michael Holtz:

Right.

Joey Pasterski:

I thought I hated chemistry, and I got into a chemistry lab and I'm like, I love chemistry, it is the most fun thing I could possibly be doing, I could do it all day, I love working in a chemistry lab, it's excellent. I wouldn't have done that if I wouldn't have reached out to this professor and said, can I work for you in your lab for the summer, and he said, yeah, come and give it a try. I worked for him for the lab in the summer, loved chemistry, he ended up being my mentor through my PhD and completely changed the course of my life. I wouldn't have had that if I wouldn't have reached out to him and asked, can I work in your lab? Can I be a part of your research? I think that it's hard to do, but critical.

Michael Holtz:

There's a lot of bravery in reaching out to someone that you've read their article, but you have no idea who they are, and then, in your case, you are asking, can you help me? Can I come work with you?

Joey Pasterski:

There's a side of it though too where maybe that person is going to be kind of a jerk, and if they are, then you don't want to work with them, and that's even better, because then you know right away, like, oh, actually I don't want to work with that person.

Michael Holtz:

Nevermind.

Joey Pasterski:

Exactly. Actually, I don't think your paper is so special.

Michael Holtz:

Well, since you brought your mentor up, tell me a little bit more about your mentor.

Joey Pasterski:

My mentor that I had my PhD with was Fabien Kenig, and he was at the University of Illinois in Chicago. He was very connected into the NASA world just by way of doing science that was very NASA focused, looking at organic molecules and rocks. He was teaming up with my PhD or with another mentor I had in the University of Illinois in Chicago, whose name was Luke Hanley. He was shooting things with lasers to try to figure out where the different organic compounds were.

We teamed up together. It was Papian Koenig and Luke Hanley at UIC. There, we started shooting stuff with lasers to see what came out of it with rocks, and then that led me to my current mentor, my MPP advisor, Sean Lee, who I met at ABPSICON 2019 for the first time, just because he also shoots things with lasers. I had a poster and he's like, hey, you do that also? I was like, yeah, we should talk about it because there's not that many people that actually shoot organics with lasers for space applications. You get kind of brought into this little world of people who shoot things with lasers and see what comes out. It's a pretty fun group.

Michael Holtz:

Awesome. It sounds like-

Joey Pasterski:

Turns out a lot of musicians-

Michael Holtz:

Right. Well, you got to dig that too, right? Shout out to your mentors. That's awesome. Joey, last question for you. What brings you joy?

Joey Pasterski:

I have a really specific one, which is new. My six-month-old son, Oscar brings me so much joy. I knew having a kid was going to be fun, I was looking forward to it, but the amount of joy that it brings me is far greater than I ever imagined-

Michael Holtz:

Awesome.

Joey Pasterski:

On a daily basis.

Michael Holtz:

That's so cool, I love it. Thank you so much for sharing that, I really appreciate it. Joey, thank you for spending this time with me, I really have loved getting to know more about you and laughing and talking about the joy and the art of science, it's been really great. I hope that later in your fellowship, maybe you can come back and tell us more about what you've learned, what you are working on, all of that, it would be great.

Joey Pasterski:

Yeah, absolutely. It's been a total pleasure, thanks for having me.

Michael Holtz:

Absolutely.

Speaker 3:

Thank you for listening to Further Together, the ORAU podcast. To learn more about any of the topics discussed by our experts, visit www.orau.org. You can also find us on Facebook, Twitter, and LinkedIn at ORAU, and on Instagram @orautogether. If you like Further Together, the ORAU podcast, we would appreciate you giving us a review on your favorite podcast platform. Your reviews will help more people find the podcast.