Since I was a kid I was interested in astronomy but when you are a kid you don't do much. So for me at that time astronomy was just the art and I was like oh I am interested in that.

To be honest and to be like very truthful I was interested in being an astronaut because well which kid isn't. Why not? Then after a while I figured out that being an astronaut is a dangerous business.

So then I just decided to stay on Earth and study the stars. I can stay on the planet. Welcome to Further Together: The ORAU podcast.

Welcome to another episode of Further Together: The ORAU podcast. As ever it's me your host Michael Holtz in the communications and marketing department at ORAU. And it is my pleasure to be speaking with a number of NASA Postdoctoral Program Fellows.

And I have another one of those spectacular people with me today. Abhishek Desai, thank you so much for joining me and for sharing a little bit about your story today.

I'm so glad that you're here. Thank you for inviting me. Yeah, I'm happy to be here. Awesome, thank you so much. So let's just jump in and Abhishek if you would tell me a little bit about who you are,

your current role with the NASA Postdoctoral Fellows Program and then a little bit about your background. How did you get here? Sure, so I am like I originally came from India and I did my bachelor's in India in engineering actually like electrical engineering.

And then I went from being an electrical engineer to coming to USA to do my master's in astronomy because I always had an interest in astronomy.

astronomy and then I went from there basically cross physics and astronomy so I went there to do from there to Clemson University to do my PhD in physics and astronomy again and then I went to do a postdoc at Ice Cube so basically that was in Wisconsin Madison and then from there now I'm here to at NASA to continue my work with Ice Cube like Neutrino stuff and high energy astrophysics so basically I've been all

around the US and a little bit India. I was just gonna say you've hopped all over the country from yeah so talk talk to me if you would about what your what your fellowship what your research focuses on you mentioned Neutrinos and Ice Cube talk a little bit about what that means.

Sure so basically Neutrinos are these highly elusive particles which just travel large distances or actually just travel without being attenuated or without interacting with anything and even if there is an interaction it actually doesn't destroy the Neutrinos it just keeps on going so these are these particles that you can actually not detect like light so basically if you are looking at light from like a distance galaxy or

star you can just measure it and say that okay we observed something but with Neutrinos it's very difficult so just to give you a scale there are about like a trillion Neutrinos passing through us right now at every second and like we actually cannot even see them we cannot even feel them and there is this huge detector called the Ice Cube Neutrino detector at the South Pole and what it does is basically it has these

light detectors inside the ice ice and when the neutrino passes through the earth and passes through the ice it creates some particle interactions which causes them to just create like this flash of light and ice cube this ice cube detector picks up that flash of light and then it says that okay we found a neutrino from this particular direction and my job basically yeah it's very amazing because it's something that you

actually can see but there is this huge detector it's a cubic kilometer detector inside the ice and that can actually find something and my job is to try to figure out if these neutrinos are coincident with light that we can observe from nasa telescopes and see if there are distance galaxies that are emitting them or actually our own galaxy that is emitting them so my work at npp is going to focus on that to study

agents which are like distant black holes and then try to figure out if neutrinos are coming from them or not wow so basically it's it's sort of origin of black holes where sort of yeah where did they come from where are they coming from yeah so it's basically these black holes have huge jets that are coming from them and there are different type of black holes there are some black holes which would be not emitting

jets but they are just rotating at a really high speed and there is this dust and gas around it and they might have a jet they might not but basically this is why we need the nasa telescopes so then we can figure out the observations like the photon observations from them and the neutrino detectors would just figure out that okay there is some more neutrinos coming from that particular direction and I have actually

simplified it a bit because because the neutrino detectors that I'm talking about it basically has a really huge background from our atmosphere so what happens is when the ice cube neutrino detector is detecting the neutrinos it sees about like hundred thousand neutrinos per year and out of that about say hundred neutrinos would be actually coming from outer space so like from the astrophysical so it has to separate out

those hundred from the hundred thousand so there is like a huge background so it's a bit complicated also but like that's how it is it's almost like weeding out the interference from yes for the background noise from what you're actually trying to to see or or detect exactly okay that makes that that I can understand but it never really sounds complicated and it sounds really interesting important research to figure out

you know where where those particles are coming from it's just fascinating. Have you always been you mentioned earlier that you've always kind of been interested in astronomy you know for a long time is that always been an interest for you?

Yeah so since I was a kid I was interested in astronomy but when you're a kid you don't know much so for me at that time astronomy was just the stars and I was like oh I'm interested in that to be honest and to be like very truthful I was interested in being an astronaut because well which kid isn't but then after a while I figured out that being an astronaut is a dangerous business so then I just decided to

stay on earth and study the stars I was like I can stay on the planet I don't want to leave my planet and then I went from there to like okay I want to study astronomy but I don't know which field.

So like the country I have been in all astronomy fields also. So I started from stellar astrophysics. So basically just looking at stars to high energy astrophysics to going to these black holes to neutrino astrophysics,

which is basically particle physics. And then coming back to a combination of high energy astrophysics and neutrino astrophysics. So in that manner also have been all around studying both extragalactic and galactic.

But yeah, I think I'm focusing on now the black holes and neutrinos. So studying space from earth, I like that. Safe zone.

Exactly. Where are you in your fellowship?

What are you doing here? Yeah, I just started it. So technically, this is my second week. I'm very new because that's why I'm taking the call from outside because my apartment is not set up here.

I'm not new. But thankfully, I'm not new to the field because I have already been because when you're doing an MPP fellowship,

we do submit the whole project description and the proposal. So there's already some work that we do about it. So for the work that I'm going to do at NASA,

there is some stuff. So basically, you need observations from NASA telescopes, like I said. So I had submitted some proposals earlier last year, basically. So I am using like X -ray data from the NASA telescope.

And I've already started analyzing the X -ray data using NASA tools. So basically, those things have already started, but not as an MPP fellow,

but now I'm going to do it as an NPV fellow with more NASA expertise. More officially, right? Yeah, more officially and with more help, because I do need the help from the X -ray experts here.

Right, right. And so, and that's an important point and question for me is, you know, obviously, you can't do this alone. So talk about the importance of collaboration in the work that you're doing and that you will be doing.

It's extremely important because I'm collaborated with a lot of people. So basically, because I'm working with the ice cube observatory, I'm technically collaborated with the whole ice cube collaboration.

I forget how many people are there, but I don't know more than three, four hundred. But like, there are quite a bit of people in the collaboration. Plus, I am also going to use Kamare data from the Fermi telescope.

So that is also again a huge collaboration. So the Fermilette collaboration. So those two are like the external collaborators. The more close collaborators, which are really focused on my work are people from my PhD.

So my university where I got my PhD from, so Clemson University, the professors and students that I worked with during my postdoc,

my first postdoc, so basically at University of Wisconsin -Madison and basically the collaborators that are here. And it's important because all of them provide a different expertise.

So for example, my my postdoc advisor gives me expertise for the high -energy astrophysics part. My PhD, so my postdoc,

the professor that I was working for with my postdoc, he gives me the expertise for the neutrino stuff. The students give me an expertise for writing the proposals because well they are grad students so I can use them but jokes apart,

like it's very helpful because they are really hard working and motivated and it helps me also learn how to mentor students. So I'm already working with two of the students from University of Wisconsin -Madison and they are part of pseudo -projects that have come out of this main big project so they are all there.

So you are working with a lot of people on this project. Exactly, yeah. It's huge because the ice cube collaboration and the Fermilad extends all over the world I think.

Right. I'm not sure about the countries but definitely a lot from Europe and well, America. Wow. But like yeah, these are all huge collaborations and because ice cube weather is at the south pole,

obviously there will be more collaborators which I don't even know about but like yeah. But it's a huge one. Do you ever hope to go to ice cube and see it in person?

Yes, but not to work there as a winter over. So that is also again an extreme, yeah, safely because you can visit ice cube for a week or two and then come back which is perfect.

But if you want to work there as a winter over you will be stuck there for I think six to eight months without any way to come back which is something that I don't want to do.

No space, no outer space. Yeah, no outer, no south pole. You don't want to go for six to eight months. I love it. The thing is I do want to go to ice cube.

One of the more reasons is not because of the observatory because the observatory is inside the ice cube. it's nothing I can see. But more because of the auroras, because you see like amazing auroras there.

So if you see Ice Cube pictures, you would be amazed at the pictures that they have seen, like it's crazy. So the sky is amazing there, so that is the only reason I want to go.

I bet it's gorgeous though. That would be worth a visit anyway. Yeah, exactly. I'm sure are there elements of working in STEM that you have found to be particularly empowering for you?

Yeah, so basically collaboration is the biggest element because like collaboration is the main thing that keeps them going.

And when we are working together, it's like, because the thing that I like about STEM and STEM researchers is that whatever is happening in the world, because science is the main importance for us,

in the end people come together and make sure it's like the science survives. Like these journal articles, journal publications, like org ID maintainers and stuff like that.

All of these things are important because they all come together and they make sure that the science is still alive. And I like that because it's that way as a scientist,

whatever you are getting paid, you still are motivated to continue the science and move forward in life. So that is something that I find really encouraging. Plus, discoveries help.

The smallest of the discoveries is like, oh my god, there's something new happening and you get that excitement that, okay, I need to work on this. Right, and you get to be part of that and then continuing to find hopefully new discoveries.

Yeah, exactly. So it's like you can build up on discoveries. discoveries and that's again the part of sort of a collaboration and sort of the whole stem is you cannot do anything alone. Like whatever you have achieved,

we cannot say like, "Okay, I am the one who has done everything alone." Like it's always like building upon the work that has been done. And then you can achieve more and more stuff.

But yeah, it's just the drive to find the new things. And to learn more stuff. Yeah. Absolutely. I understand that there have been any obstacles that you've had to overcome.

I mean, I realize you grew up in India. So I don't know if that part of it is maybe is cultural or part of it is just life in general.

Yeah, there were quite a few actually. But so like it ranged from a lot of stuff. For example, like when I came from India,

I didn't know about the PhD programs here. So I didn't know that you could do actually a directly master's plus PhD and get a tuition waiver. And I enrolled in a master's only program and I ended up with a huge loan on my head,

which is like something that no one wants when they start. And so that's something that has been bothered because like when you are in the science field and as a going from a master's to like a PhD student,

you get paid like a low stipend. So you cannot pay off a tuition loan with that. So it keeps on you keep on getting that thought that oh, I want to leave science and I want to go to say data,

data analysis, go into industry, just pay off everything and then continue. But the thing is like that's what I was saying because that's where the STEM researchers come into play.

Because when you're talking with your collaborators, when you talk with people who have done amazing research, you see that okay. you just have to continue working. And after like it will take a long time but like after some time the problem goes away.

So and it's something that my dad had always said that was actually a sort of also an obstacle because sadly my dad passed away in between when I was in my PhD.

But my dad himself had always said that whatever happens, you need to like keep on going because it's like you have worked so hard to get here.

So all you have to all you need to do is just keep on working hard and not give up basically. So yeah, that is there is something that has also helped. So there have been obstacles but you just need to keep on going in my opinion.

Absolutely. I know that mentorship is really important in science as well. Are there specific mentors that you can point to that have helped you get to where you are today?

It sounds like even just getting your MPP proposal, there were folks who mentored me to get to the fellowship itself.

Yeah, for sure. So for the mentorship, I would start from the non -scientific engineering mentor because my dad. So he was my first mentor because he taught me how to write stuff basically.

So my first statement that I've ever written is so crappy. When I read my first statement, it's really bad. It's like,

"Oh, I dream to be a scientist." But my dad had always given me good scientific suggestions about how to get forward. My mentor here at NPP,

Regina Kapoor, she has also helped a lot trying to make sure that my proposal is more NASA centric so the problem is again like I said that I am talking about ice cube nutrient observatory and because I've been working with ice cube so long my proposal turned out to be a nice cube proposal rather than a NASA proposal while I'm trying to say something that I want to use NASA thing it is still reading in a different

manner so Regina gave me all of these tapes that okay you need to adjust the way you write and say my my Zock mentor and both my phd mentor Marco yellow and Justin Vanderbroek both of them also kept on giving me suggestions for like different proposals so whatever proposals I've written with all of them have actually helped me get to this stage and write the proper NPP proposal which actually got accepted so I don't

think any mentor is small every mentor is important and there are many that I have not mentioned actually even the students so students I would not consider as my mentors but we have still circulated small small proposals to students and that is something that we have a drawback with because like I have my background is from India sometimes some of the stuff that I write might not be perfectly clear or it might be in

a twisted line or something so native English speakers or basically speakers who are from like USA they will give you suggestions that okay this line we are not getting what you meant by this line and it helps because we are so used to it we don't see it but like if an undergrad says that oh I don't understand this line it's like oh thanks I never knew you could not understand this line so then I would just modify

it so stuff like that so you can make it better yeah that makes more big sense um Abhishek if you have the opportunity to mentor it sounds like with working with undergrads you've had the opportunity to be a mentor mentor to other students um what is that like from your perspective it's a very different experience so basically i've mentored grad students and undergrads and it's a very delicate balance of trying to give

knowledge while also trying to stay cool because by cool i don't mean cool in the literal sense by cool i mean in a temper state because sometimes some students can be not challenging but like they would be hesitant to work in a particular direction or work in a particular manner or with the speed that you are interested in working with so basically you learn from your advisors about how to deal with students because

they are not you right so you cannot expect the same thing like okay they are not going to work like i am going to work with and it's a different thing because you need to find their strengths and then work with their strengths and it works sometimes because like in the beginning i had some issues where i would be like okay why are you not working like this i would not say that but in my brain i would think that

okay they can do better and then then i figured out that okay their strength is something else so i can get to him out of much more out of them if i work with their strengths rather than trying to make them like me so it's basically a learning experience about me here at the end for them basically so i feel it's important to mentor also because it improves ourselves not the students basically it improves you exactly

it's important average if you were to talk to someone to a young and upcoming researcher who's following in your footsteps so what would you tell them so if anyone who is just following i'll just say that don't give up for sure don't give up on science science.

Science is worth it. And I would just say that just keep on going, basically. Like if you are writing a proposal, if it didn't get accepted, don't worry.

Just keep on writing. To be frank, this is my third NPP proposal that I had written. So two of them were already rejected. The first one was for a project that, well,

it was a long time back and then basically I didn't give up on the project, but it's not that big of a project. I just found a bigger project. So we are still working on that on the side.

And the second one for the project was like was the same thing that I talked about like Regina mentioned that okay, it's more ice cube centric. So it was literally the same proposal I had written, but it was more in an ice cube manner.

So it can be something very simple like this. It can be just modifying some statements trying to get some more observing time on an X -ray telescope. Just don't give up.

Just keep on working hard. Just keep on writing proposals. Keep on just doing whatever your field requires you to do, but don't give up. That is the only thing I'll tell people.

I love that. That's perfect. Last question, Abhishek. What brings you joy? Traveling. So I love traveling. Well,

people would expect me to say science, but like traveling brings me more joy. I'm sorry. And for that, actually, science is the best field. Because if I have a researcher and if there are conferences,

I can travel around the whole U .S. which I have done, actually, because the last conference was in Hawaii. So if you stay a researcher,

you can go to Hawaii for free. That's right. Awesome. Well, Abhishek,

decide. Thank you so much for spending this time with me and telling me a little bit more about who you are and about your... your research as a NASA MPP fellow.

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