

Inspiring Women

Episode 16: Katie Melbourne

Laurie McGraw:

Welcome to Inspiring Women with Laurie McGraw. I am your host, Laurie McGraw. I have spent the past 30 years in leadership and over the years I've come to learn one thing, women need women and not just any women, but inspiring women. Tune in every week to hear from women at the pinnacle of their careers and from others who are just starting out. Episodes can be found at inspiringwomen.show or subscribe on your favorite podcast app. Thanks for listening and I hope you will be inspired.

Laurie McGraw:

Welcome to another episode of Inspiring Women. And today we are speaking with Katie Melbourne. Now, Katie is an astrophysicist. She is assistance engineer at Ball Aerospace. She's working at the James Webb space telescope commissioning team, and she got her degree in astrophysics from Yale, just in 2019. Her undergraduate thesis on main astronomy research was on M-dwarf stars, which are, I don't know, Katie is going to have to tell us about those, but she's done internships at NASA headquarters and also Ball Aerospace strategic operations office in DC.

Laurie McGraw:

She's been pursuing this career in astrophysics for a little bit of time. She has an interest in policy. She'll be beginning her PhD at University of Colorado in Boulder this fall. And if that wasn't enough, Katie also has a couple of outside interests, whether it's learning to play the guitar or doing ultra marathons. Katie, thank you so much for joining us today.

Katie Melbourne:

Thank you so much for inviting me, Laurie.

Laurie McGraw:

Yeah, I'm really excited to be talking to an astrophysicist and learning a little bit more about what that is, but let's get started. So you've done a lot of things in your young career and you are an associate or a systems engineer today, and you also describe yourself as an aspiring space security policy maker. Why don't you start just tell us what you're doing right now.

Katie Melbourne:

Yeah. I'm kind of combining my background in astrophysics with my interest in mission level design by being a systems engineer. And so what systems engineers do is they deal a lot with how a big, large mission is developed and designed from the requirements with the customer all the way through the testing and verification of those requirements before the payload is finally

delivered to the customer. So that can be on small or big projects. And right now we happen to be, I happen to be on a team for a \$9 billion telescope called the James Webb Space Telescope, which will be launched in October of this year on Halloween, and it will completely be the next generation of an astronomy instrument.

Katie Melbourne:

So it'll kind of be the successor to the Hubble Space Telescope that's currently orbiting our earth.

Laurie McGraw:

So we can expect not blurry images and things like that. Is that what \$9 billion will get us?

Katie Melbourne:

Hopefully. Yes. Yeah. So I'm on the team that will help with the alignment of that telescope. So I know that everyone's feeling the pressure to get that right as we speak.

Laurie McGraw:

Well, that is incredible. What an amazing project to be working on. But when we talk about what you're doing right now, it comes with a lot of work that you've done both in your undergraduate studies, your previous research assignments and the like, and you've also done things to advocate for women in STEM and you have a lot of interest in the policy area of astrophysics and things of that nature. But I read something about you that your interest in science and your interest in STEM began when you were eight-years-old. So where did this come from and how were you so clear at such a young age?

Katie Melbourne:

That's a really good question. So I think I was just really naturally curious growing up. And my parents were really helpful in that. So every time I'd say, I want to be a writer. They would help me sign up for writing camps or introduced me to people who had done that for a career. And so I had always really been interested in science and math in particular. And so my mom found this book series by Danica McKellar. So she was on *The Wonder Years* and she also got a PhD in math and she gave it to me and it was it's called *Math Doesn't Suck*, and there's a couple others in the series too.

Katie Melbourne:

But it's basically like breaking the stereotype that math books just have to be about exploding cars and all these like very male dominated examples in their mathematical learning. And this one is more like, Patricia wants to go to the mall and buy makeup with her friends and if she buys a certain amount, what would that look like in terms of like a pre-algebra kind of problem? And so I saw that Danica McKellar had this thing called a PhD on the title of her book. She said, Danica McKellar, PhD. And so I asked my mom what that was.

Katie Melbourne:

And she said, well, she made a unique contribution to the field of mathematics. And so I sit down with my sparkly pen and my rainbow notepad and say, I'm going to make a unique

theorem and contribute to mathematics. I'm eight-years-old, just messing around and ended up getting one equals zero and I thought I broke math, so I took that away for safekeeping. But at that point, I decided that I wanted to get a PhD. I don't think I really knew what that meant at the time, but I kept exploring science, ended up going to a public sky night in astronomy and that's kind of how I got in the astronomy path.

Laurie McGraw:

Well, that is amazing and I love this image of a sparkly pen and one equals zero. And I don't think you broke math because of the telescope and work that you're doing right now, thankfully. But, let's go back a little bit just in that you also are acutely aware that women in STEM are underrepresented, and I have to imagine that you are seeing that in some of the very specific technical work that you're doing right now. And you've also had efforts to advocate for women in STEM. Now, I remember this. I remember fifth grade being in a class that was all about motors and science and having my teacher tell me as a girl that I wouldn't do as well just because girls don't do well in science.

Laurie McGraw:

But that was decades ago, Katie, but you started to see some of these differences early on. So tell us when you started to notice that there were some gender differences.

Katie Melbourne:

Yeah. So I think the first major time I noticed it was when I was 15 or 16 in my AP Physics class. So I'd kind of taught myself honors physics through an online course in order to prepare for AP Physics, instead of doing the traditional route of taking it at the high school. I wanted to take too many classes, so I had to take it outside. And I noticed that, so there were four women out of a class of like 22 people. And three of us had actually done the online route as well. So we hadn't even taken physics at the high school yet.

Katie Melbourne:

And it was a little intimidating to think that sometimes I had to work a lot harder than, I had a partner at the time and it seemed like he would open up the textbook right away and just understand things and I would have to do the homework and redo the homework. And my professor was a female, so that really helped. She basically encouraged me not to drop the class when I thought I was failing. And I ended up being able to work really hard and do well in it. But it's really intimidating to be in an environment where there's not a lot of people that look like you and that kind of continued on in college.

Katie Melbourne:

But luckily, I ended up graduating in 2019 with four females and only four females in astrophysics. There were no other people. It was just the four of us, so that was pretty incredible to graduate in that type of environment later on.

Laurie McGraw:

It also creates sort of a bonding experience. So obviously you have a lot of your own self-directed energy, I mean, to do online classes to get so to end those advanced classes back in high

school, but it also seems like you tend to gravitate towards groups of others. So Yale in physics is a ... I'm sorry, Yale Women in Physics was a group that you were involved in and led. Tell us about that group and how it helped you.

Katie Melbourne:

Yeah, they were incredible. So Yale Women in Physics was comprised of most of the women who did physics at Yale, obviously, but it was also, the professors were also really involved in it too. I didn't realize we were so lucky at Yale to have six female faculty in physics. Apparently that's very rare and actually just a very large number for most physics departments to have, but even then they would be super involved. They would have lunches with us and tell us about some of the issues they'd face, but also would be just the people we could go to when we were struggling the most.

Katie Melbourne:

So having Women in Physics is a very formalized path to getting mentorship from the people who we needed it from the most. And I remember talking to one female professor in particular after I had basically almost failed my Math Multi-Variable Calculus class my freshman year of college, and decided to drop out on the second to last day and take a W in the class. I was crying in her office and she's like, you know, you can still be a physicist even if you have to retake Multi-Variable Calculus and just having especially a woman tell me that and like having Women in Physics to back me up in that path every time I felt doubt was the most valuable thing that I experienced in undergrad.

Laurie McGraw:

Well, it also really speaks to the fact that role models matter. And when you're in such a technical field that you obviously have such excitement about to have more than just one other person to perhaps look to, that looks like you, that can give you the supporting advice really matters. But you have spent some time researching this a little bit further, so not just experiencing it, but also trying to dissect a little bit about why role models matter, why they matter so much for women in STEM. You've written about that, and I think that some of your ideas about emotional intelligence and advice that you gave or through the research that you drew out were some really important concepts.

Laurie McGraw:

Could you speak to that a bit in terms of what you think is important for women in STEM and the types of things that people can either do or understand to be helpful to promoting women in STEM?

Katie Melbourne:

Yeah. I think that realizing that everyone needs different levels of encouragement is really important. You're referring to the paper that I wrote for my emotional intelligence class in college, actually. And that was really fun to kind of combine the psychology and something that I was really interested in, which is like promoting diversity in physics. So I think encouraging people as much as they need is really important and that can be mixed between the genders as well. But I think sometimes experts in the field will say, this is a really simple concept or

something like that, and really alienate people who maybe need one or two more times hearing that in order to understand it.

Katie Melbourne:

So, that's one big thing. Another big thing is showing people a path forward. I think a lot of people might not have grown up with scientists for parents, especially women and gender and racial minorities. And so showing people how you can get from point A of taking your freshman physics class to point X, Y, Z of being a professor in physics, for example, and teaching them about those different options is really important. And that's something really exciting is that there's a couple of new fellowship programs actually that were either founded in the past couple of years or were currently founded this year, actually, that support that type of diversity in STEM.

Katie Melbourne:

There's the Brooke Owens Fellowship, which I was a part of, which supports all gender minorities in STEM. So if you're a gender minority undergraduate, you can be matched to an aerospace industry company for a paid summer internship and get that mentorship that you need. And same with the Patty Gray Smith Fellowship. That's new for specifically black undergrads in aerospace. And then there's the Zed Factor Fellowship, which is new also for any underrepresented minority. So all of these are really good ways of like showing people a specific path forward in their field of STEM.

Laurie McGraw:

Well, also, in terms of seeking those types of opportunities out so that you can surround yourself with people who can mentor you, I think is really terrific advice. The other thing that I like, and maybe you could comment on is how small interventions matter. So saying things like, hey, really terrific job, that was challenging. Those small pieces of encouragement or the opposite discouragement actually matter, particularly when you're in a category of other. So in science, other, less women, those types of things matter.

Laurie McGraw:

Is that something you've experienced, Katie, or is that something that you just learned through study?

Katie Melbourne:

I'm so glad you touched on that, actually. Yeah. So I have learned firsthand that that matters. Like I said, the professor that told me I can still do it when I failed. And this has happened actually throughout my career. It's really intimidating to start as a new hire employee. I have a physics and astronomy background, which is relevant to what I do in my work, but I'm not an engineer by training. And so when my colleagues, I have one in particular, who's just a wonderful mentor and role model. She will tell me that was specifically a very good job you did, and she'll point out exactly why, and that just gives me so much more confidence going forward.

Laurie McGraw:

Yeah. And it also matters in terms of just like noticing those things and saying them, and so I think that's a lesson for also so many people who have influence and power over the young learners that are out there. Well, let's go back to a little bit more about you. And so, Katie, you also have an interest in policy. You did work at NASA in terms of research there. So what's the interest in policy? Why is that intriguing to you?

Katie Melbourne:

Yeah. So, I really loved research and I was really interested in uncovering the mysteries of our universe through astronomy and data analysis, but I didn't know for sure that I wanted to be a professor. So it was kind of exploring alternate career paths in education and policy and I came across the NASA internship for international relations. And so they have an entire office, as you might imagine, you always hear about how NASA works with Russia to launch our astronauts up to the ISS well before SpaceX and everything like that, but they still use that partnership a lot.

Katie Melbourne:

And as you can imagine, they have an entire team dedicated just to forming those diplomatic relationships. And so through that internship, I got exposed to all the different ways space policy is made in DC. I got to sit in on the hearings on the Hill. I got to talk to people who are high up in the Commerce Department and things like that who were just doing incredible things for laying down the future of space development, basically. And so I decided there's a couple of different paths. There's science advocacy, so more on the side of science needs funding and they need people in the government who understand science in order to get said funding, and because we want our leaders to understand science as well.

Katie Melbourne:

But there's also space policy, so working on more of the commercial side and developing regulations around the launch of satellites and the development of different payloads and things like that. And I decided that's what interested me most after working at Ball. And so I'm kind of working towards a career in space domain awareness, which is basically looking at how we can track satellites, look at images of satellites moving across the sky and determine their intent, the way they're moving, if they're getting close to other satellites, things like that, so that we can best have an idea of what the space environment looks like in order to make it sustainable for future generations.

Laurie McGraw:

Well, this is just like a lot of really interesting things that you're covering and you're exploring many different aspects of a broad and technical field. But Katie, you also have many other interests. You're a pretty accomplished clarinet player. You've done marching bands, you're a marathoner, and now I understand ultra marathoner. So first of all, why are other interests important to you and how do you fit them in? I mean, it just sounds like you're super busy. And ultra marathons, I can't even wrap my head around how you have time for that.

Katie Melbourne:

Yeah. Honestly, those are the other things that keep me balanced. I find that everyone is super different and some people dive into their field and can think about it 24/7, and really innovate by

being very focused on one thing. But I found that I worked really well with balance. And so running is a way for me to clear my head and I used to run in high school, but then I kind of lost touch with it in college, picked up marathoning just because it was something that I could achieve on my own. And I was really proud of being able to pick a goal that was 10 months away and work toward it.

Katie Melbourne:

So I found a lot of parallels in my work in science to running because of that long-term goal and the consistent effort over months to get where you want to go. So that's kind of how I think about running day to day. And I wish I still played clarinet, but now I've kind of switched over to guitar for fun. But yeah, like I said, just keeping that balance makes me more motivated to do the things that I enjoy professionally as well. Because otherwise, I would get very burnt out as much as I love space, if that makes sense.

Laurie McGraw:

It does make sense. And also sort of having sort of time to decompress from the effort that you put into your profession and you have a lot of effort going into that profession makes it makes a lot of sense. So that's really terrific and thanks for sharing it. But I want to move to something a little bit different, Katie. I mean, you and I have something in common. We're from Boulder. You live in Boulder right now and I live in Boulder and there's recently a really difficult, awful mass shooting there at a supermarket that we both frequent, and so I know this is impacting you.

Laurie McGraw:

What are you thinking about right now? Those are one of the things that really take you off balance a bit from what you're focused on. How are you thinking about it?

Katie Melbourne:

Yeah. I feel like we've become a little desensitized to seeing these things in the news. And I certainly get sad after every single mass shooting I've heard about in the last decade, honestly. But it's incredible how hard it hit me because my partner lives across the street. Between the two of us, we're in that store every day. And so to know that it could have been us was just added a layer of reality to it, I think. So along with the policy that I'm trying to do in space, I think it's so important to stay grounded in the policies that can help us in our day-to-day lives here.

Katie Melbourne:

So it's finding those ways to take meaningful actions so that you do not get so lost in the disparate at all. So I've reached out to Moms Demand Action and things like that to try to get involved in their local chapters and feel like I can do something. But yeah, that also makes me want to do something bigger and grander in the future, like maybe running for office or something like that. So there's just a lot of ways to get involved, but it's really, really hard not to feel helpless in such a horrifying situation.

Laurie McGraw:

Yeah. And the reason I wanted to ask about that, I really appreciate you sharing that, Katie, is just that you are very inspiring in what you do and how you think about just your work in

astrophysics and in space. And then life events can be very jarring and they take you in different directions, whether emotionally or what you want to work towards. So I really appreciate you sharing how you're processing that and then also thinking about action in terms of your orientation. So just with moving off of that and thinking about what's ahead for Katie, and as you look to the future, you're pursuing your PhD.

Laurie McGraw:

What are you thinking about what's next or what you want to pursue after October 31st when this fantastic telescope comes to life?

Katie Melbourne:

Yeah. I'm so excited for the balance I'm going to have doing my PhD and work at the same time. I know it's going to be incredibly difficult. I am not naive about that for sure. But I do think I will be a lot more grounded in my studies with my full-time job as well. So I'm excited to be part of the web commissioning team. So after it launches, we have about six months where we're working on aligning the telescopes. So hopefully I'll be part of the team that does that 24 hour shift work. And after that, I'm excited to also integrate my research for my PhD into what I'm doing at Ball.

Katie Melbourne:

So hopefully, I'll be able to figure out a way to do that because I know that [inaudible 00:20:11] awareness is a growing field for many different aerospace industry companies. So I'm again not an engineer by training, so this will be my first foray into engineering courses and I can't wait to have such a wonderful advisor at CU Boulder and also be able to work on policy with that as well. I know he's very interested and excited about my interest in policy. So I'll definitely find a way to integrate that into my technical training.

Laurie McGraw:

Well, Katie, those are a lot of big dreams and aspirations and I just from the sounds, it sounds to me like they're going to come through for you, so I'm really excited to be following you as you go forward and advance. As we close out this discussion on inspiring women and other younger women who are at the beginning stages of their careers, what advice might you give others or what questions might you have for people who have already made it at the pinnacles of their career?

Katie Melbourne:

That's such a good question. For the people still coming up and exploring, I think it's really important to not let people try to pull you in the direction that they think that you should go in. You might hear a lot that you'd be a really great researcher or you'd be really great at this, but that's not ultimately what you want to do. So I think really taking the time to self-reflect and figure out what you want most from life or from your technical career or whatever you choose to do is so important, and I'm still working on that myself.

Katie Melbourne:

And then as far as people I'm looking at in the future, I'm excited to learn how to progress in my career and how to make these lateral moves into new fields with confidence, and really just kind of hit the ground running whenever I make one of those transitions. That's something I'm definitely still working on and we'd love to hear more about from people who have a lot more experience than I do.

Laurie McGraw:

I'll be sure to ask those questions, Katie. I think you're off to a great start. This has been a fantastic conversation. We have been talking to Katie Melbourne on Inspiring women. Katie, thank you so much.

Katie Melbourne:

Thank you, Laurie. This has been wonderful.

Laurie McGraw:

This has been an episode of Inspiring Women with Laurie McGraw. Please subscribe, rate, and review. We are produced by Kate Crews at Executive Podcast Solutions. More episodes can be found on inspiringwomen.show. I am Laurie McGraw and thank you for listening.