**STEM careers podcast series – Astrophysicist**

**Dr Sam Hinton**

*Dr Sam Hinton is an astrophysicist at the University of Queensland. He is currently the lead data analyst with the Queensland based COVID-19 Critical Care Consortium and a post doctoral researcher in the area of supernova cosmology. He has won numerous academic awards including the Australian Institute of Physics Prize for the top physics graduate, and the University Medal for Science and Engineering from the University of Queensland. He is also a previous Rhodes Scholarship finalist and was a contestant on Survivor 2018.*

**Announcer:**

This is Queensland Department of Education podcast.

**Virginia Bowdidge:**

The careers that fall under the STEM, science, technology, engineering and mathematics umbrella, are many and varied. In this podcast series, we talk to professionals working in some of these careers.

Hi, my name is Virginia Bowdidge from the Department of Education, and I'm joined by astrophysicist and former survivor contestant, Dr Sam Hinton. Dr Hinton, thanks for joining me today to talk about your career and STEM education.

**Dr Sam Hinton:**

Thanks for having me.

**Virginia Bowdidge:**

Can we start with the basics? What exactly is an astrophysicist?

**Dr Sam Hinton:**

Right. An astrophysicist is just someone who likes astrophysics, of course, and that just means space. If it's off the planet Earth, I care about it. Whether it's exotic planets in other solar systems, other galaxies, dark energy, dark matter, black holes, the fate of the universe, those are the questions that we try and answer as astrophysicists.

**Virginia Bowdidge:**

As well as an astrophysicist, you are a robotics and software engineer, and you've recently completed your PhD in supernova cosmology? What first sparked your interest in STEM and in astrophysics in particular?

**Dr Sam Hinton:**

I'm not actually quite too sure, and I think that's because I've been interested in it for as long as I can remember. I suspect when I was a young kid, I might've watched a couple of space documentaries and seeing black holes sucking things up, seeing stars exploding and just thought, "Damn, this is really cool. I want to try and study a bit more of this." I do remember, one of my first birthday gifts before I got Harry Potter and the Philosopher's Stone the year before, my mum gifted me an encyclopaedia of space, which I read cover to cover. I think as soon as you read an encyclopaedia cover to cover, the fact that you're going to go and study that is pretty much a given.

**Virginia Bowdidge:**

Did your parents have any background in astrophysics or STEM?

**Dr Sam Hinton:**

Not at all. My mother was a journalist and my father worked as a police officer and a lawyer, so no STEM background there, but it's what I was interested in, so they encouraged the hell out of that, and I really thank them for it.

**Virginia Bowdidge:**

That's fantastic. How did you get into astrophysics?

**Dr Sam Hinton:**

It has been a bit of a convoluted past. Coming out of high school, I actually didn't enjoy physics too much. There was too much of this boring, grindy work that I just didn't care about at all. When I started university, I go, "You know, never mind physics, I'm going to do robotics."

I did that for a while because I really like creating things with my hands, and robotics was such an interesting thing because you can create some stunning, amazing, intricate things that actually do stuff for you, and that's really cool. But then I also got into software engineering because the difference is if I programmed something, over the course of a week, I can come up with some cool concept or some cool thing that does something, whilst if I was doing robotics and you make like a circuit board, you have to then ask someone to go and print it for you, and get the components, to make it all work, it takes a lot longer time to get something off the ground, so I deviated into software engineering.

Then, at the end of your software engineering degree, you have to pick a thesis, a big year-long project that you dedicate that year to. Then I talked around to a bunch of people in physics because I decided to pick up physics just to see if it was different to high school physics, and it definitely was and I'm glad I did it. I talked to a bunch of people, I did a little project in quantum optics and I was like, "It's all right, not quite for me." Then I talked to a whole bunch of astrophysics lecturers, got a bunch of projects with them, did some, was like, "This is really cool," and I just kept doing more and more projects until somehow I ended up with a PhD in astrophysics.

**Virginia Bowdidge:**

Wow. That's a lot of study.

**Dr Sam Hinton:**

Yes. I have been studying for around 10 years. I'm finished now, but it's a long time, but you pick up a lot of skills that you can use in a lot of different ways, so I don't regret it.

**Virginia Bowdidge:**

As an astrophysicist, what does a typical day look like for you?

**Dr Sam Hinton:**

During the COVID-19 scenario, it's pretty much staying at home like a lot of other people. But that's one good thing about being an astrophysicist, which is, if I was studying at say quantum physics at uni, you'd be stuck in a lab somewhere, you have a physical laboratory that you go to, you set up your lasers, you do your experiment, and that is difficult in isolation because you got to work with people. But in astrophysics, I have telescope data, I get that over the internet like we get everything else. I essentially have my big workstation set up at home. I take the data from the telescopes. I log into various supercomputers, whether they're over in the NERSC or Midway, so that is California or Chicago, the big super computers over there, and I just start running simulations, crunching the numbers, writing code. Sometimes when I can't avoid it, I have to do the math, but I do try and make the computer do as much of that as possible.

**Virginia Bowdidge:**

At the moment, you are working in COVID research. Can you tell me a bit about that research and how an astrophysicist finds himself working to find a cure for a pandemic?

**Dr Sam Hinton:**

Yeah, it's a bit of a jump, isn't it? But what they were looking for, so I was at uni and the call went out and they said, "Hey, we need people who have experience with data to come help us manage the data for this consortiums," this is the COVID-19 critical care consortium. What we're doing is we've got hundreds of different hospitals from around 50 different countries and they're gathering data on patients who come in with COVID. But the issue with each hospital, some doesn't have that much data, so to gain insights, you need as many different data points as you can get. We take all of the data from all of these hospitals, and the issue is that a hospital in one country, it does different things than a hospital in another country. They measure different things in different ways with different units, and someone, me, has to come in and take all this data and standardize it, turn it into a useful product that looks the same so that you can actually do statistics, do science on it and try and glean some insights that are actually useful.

The reason why that's actually fairly close to astrophysics is because we do this already. Instead of having hospitals, though, we have telescopes, we have data from different telescopes, they're all different, they come down into a data pipeline, we have to fix it up, do all our data processing and turn it into a useful product, so we do exactly the same thing, but now, instead of telescopes, we're just using medical data from different hospitals.

**Virginia Bowdidge:**

I bet a year ago, you would not have thought that's what you would be doing.

**Dr Sam Hinton:**

Oh no. This was a complete shock, but luckily, everyone knows how important the fight is, so there was absolutely zero issue from the department, from my supervisor when I said, "Hey, look. Do you mind if I take a few months off, split my time 50/50 and work on this?" Everyone just said, "Do what you need to do, try and go out there and help some people."

**Virginia Bowdidge:**

It's a wonderful thing to be part of.

**Dr Sam Hinton:**

Yes. It's been a fantastic learning experience and actually trying to give back, that's one of the things with astronomy and astrophysics is that even though sometimes you come up with really cool things, digital cameras being one of them, you don't know when the work you're doing is actually going to benefit humanity right here and right now. It might be in five years, it might be in 50 years, you don't know, but with COVID-19 research, you know that you're hoping right now, and so that's really gratifying to try and be part of something so important.

**Virginia Bowdidge:**

What is it about your career that motivates or inspires you?

**Dr Sam Hinton:**

Ooh, that's some tricky question, but I think for me, I've always liked challenging problems. There aren't many problems that are as challenging as some things that you find in physics or astrophysics, so trying to answer questions like what is dark energy, what is dark matter, these mysteries that have been unsolved for over a hundred years, and contributing to try to figure out their properties and what they might be is really gratifying. Unfortunately, I don't have an answer. I don't think we will have an answer for many, many years, yes, but just trying to contribute to some of these fundamental questions about the universe is really inspiring to me.

**Virginia Bowdidge:**

What's been the highlight of your career to-date? I know you've won many awards and been involved in lots of extremely impressive research, but what would you say is the highlight?

**Dr Sam Hinton:**

Really, not the awards. They're nice to get, but that's not the thing, that's not why you do astrophysics. For me, the thing that I love the most is enable to travel to different sites, to work with different people. For 10 weeks I was working in Chile, where I got to go up the mountains to visit the telescopes on their Rocky Thrones and get as close to the night sky as possible. I've travelled to, I don't know how many countries to collaborate with the international researchers. That's one thing that I think we really have to point out is that astrophysics is an international thing. It's not like you do it just in Australia. We don't have giant mountains to stick telescopes on.

I work with people from dozens and dozens of countries, and we have meetings every week where people sign in from 30 different countries. We have people from different countries, different cultures, different backgrounds, and you're all working together towards a common goal, and you go out and visit them. You go to the UK for a week, you sit down, you try and hammer through a project, get some results, come back home, and just doing that, visiting these places with these new people, with these new ideas and all working together towards a common goal, that's just super amazing.

**Virginia Bowdidge:**

It sounds like a really wonderful and rewarding experience.

**Dr Sam Hinton:**

Oh, it definitely is, yeah.

**Virginia Bowdidge:**

You were also a former contestant on Survivor. It's not every day that an astrophysicist is on reality TV. What was that like?

**Dr Sam Hinton:**

That was actually really fun, and I was glad that I got the call. I was just working on my PhD at this stage and I was working really long hours, trying to get out some really difficult results, and I was starting to feel burnt out. I'm sure a lot of people listening to this can empathize with that and understand. When you've been crunching for so long, you just need a break. I've got an email out of the blue from one of the casting people and I thought it was spam initially, and it turns out they needed an academic person. The theme for that year was champions vs. contenders, somehow come across my website saying, "Now, this guy's a good academic. We should see if he wants to go on the show."

I was like, "You want me to take a three month break from my work to go chill out on a beach and starve a little bit? But that's fine, I'll take it." I need the break, and it was a great experience, a whole bunch of people that I would normally never interact with doing things that I never would have in any other circumstance, and yes, it was absolutely fantastic. Obviously, I didn't win, but the goal for me was simply not being the first one voted off and I did that pretty well.

**Virginia Bowdidge:**

What advice do you have for high school students interested in a career in STEM?

**Dr Sam Hinton:**

I think the best bit of advice is definitely just get in there. When you start a university degree, you don't have to rigidly follow towards a very specific goal. If, let's say, you're wanting to do engineering and you're curious about, let's say, mechanical engineering, there will be a core structure for mechanical engineering. I know a lot of students go in and they just say, "Yeah, I think this is what I want to do, so I'm just going to focus on this." My advice is don't. In the first two years of your degree, you have a huge amount of flexibility to try as many things as you want, so get out there, try different things. If you're thinking about engineering, do some mechatronics, do some electrical engineering, do some mechanical, do some civil, do some chemical, try different subjects out so that you actually know what's more interesting to you because a lot of the time, if you haven't done it before, you simply don't know what it's like.

**Dr Sam Hinton:**

Then if you do find something that you're really passionate about, don't just do the coursework. The best thing that a student at uni can do, if they want to get ahead, if they want to try and start working or have a job waiting for them, or just get industry experience is get industry experience. Go up to your lecturers, go up to your course coordinators and say, "Hey, I'm really interested in these topics. Do you have any projects that I can help with as an undergraduate?"

**Dr Sam Hinton:**

The answer is always yes, we have summer scholarships, research scholarships, winter scholarships, industry scholarships, there are so many ways that you can actually figure out what the industry is like before you finished your studying so that you know at the end of your degree, that this is exactly what you want to be doing, and people that don't take those opportunities cannot get to the end of the degree, then get a job and say, "Hey, this is different to the coursework." Of course it is, because coursework is very different to what you do in an actual job. Make sure that you try as many things as possible, try and get the experience outside of just doing subjects, so that when at the end and you have a degree, you know that what you're going to be doing is something that you love.

**Virginia Bowdidge:**

Thank you very much for your time, Dr Hinton. It's very much appreciated.

Dr Sam Hinton:

Thanks for having me.

Announcer:

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