Bonus: Nerdin' About Live with Dr. Samantha Yammine, Kim Senklip Harvey and Pramodh Senarath Yapa

Nerdin' About Podcast Transcript, Season 2 Bonus Episode 3

Michael
Hey everyone, Space Michael here. How's everyone's summer going? I'm having a hot boy summer and not the good kind, here sweating on the west coast. I'm here dropping into your feed to bring you a bonus episode that we recorded as part of a live Zoom event for Science Odyssey back in May 2021. Now, Science Odyssey is a Canada-wide festival that celebrates all aspects of STEM and STEAM, which is what we're about. So, we brought in three guests that were all featured in Season One of Nerdin' About. We talked with Dr. Sam Yammine, got an update on communicating about COVID-19, also Pramodh Senarath Yapa a condensed matter physicist and Kim Senklip Harvey, who you'll hear us talk about her recent Governor General Award nomination for her play 'Kamloopa'. Well, since then she has now won that award. So, we highly recommend you going out and buying 'Kamloopa' from your local bookstore, as well as going back and listening to each of these guests' original episodes in Season One. So have a look at our show notes to follow them all on social media. They are all active there and are amazing science and art communicators. We're recording episodes for Season Three that will be out in the fall. Drop us a line, tell us what you're nerding about, but for now, from Kaylee and I, HAGS! Have a great summer.

Michael
So, if you have listened to the podcast, if you've listened to any of them, get in on the Q&A because we're going to have a very tight hour. So, it's going to be really fun, and it's going to be wild. It's going to be you know, a lot of laughs, a lot of cries. all of the above really.

Kaylee
I don't want to cry. Can we not cry? I feel like the last year has had a lot of that. Can it just be good vibes?

Michael
I mean like laugh cry, not sad cry.

Kaylee
Like the emoji with the tears. Okay, I'm on board. That's fine.

Michael
Oh, one final thing that I wanted to mention off the top. So, we did a in lieu of a ticket price. We asked people to donate to the BC Cancer Foundation. If you have not listened to one of our more recent episodes, with our friend and colleague, Dr. Greg Bole, he has stage four cancer, and he has directed all of his support to go to the BC Cancer Foundation. So really appreciate if you have any extra cash lying around to go there or to your local Cancer Foundation. Because, there's a lot of big problems in the world right now, and that has been an ongoing one, and will

continue to be a big issue going forward. So, thank you all for your support. Okay, let's get to our amazing guests that we have here Kaylee.

Kaylee
Yeah, who are these super rad people? Well, we are going to introduce to you some folks who are doing some amazing communications and who have been past guests on the pod. First up, we're very lucky to be sharing some virtual space with Dr. Samantha Yammine, who joined us on our very first episode of the podcast our very first baby episode. You may know Sam as Science Sam on social media, and Sam has been continuously communicating about COVID-19 over the past year debunking misinformation and helped to launch the #ScienceUpFirst initiative. So, everybody please say hi to Sam.

Sam
Hey, everybody.

Michael
So, Sam's with us. We've also got Kim Senklip Harvey, who is an Indigenous theorist cultural evolutionist. Kim's efforts to decolonize theatre through comedy was in episode nine. We talked about her podcast the Indigenous Cultural Evolutionist, Kim's doing her Master's in creative writing University of Victoria, and she's the author of 'Kamloopa: An Indigenous Matriarch Story', which was nominated for a Governor General's Award. Kim, what's up?

Kim
Hi, thank you so much for having me. What an introduction. I'm so excited to be here with a space expert. I put on Twitter, the rat doctor. (laughs) Kaylee I'm so sorry. I was walking down the street. I was like, what was I saying? So, I'm just grateful to be with so much knowledge.

Kaylee
It's so funny when I saw my uncle last summer and I was explaining to him that I just got a PhD he said "so you're rat doctor. So, nothing serious, but just rats." Like I guess so. So, you hit it right on the head.

Kim
I'm with your uncle. Grateful to be here, thanks for having me.

Kaylee
Thank you so much, and last but not least, we have Pramodh. Now you might have noticed if you listen to the podcast, we usually have a different intro music but today we have some music that Pramodh made for us and it is incredible. Pramodh Senarath Yapa told us on a previous podcast about why helium is super cool. Pramodh is a theoretical condensed matter physicist and PhD student at the University of Alberta where he studies the properties of matter when it's cooled to near absolute zero. In addition to that, in 2019, Pramodh also won the dance your

Ph.D. Competition for his swing dancing rendition of electron behavior. Superconductivity: The Musical.

Pramodh
Yes. It's very hard when you're confined to a chair to do anything that looks remotely cool. So hello, I'll wave that's my dance move. So glad to be here.

Michael
All right, just like I said, get into the Q&A if you have questions, but we're going to start with an update with our very first guest, episode number one of Nerdin' About and that was Science Sam, you know her from her amazing science communication work on Instagram and Twitter. Hey, Sam, what's been shaken? I mean, we had you on in late March, early April, kind of like the beginning of the pandemic. You had just switched a lot of your science communication to talking about COVID. You've been doing amazing work. I just got my AstraZeneca vaccine the other week, and I haven't been looking at the news. I don't know if there's any news about that. I guess the pandemic is over, why don't you give us an update? What's going on out there in your world?

Sam
What a world away from when we first spoke, I definitely dove in those early weeks of the pandemic, I remember saying it's just going to be one week of coverage, now I don't even know how many months because time is not real. I have still been talking a lot about COVID trying to engage people with facts, mostly about vaccines. It's been a wild ride, honestly, especially the last few weeks here in Canada with the AstraZeneca vaccine, which I'm so glad you did get by the way for anyone feeling weird about it. It's an amazing vaccine. So happy for you, but it's been a wild ride.

Michael
Why don't you tell us a little bit about the nuances of that messaging with the AstraZeneca vaccine? Just for my personal knowledge. (laughs)

Sam
I mean, the AstraZeneca is the media darling, it's just been for so many different reasons. It's been in the news. I would say what people should remember the core takeaway is that the science and the rigor behind the review process, the science behind this vaccine is incredible. I think what people may take comfort knowing is that part of why the communications have been all over the place, is because we actually have so many different independent bodies here in the country, who are reviewing things, and independently going through different data. That can sometimes lead to like a slightly different version of the message, especially when we don't have a unified message coming from the top. So that's why I think there's been a lot of chaos, is there's been some things to review, and many people reviewing it, giving their own version of pretty much the same message. So, I just want to say for anyone feeling nervous, you got an awesome vaccine, you have protection, and in a crisis, that's dope.

Michael
I think everyone should put into the Q&A. If you have gotten the vaccine, let us know which vaccine that you got. It can sort of be like that SNL sketch on the weekend, when it was like every post-pandemic or post-lockdown conversation. "So, what vaccine did you get? I got Pfizer." (laughs)

Sam
I'm going to say I love the memes and the different Tik Tok videos like turning them into personalities, I don't share them, because I'm like, maybe people will take it seriously if I share. But just know that on my spare time, that's what I'm watching.

Kaylee
So, when we first talked before, we were even talking then about the messaging around masks had just changed, right? Everything at first was like, you don't need to wear a mask. I was that person. I was like, “you don't need to wear a mask, save it for the doctors”. Then I had to be like, "oh no, the science is changing." Then "oh, it's by touch really wash your hands", which wash your hands, but actually aerosolization and airborne. So the science has constantly changed. How have you stayed up with that to be able to keep communicating because you've built such an amazing community of trust in science, which is hard to do when the science and the message keeps changing.

Sam
Thank you. It's really interesting and every now and then I might sound like a narcissist. for saying this, but I actually think it's a really important thing. If you post online, go back and look at your own stuff every now and then, and see how you feel watching it. It feels weird at first, but you get used to it. I was going through some of the things I've written about the vaccines for the last few months, and it's been really interesting to see just the different things that you're emphasizing because the messaging is changing. I think ultimately, what I'm proud of having done is to always be clear about limitations, always be clear about caveats. I think a lot of people are really quick to dismiss things, especially sorry to keep bringing up AstraZeneca. It's all have been talking about, I don't know, last two months, people were really quick to dismiss things. And it was like, no, we should talk about it. We don't have to baby people, we can let them know, this is what's up, and now make your decision, and it's a great one. Same thing with masks, we were quick to dismiss and say no, we never wear masks here so we're not doing it. Instead, we should have been like, oh yeah, cloth masks exist, if we're having a shortage, there are other options, but I too didn't really think of that because we can be quick in a crisis to just want to say something comforting when really what people want is the truth.

Michael
The truth is a sticky matter, Sam so you're talking about the AstraZeneca and I would love to not to end on like a downer, but it is positive because even though a lot of people are talking about it. I hear a lot of science communicators trying to say people should be celebrating that we have

this vaccine. So where are we at today with people that have gotten the AstraZeneca? I know a few people in the webinar said that they did get it. So, Ontario, I believe said that they were taking out it of the rotation. What's going on?

Samantha
I might have missed the news. It's funny, I was being interviewed in the news a lot today, which means I missed what was being published in the news today. So, I may be a little behind too, but as of this morning, Ontario and Alberta had both decided to pause giving out more first doses of the AstraZeneca vaccine, Alberta citing more of a supply limitation like dwindling supply wanting to reserve the limited supply we do have for people who want their second dose to match, and in Ontario was a mix of things. The fact that we have so much mRNA coming in dwindling supply as well and also slightly increased rate of those rare but unusual blood clots. So, it was kind of mixed reasons. I think that that was a fair decision to make right now. The difficult part is that many things can be true at once. It is true that this was an okay decision to make right now, and still true that you deciding to get the vaccine last week was still a great decision. That duality, because we're so focused on trying to give the simple reassuring answer, we're sometimes afraid to give the detail, or sometimes we give too much detail. So, we're always on one extreme, and people really want the concise detail. The snack version is what I like to call it, and that snack version, I think gives a bit more clarity.

Michael
I just want to end with one last question for you Sam. How have you been doing? You have been so on top of all of this that is coming out. Sometimes I get a little angry when I see people give you some flak, and I'm like, well, that's my friend. I don't like that. So, like, how long have you been doing?

Sam
You know what? I'm okay, I'm strictly okay, I'm not going to lie, it's been really hard. Fun fact about me, I have extreme needle phobia. Like, it's a pretty common thing, but I'm on the very severe end. So definitely never wanted it to be my job to have to think about needles every day. So, it's taken a toll I recently started back in therapy, which has been amazing. I have an awesome therapist who practices from a disability justice lens, and it has been already so affirming and wonderful. So highly recommend folks who are also strictly okay, seek out a therapist if you can, lots of free resources floating around right now too, which is really awesome. Ultimately, I'm optimistic and if that reassures anyone else, I want to be clear, I'm really optimistic, I think especially in the next month, stuffs going to become so much easier in Canada. Now my heart is more so breaking for what's going on around the world, and the responsibility we have for vaccine and health equity, and just all over equity around the world. So that's kind of where my heart is breaking these days, but we are going to be okay.

Kaylee
Yeah, I think that's an important highlight is that we're balancing so many traumas, trauma at home, trauma close to our family, trauma globally, and be able to balance those, and find space, and still find energy to invest in and take care of, I think is really important. That's something that I really appreciate about your communications too. So, we are going to have a little transition. Speaking of lots of things going on and happening, there has been a lot going on here for our next guest, Kim Senklip Harvey. Kim, you've had so much on the go last year, that I find it really hard to keep track. But then also in the last week, you've had an incredible number of new things happening with your work, with your Masters, with the Fire Company with your creative works. I was really lucky to sit in on your Masters defense, and learn more about what you've got going on, PS there were musical numbers in this Masters defense, and it was amazing. All defenses should have musical numbers, my rat musical would have been something else. So, give us an update. What things have changed for you since we last chatted?

Kim
Wow, what a question. I successfully completed my Masters at the University of Victoria. So, I have my master's in creative writing. Yes, Kaylee so glad you were able to be there, and witness the work. Yes, Adrian Glynn sang two of the songs for my Masters thesis project. I was also in the Fire Company and I had the fortune of finding out last week that ‘Kamloopa: An Indigenous Matriarch Story’ was nominated for a Governor General's Award, like nobody usually cares about theatre or plays. It's the highest honour a play can get, there's really no literary awards for theatre except this one, and it's a big one. So, we were very grateful to get that nomination alongside so many other incredible works of people. That was a wild one, because I actually finished writing that one in 2019, and we produced it in 2018. So, it feels like this really fun trip down memory lane. I mean, my friend read it the other night being like, what did we write and trying to remember what exactly it was, and be like, "This is a great play. This is fantastic. Good work us." Then I also got my offer to go into my PhD at law at the University of Victoria. So that's something that's just in the works, and would be a justice focus journey for me into intersecting artistic legal orders, and the intersection of imperial justice, and ensuring that Indigenous peoples legal orders are represented in a multi-judiciary, a society and Canadian state. So that's just a few things that are happening. We also are just in the midst of signing a premier deal to do a 75-minute film of ‘Break Horizons’, the live musical version that would premier in October, but details for that to be announced. I also started teaching at UBC, last Tuesday, a creative writing course. So yeah, just a few things happening, but I feel very grateful. I want to just hearken to what Samantha was saying. I feel like the reason that I was able to keep and manage all these projects is my deep commitment to my mental, spiritual, and physical health. I just had a great session with my therapist today to kind of keep me on track, we really do advocate that if you are struggling or you need something or even when you're not struggling to really invest in yourself, because even with all these things going on, we are in the middle of a pandemic. So sometimes I have these thoughts "Is this too much? What's happening?" How do I calibrate and have multi support systems in a world where a lot of our regular people who are taxed or dealing with their own stuff? I'm just very grateful to have many support networks in my community right now.

Michael
Well, we're so happy that you came into our lives last year Kim, I learned about a little play that you're working on that you've already named checked called 'Break Horizons'. I think for everyone that's here, if they hadn't listened to your episode and don't know what 'Break Horizons' is, I think you need to tell us what you're working on. Because this is just like, fucking phenomenal. (laughs)

Kim
So, 'Break Horizons' is a rocking Indigenous justice ceremony. It's a play that kind of spirals around, orbits around Indigenous women's healing lodge, which is a minimum-security prison that's focused on Indigenous values and forms of rehabilitation and restorative justice. To me, I was in the Masters and I was thinking about how do you get anyone to give a heck about Indigenous justice and judicial reform. I was like rock and roll, sexiness, fun comedy. So, I've been working on that project and so much has happened in terms of the development of it. We now have 10 songs for it that are a vibe of rock and roll, rap, pop, a bit of folk country, and the script has taken giant transformations. Just the way that the pandemic has rolled out, we're actually making a digital adaptation so that we can share and disseminate because who knows when we can gather in-person, and theatre has been obliterated during the pandemic, people's ability to gather, and it really hasn't been talked about, the fact that theatre is being really hard hit. For me, 'Break Horizons' is about Indigenous emancipation. It's about the respect of Indigenous dignity that's going through incarceration and also the reclamation of Indigenous femme's body sovereignty, sexuality, and a sovereign right to have the sense of a radical liveliness, what we're calling are in my nation, the law of *gwesneh*, which is what it means to truly be spiritually alive. So, 'Break Horizons' really means a lot to me, especially, you know, the impetus in the genesis of that project came on a CBC segment when I heard that Indigenous women were the fastest rising population and the incarcerated system in the Canadian state, and I wanted to investigate what was going on in there. It is a tough topic to hear what Indigenous women have gone through and the sort of traumatic positioning that they've endured to be in incarceration. For me, it's a part of my teachings, as I say, applied to a storyteller to ensure that the people who are being the most marginalized, the people who are being the most oppressed, the way the state has weaponized trauma. Actually, it's an extension of a genocidal tactics from residential schools to colonization, to bring deliberate attention to how the state continues to harm Indigenous people. But as one of my friends calls it "in Senklipian fashion", we do it with irreverence, and humor, and rock and vibes, because I think that's what we have to do. As a producer and a creator, to keep people's attention because we need people to listen to what's happening to Indigenous people, deeply, urgently and with courage.

Kaylee
When we last talked, you were talking about creating this piece, and now you're looking to bring it to a digital space. So, what does that look like? How does that process transform the work? How are you managing that?

Kim
I think artists who are going to be pivoting through this pandemic are artists who are going to know how to take the kernel and framework of a story and adapt it to different digital platforms. So, for me, the way that I write is there is a story, a framework, sort of the bones of it, and it's just a matter of figuring out what modality is. I'm writing a piece for Greenthumb Theatre called 'The Mystics', and we're adapting that play into a six-part pod play, a mini-series that we can get to Indigenous youth across Turtle Island that talks about the laws and traditional ways of living. For a 'Break Horizons', that's a huge task that I'm heading into right now to basically do a complete redraft of that script, meet with the Healing Company, the designers to reimagine what that piece would look like in a digital platform. But basically, we're looking at like Bruce Springsteen on Broadway, Beyonce at Coachella, Lady Gaga, in concert, we're all watching these really amazing rock'n'roll live captures of music at festivals, and watching a lot of performances at the Grammys, trying to see how people are in COVID safe ways, capturing live music. That's what it's going to be is a 75 minute back-to-back. I kind of think like a Meatloaf, but Indian vibe music video for 75 minutes. So that's where my brain has kind of been percolating. I'm just going on long walks trying to figure out how we do this. It's a really exciting project, and I think for me, the positive out of this is that more people will be able to see it. With theatre, it lives and dies where that house happens, and people never get to see it again. Now I'm speaking with somebody who does engagement at Folsom Prison, we potentially could disseminate this piece to the people who might need that ignition courage, and healing the most by getting it into incarcerated centres and healing lodges, which would mean the world to me.

Michael
One thing that I would love to transition on before we get to Pramodh is you put quantum physics into this play. I can already see Pramodh giddily ready. So, could you maybe give us a teaser? How do you infuse quantum physics into 'Break Horizons'?

Kim
I was reading around this notion that there's a theory of the many worlds and the third, fourth and fifth dimensions that the law that encapsulates around it or the theories around it. I put out as a theorist, this notion that dark matter and dark energy is actually the ancestors traveling in from the different dimensions, and that we can only see it and feel the reaction, but we can't prove it. Which is why non-Indigenous people being like, why do you guys think the Eagles are your ancestors? Why do you guys have these vibes? I'm putting out the theory that it's actually dark matter, dark energy, which is a scientifically proven presence, is actually our ancestors coming in from the different dimensions through the notions of quantum theory, and quantum leap visiting us in this world and we only experience them through that sensorial aspect, but we can't actually prove it because we're three-dimensional beings. So that's what I'm playing around with.

Michael
Pramodh. What's going on here? Is this true? Is that what dark matter is?

Pramodh
You know what? I absolutely love this theory because I feel like nobody knows what's going on with dark matter. So, all cards are on the table, and I'm voting for this one.

Michael
Pramodh, let's transition into your work. I think I need to crack my beer here. This is a transition into what we talked about when you were on the podcast because you talked about super fluids, and you describe that if we stirred a superfluid beer, that it would just keep swirling and swirling and never stop. So that superfluid beer that we stirred back last summer, it's still swirling, right?

Pramodh
Absolutely I hope you kept it in your negative 273-degree fridge. Otherwise, no. If you did, oh, yes, absolutely that would still be swirling. If you did some other things to it, it could form something that's related to my research, which I can tell you about.

Michael
Well, get into it. What's going on with helium?

Pramodh
Absolutely, last time I was talking about this superfluid helium, which has this amazing property when you cool it down to almost absolute zero, it becomes frictionless. It moves without having any interaction with the container it's in. So, we just came out with a paper recently looking at this, studying how superfluid helium behaves when you squish it down to 1/100th the width of a human hair. Now, normal liquids would not be able to go through this, if you squish it down, it's like when you try to drink a milkshake that's really thick, you try to get it through a straw, it gets stuck, that's because it's viscous. So, any liquid that has viscosity, usually you can get a straw small enough that it'll never be able to pass through it. Superfluid helium is the only thing that no matter how small you make that straw, you'll still be able to slurp up that superfluid helium, if you wanted to. You wouldn't want to, because it wouldn't taste very good, and you'd have to go to the ER. But it can do that, and when you do that, it actually does some really interesting phenomenon, and we call it a super fluid crystal. What that means is that at the same time in which it is a frictionless fluid, if you squish this helium, thin enough, it also becomes a solid. So, this is a substance that is both a liquid and a solid at the same time through the magic of quantum mechanics. That's what I've been working on, and very excited about this research, because we can also think about where to take that research afterwards, and think about where would it be useful? I like stuff from a fundamental science perspective. Why does it do the things it does? But a lot of this stuff that's happening right now is people are also thinking about how can we use the principles of quantum mechanics to make things that are useful for society? How does it get into society and industry? So, there are things that could be used for making sensors that are sensitive to the smallest forces in the known universe. So, a lot of cool applications in the future, too, but also a lot of cool fundamental sciences that overturn our ideas of what states of matter are.

(Pramodh's paper on superfluid crystals can be found here! For a twitter explainer visit this thread.)

Kaylee
So, you got into applications, and I love that you're forward thinking, and you're just looking at changing the world. My question, how do you squish helium?

Pramodh
I mean, that is a very good question, and I'm sure it's much harder than I'm going to make it out to be. I don't actually know because I let the experiment list at the University of Alberta do it and they show me fancy pictures, and I believe that, but it just looks like they make two glass plates, really squish it, and that's how you squish helium. Another beer thing that I just thought of is the way the experiment was described, the way they figure out that it's a superfluid, is the same way when you have a bottle of beer, and you blow across the top, it makes a noise like a beer flute, depending on how much beer there is, and you can change the tune. The same thing happens with the superfluid helium where you can squish it really fast, and that tells you how much superfluid is inside that. How fast you squish it, it makes a resonant sound that you can hear. That's how they know there's a super fluid in there. So, it's the same principle as beer, beer connects to superfluids. I hope somebody makes a beer out of this now, well not out of it, but markets it. It's a marketing opportunity.

Sam
That only you will understand. (laughs)

Pramodh
I promise a market of at least three people will buy this beer, at least, come on.

Michael
Well, you've also given me a really great potential drag game, if I ever want to get into drag with Superfluid Crystal, I think that is definitely on the draft list for a future drag name. I want to know more about the superfluid crystal. I have so many questions, but basically, what is it? It's like a crystal. Is it literally crystal or is it a model? When you're talking about superfluid crystals, are you literally talking about crystals?

Pramodh
I guess we have to define what a crystal is, before we have that conversation. You can define crystals that you see every day, using the same definition, but for a physicist, a crystal is something that has order. Those chemistry, ball and stick models that you build atom models with, you can put a ball in a stick and they form bonds. Then you can build these up into little lattices, that's what a crystal is, usually you have an atom right here, and then you have a space, and then you have an atom next to it. A liquid is very different from that in which all the atoms are moving around all over the place, there's no fixed distance that you are definitely sure you're going to find another atom. That's the definition of the liquid. The definition of a solid is

you if you know an atom is here, you know exactly what distance away you'll find another atom. That's the way the superfluid can become a crystal, within a normal fluid phase, there is super fluid everywhere. There is no fixed position in space that there isn't any super fluid, but once you squish it into this really thin space, it suddenly spontaneously forms into a very spatially ordered crystal. So, the news release came out for one of these specially ordered phases, like a year ago when the experiment was founded, and they literally called it a polka dot phase, say the polka dot superfluid. That is what a superfluid crystal is.

Kaylee
The polka dot door but way nerdier I love it. (laughs)

Kim
When he said lattice, my thought was lattice fries, and then tater tots, that's my reference point. (laughs)

Pramodh
Next time I do like some outreach experiment with kids. I'm just going to pull out some lattice waffle fries. Oh, that's perfect. I love it.

Michael
So yeah, I would love to combine what was already started like Kim, listening to Pramodh, finding the lattice intersections there. I love to hear from the three of you, questions you have for each other, from your own perspective of what you're curious about.

Pramodh
I am curious about the aerosol spread. So, Sam, communicating about that, because I feel like that is one of the most like misunderstood parts of this. My favorite part has to do with fluid dynamics and how fluids flow through space, and nobody is really communicating about that. These 6 feet, 15 feet, restrictions don't make sense. Do they make sense with aerosol spread? What can you tell us about fluid dynamics and how it relates to disease spread?

Sam
I mean, I'm almost scared to talk about this because it's become like such a polarized topic and such an aggressively polarized topic. So, I do want to let people know, actually, when discussing these topics, be aware that there are two really strong camps that attack one another on social media. It's really, really weird, because we're all on the same team here. They're both pro-science groups, but the conversation has become so hostile. So, I'm afraid of what I'll say. I think ultimately, what epidemiologist folks have been trying to say is, that everyone uses the same words to mean different things, and when I say everyone, I mean different types of scientists from the fluid dynamics people, to the epidemiologists, to clinicians, and then regular scientists. The people who aren't in science, we all use the same words, but they mean different things to each of us, which is kind of interesting. It's like a non-jargon, jargon word. Like aerosol

for most people is a hairspray. Right? So, I think what's been difficult here is people disagreeing on what the definition should be, but at the end of the day, I always look for the epidemiological pudding, which is what Laurel Bristow aka @kinggutterbaby says. The proof is in the epidemiology pudding. What patterns are you seeing through contact tracing? For the most part it's close contact, is it exactly 6 feet? Nah. It's usually prolonged, most transmission is happening indoors and even outdoor events where there was an indoor component. I think the tricky thing is, do you call that airborne, then? It's borne by air, but is it airborne? And what does airborne mean? Just because it can transmit via aerosols? Does that mean that it's going 50 feet and it's staying in the air for two days? Is that your definition of airborne? So that's why it's all messy. I think what people really care about the most is, what do I need to do to be safe? I love semantics. I will always argue semantics, but at some point, we have to be like, people just need to know, to ventilate, have distance wear a mask, less contact is better. That's the real takeaway there. I think the arguing is important, but it made the message confusing.

Pramodh
I think that's a perfect bottom line. Thank you.

Kim
Now pudding just became an incredibly funny word to me. I will be putting pudding somewhere in my next artistic piece. It will be an ode to you Samantha, that one performer will make a joke about pudding of some kind, and you will know it's in there because of this.

Sam
I am so honored. Okay, I don't know anything about physics, but isn't pudding a weird non-Newtonian fluid Pramodh?

Pramodh
We can make it relate.

Kim
One of the things that I wanted to ask because you're in such a specific study, what is something that people constantly get wrong about with the work that you're doing? Like, what is an assumption people make that you're constantly like, "No, no, no, like, I'm not holding a beaker with nitrogen" Like, what is something that people think you do that you absolutely do not do.

Pramodh
I think physicists have a weird marketing issue with all of the different pop media representations that are around, you know, asocial, sit in a dark basement, writing on a blackboard all day. I do enjoy blackboards, and I have opinions on it. But physics is such a social venture like scientists are part of a community, and you have to talk to people. That's the part of science that really gets me excited, is talking to people and sharing ideas. There is this

idea of this, lone genius, a mythology that spread in physics, which I dislike so much. It perpetuates a lot of like bad ideas about doing science. So that's the one big thing that overhangs all physicists, I feel,

Kaylee
Throughout all of science, and it's super messed up. It's like the idea that science is done in isolation by these geniuses who do nothing else but science, and love this thing and have no other hobbies. Why does society think scientists are elite? Oh, I don't know.

Pramodh
It's the furthest thing from the truth.

Kim
I also really want to know who the marketing team is for science. How are they marketing? What is their approach? What is the budget? And can I be in their next meeting?

Sam
There isn't one. Budget is $0. You have to pay to do it.

Kim
Sounds like theatres.

Sam
Yeah, that's the real truth. Okay, Kim I want to throw your question that you asked Pramodh back to you, but with a slight tweak? What something about the more Eurocentric colonialist version of science and academia, that Indigenous ways of knowing are better at. Does that make sense? Yeah, look, what's the thing that I did a lot of things y'all probably do better, but what's the thing that we all need to change in the current dominant academic system?

Kim
For me I think it's the hierarchy of knowledge sharing versus knowledge dumping. It's of my teachings that you get into relationship with people to share knowledge and create cyclical, but reciprocity relations, that you are going to share knowledge. That everybody here has their expertise, and that even if you're a professor and expert, and it's something that I use also for my youth engagement practice. This is that I'm not the expert in the room, the collective knowledge of the people gathering is the greatest thing and the greatest entity to be harnessed. So even from a directing position, I'm not in here to be sit on a chair and be like, "you stand over there, you do this. I'm the writer don't say that word. I didn't write it that way." For me, it's really a collaborative practice in terms of ensuring that everyone coming into the room is respected for all that they bring in. Whereas in a lot of Eurocentric Imperial places, you have that genius, you have the director, you have the professor, you have the tenure track, and it's just so uncomfortable for me, because I see ideas die in the room, I see ideas get oppressed in moments, and I go, man, someone could have just solved the world right there. Yet, because of

the way the system and the framework of knowledge sharing is set up, it's just not appreciated and seems disrespectful. That's really hard for me to engage with when I see a young person, and I'm like, "What can I learn for you? What is the honor that I have to get to learn from you today?" because that's just the way that we were raised. I'm in no way an expert, but just a person humbly on route to help serve the community and collect knowledge to help us all in a community of practice.

Sam
I love that. I want that for all of us.

Kaylee
That would be so amazing.

Kim
Like imagine, if we came in and we're like, Samantha, Kaylee, what are we going to learn today? How can we collaborate on this class? What do you have to offer? What expertise are you bringing? That to me is the greatest part about my job, getting to come to work, and realizing what amazing intelligence and knowledge people come in with that is new from the next day, because I don't know what happened to them since I last saw them. That's the exciting part about my practice.

Michael
I love how Kim wanted to write a letter to the manager of science, but I think she basically just made a case that she should be the manager of science.

Kim
Well, I think that's a big misconception is that Indigenous peoples don't have scientific theories, that Indigenous people don't have technologies that we didn't have engineers, but actually, Indigenous people in our nations, clans, and families had many technologies, ideologies and systems and actual legal orders that informed how we live our lives. It's a misconception that we just sat around a fire, looked to the smoke, smudged, and came up with our way of life. Instead of honoring that we have very complex ontological ways of governing ourselves. That relation-based value-based order is sometimes deemed to be not as sophisticated as Imperial ways of being which is also just completely fallacious.

Michael
Amazing. Should we should we nerd out guys?

Kaylee
Yeah!

Sam
Yes!

Pramodh
Yeah!

Michael
What have you been nerding out about? Let's go to you first, Sam. what's going on your world?

Sam
I think my favorite topic, because I'm itching to get back to is neuroscience. I've been thinking a lot about motivational science, and motivational and behavioral neuroscience. Again, I'm just so thirsty to think about the brain again. (laughs)

Michael
Thirsty to learn about the brain again? Love it.

Sam
Yeah, and just thinking about what motivates us, the different motivating factors that we have, even though it can feel hard to be motivated these days. But it does relate to my work in vaccine confidence too. Just thinking of like, why do people hate vaccines, it's because the reward is so delayed, and also it never comes. Because when they work, nothing bad happens. So, it's been really a fun intersection nerding out about psychology, I guess.

Kaylee
That's super, I can't wait to - I love your COVID communications. I also am looking forward to the day when I can tune into your feed and I get to see fun brain things.

Sam
Remember this cool cell? Like that used to be my thing!

Kaylee
You had a great one about why when you're cooking vegetables, it gets super green and how you know when it's been cooked too long. I still remember that from right before the pandemic, and then cooking vegetables and be like, wow look how green they are.

Sam
Okay, and also, I did a whole chemistry of why your vegetables change color. Then I was like, I'm going to use this to cook better, and then my vegetables were gray. And I was like, damn it! Why doesn't this translate for me?

Kaylee
Okay, moving on, Kim. What are you nerding out about?

Kim
I was going to say because I was just very much engaged in my creative writing and my thesis. I'm really into like syntax these days, like the construction of a sentence. Like we jokingly say “that sentence is sexy, that sentence is working hard for you, that sentence giving you life.” The nerding out on just the way you can construct a sentence. Oooh! So, I've been nerding out on reading things, and looking at people that were posting things, I mean, like that apostrophe! That comma use! That semi colon! That em dash! So, for me, I've just been in lit world and really trying to think and build my capacity around it. But like, first hating that stuff, because it seemed so intimidating, and there's so many rules around it. But recognizing that as a creative writer, how can we manipulate them, use them, leverage them and make them fun. Once I realized that I could claim that power and it wasn't like my English 10 teacher being like, “you suck at writing, don't ever write poetry”. Like all of that trauma we endured in high school when everyone basically got told they suck at creative writing, which we don't. We just got traumatized in high school because we weren't the greatest. So, reclaiming the notion that sentence construction, creative writing, composition can be something that we all do. I really love looking at it and seeing the syntactical vibe. That is a sentence I just said, and these are things I'm nerding out on.

Michael
Syntactical vibe. There are so many great things I should be tweeting out right now, but we are recording it. So, I'm going to go back and look at some of these gems.

Sam
Kim, you bring up syntax and order of things in sentences because people say "not me saying syntactical" I love how you can say something so wrong, but it makes sense. That's kind of like what I love about meme culture, and internet culture is things don't really make sense, but then they do. That just tells you the whole construct of grammar is not necessary.

Kim
It's unnecessary, and anybody weaponizing grammar, anyone shaming people for syntax can literally go to hell. Folks who are afraid to post because of what the grammar police are going to come after me for, anyone who's ever corrected, literally go away, it doesn't matter.

Sam
Sometimes the version that is grammatically incorrect is clearer. So, for me, I will end a sentence with “for” or “to” because it makes more sense. It sounds better.

Kim
That and the vibe you're coming from, and if you didn't have enough time to prove who cares? Like if you care, move on, kick rocks, get something else to care about. It really doesn't matter. We're not writing an LSAT here, it's social media.

Michael
Oh, my god. (laughs) Well speaking of moving on, Pramodh, what syntactical vibes are you nerding out on?

Pramodh
That's a great segue. So, I have been nerding out about an old mathematical question. Don't let that turn you off. That I want all of you to answer before I explain what the question even means, or give the answer to. So, the question is, can you hear the shape of a drum? Yes, or no?

Sam
Yes.

Michael
Yes.

Kim
Yeah.

Pramodh
So, can you hear the shape of a drum? The answers are all yes. So, this was a question asked by a mathematician back in 1964. Okay. So here is a drum. So, I can play this, if you look back behind me, I have a bigger drum there. If you hit it, it's going to make a deeper sound. Right? So, the question amounts to asking whether the sound of drum makes is like a fingerprint? Can you uniquely identify which drum it is by just listening to it? So, it's a really great question and actually has a really good mathematical way to answer it. So, they asked this question in 1964, and they immediately got an answer in the negative, saying, no. There are drums that can sound the same, but have different shapes, but wait for it in 16 dimensions. So, if you were a 17 dimensional being and you brought your 16-dimensional drum with you to the drum circle, you might find that there's a person with a drum that looks completely like a different shape, but sounds the same. Okay, so in 1964, the answer of in 16 dimensions, came in less than a year. It took almost 30 years to answer it in our world. So, in the 90s, was when they figured out that in two dimensions, the normal two-dimensional flat drums that we play. That is also true in two dimensions, you can make a two-dimensional drum that has different shapes, but sounds the exact same as the other one. So, I've been nerding out about this question. How amazing of a historical fact, it is and how mathematicians work. They're like, Oh, yeah, two dimensions, way too hard. Let's do 16 dimensions first, and then work our way down. It just blew my mind. All of you said, yes. The answer is no.

Sam
Maybe we're a 17-dimensional beings.

Pramodh
On the inside you are infinite dimensional.

Kim
I think Pramodh won that round for nerding out just saying.

Kaylee
Yeah, I don't know. We've got a pretty strong contender coming next generally on the nerd outs, Michael, what do you nerd out about? 18 dimensions?

Michael
The other job that I've been doing this past year is working with the BC Science Fair Foundation. I'm Sweating for Science right now, raising money for kids in science fairs. One thing that has been decimated in this pandemic is extracurricular activities, not just for the kids, but for the teachers that are having to take that on amongst all of the other things that they're taking on. So, my nerd out is actually a challenge to all of you, think of a teacher that you know in your life or a stay at home, homeschool parent. Think of them, and as soon as we're done here, I want you to message them, just to say, "Hey, how's it going?" Because I can guarantee you, they are stressed out right now. It's the end of the school year, this has been a wall-to-wall pandemic school year, and sometimes they run into parents in the grocery store, and the parents ask that question, but they can't say, "I'm fucking crying every day". No, they're stressed out. So, let's give some love to our teacher and stay at home parents that are teaching their kids right now. Extracurricular activities have been taken for granted. Sweating' for Science, google it. I've been running every day. That's what I'm nerding out about. Kaylee, what about you?

Kaylee
Well, now for something of a slightly different flavor. Today, we released our episode of the podcast with Peter Soroye, and Peter talked to us all about bees. While we were recording that episode, it reminded me of some orchid bees that I had learned about. In the podcast, I talked a little bit about the orchid bees, but I've been nerding out about them so hard, because one, they're beautiful, but two, they're real weird. So, the male bees go around, and grab scent compounds. I always thought that they just grabbed them from orchids so that they smell nice, and make a sexy little cologne for the female bees to attract them. Well, on a bit of a deeper dive, I've learned that they actually grabbed these compounds from 20 to 40 different things, including stuff like tree resin, rotting wood, fungi, leaf litter, a compound called skatole from feces. They just go around, and they mix this little unique cologne to bring the female bees to the yard. I just love that idea that I could walk through my environment and be like, "I like that, that's for me, I like this. This is also for me." I would pretty much just rub myself all over a poplar. I think that would be my scent. Anyway, they store their little perfume in their back legs, like what is going on?

Kim
They're still putting in the effort. They're not saying it's COVID times I'm just going to wear whatever and put my hair in a bun and wear pajamas. Still gathering scents, and putting it in their back legs. Respect.

Sam
On the organza sleeves. (laughs)

Michael
Oh, my goodness. Well, everyone, that's the end of our hour. This has been an amazing time. Thank you all so much for joining us. Thank you all for being on the podcast. Kaylee just mentioned, Peter Soroye, an episode that was just released. So, if anyone watching has not listened to that you should definitely go and give a listen. If you haven't listened to Pramodh, Kim, or Sam's episodes, check those out. We really appreciate all your support, please. You know like and subscribe, write us a review. You know those always help. We'll be back doing live events eventually at some point. Final things. Thank you to my work at HR Macmillan Space Centre for donating us this Zoom webinar, check us out on our website, check out our events that we got going on there. Check out Visions of Science, which is a nonprofit that Sam works on, a charitable organization. Aiming to advance the educational achievements, and positive development of youth from low income, marginalized communities, through meaningful engagement in science, technology, engineering and mathematics. Go there if you have any extra money, we've thrown out a ton of charities tonight, but really appreciate all your support. Any last words Kaylee.

Kaylee
I think this was a great first live podcast. Thanks, everyone for tuning in. We're not going to be back in a couple of weeks like I normally say. But until we meet again, it's all about communications, quantum, and rock and roll.

Transcribed in part by Otter.ai