

AT: Welcome to the Infinite Women podcast. I'm your host, Allison Tyra, and today I'm joined by Courtney Lee, Nancy Grace Roman Space Telescope Social Media Lead and Outreach Support at NASA's Goddard Space Flight Center. And we will get into what that job entails, but first I wanted to chat about the telescope's namesake. So can you tell us about Nancy Grace Roman?

CL: So Dr. Nancy Grace Roman was NASA's first chief of astronomy and first woman executive. So when NASA was becoming NASA in 1959, they reached out to her and were like, "who do you think should run the astrophysics division?" And she was like, "me," and they were like, "okay," and they gave her the job. I simplified it a little bit, but that's kind of how it went. She was always a go-getter for things, and she understood the importance of space exploration. She understood that we could not only study the space here on Earth. We have to be able to go into space to be able to study a little bit better. I was reading her children's book recently, and she said that trying to look at space here on Earth is trying to look at a streetlight through a stained glass window. Like it gets all distorted, it's really hard to see, so we have to be able to leave that in order to be able to see the universe a little bit better. So she was a huge advocate for space-based exploration. She was one of the big advocates for the Hubble Space Telescope. So she's the reason we have the Hubble Space Telescope. She's also known as the Mother of Hubble. She's the reason we have all other space-based telescopes. So in 2020, we decided to rename the telescope after her in her honor.

Some early history, she's always been interested in science and space and astronomy. Her mom used to take her out for walks at night, and she would just look at the different stars and the different constellations. She started an astronomy club with her friends, because that's how much she loved astronomy. When she got into high school, she wanted to take another year of geometry, and her teacher was like, no, you need to take home economics, and she was like, "what lady takes geometry?" And she was like, "me." So she ended up taking another one, and then she went to school. And there's actually a lot of videos of her speaking, telling about her experiences at school and how a lot of her advisors didn't even look at her when she walked down the hallway. She would wave at them and they would ignore her. They're like, "this is not a place for a woman." But she was able to persevere. And she then, when NASA was becoming NASA, she became the first chief of astronomy. So I like to say she wasn't the first woman, she was just the first, which is amazing. I spoke to the guy that came after her, and he was like, "I always say I was the first man, because you never hear that in the '70s," the first man to do something.

She was an amazing woman. She used to knit during meetings. She's a big advocate for open science data and just making sure that everything that we produce is available to the public. It's not just something that the government's holding. It's actually things that amateur astronomers and also seasoned astronomers and astrophysicists can be able to grab and to look at.

AT: And that's actually a really important thing, because when we're talking about science communication, it's not just folks like you who are translating what the scientists are doing for public information. It's also being able to share what scientists are doing with other scientists in other countries and other organizations, and not being very guarded and proprietary, because

it's much harder to make new developments and learn new things if everybody refuses to share. Sharing is caring.

CL: Oh, 100%. And Dr. Nancy Grace Roman was a huge advocate, making sure that that was something that NASA did. And we're able to do that with this next telescope that's named after her, where people are going to be able to get data within the first 24 to 48 hours. And it's going to be open to all of the public, so they don't have to reserve time on the telescope. They can just grab the data for it, which is going to be great.

AT: Well, that's particularly interesting, because at the time that she would have been getting started and being very active, obviously, she was active for quite a while. But this was in the middle of the space race, and everybody was paranoid about the Russians not hitting milestones before the Americans. So the idea that she was out here saying, "you know, we should share" was probably not super popular in that context.

CL: She was one of the first American astronomers to be able to cross Soviet lines and teach them about astrophysics. And that's one way NASA found her, because she went over there and spoke to them. And then when she came back, she had to do this tour around the different government branches to tell them kind of what she talked about over there, what she learned, and then NASA saw her from those one of those speeches and reached out to her. She was always a person about getting everyone interested in space and and astrophysics and just science in general. Growing up, she thought she was going to lose her vision. Her doctor told her that she actually need to stop reading because it was just messing up her eyesight. And fortunately, she didn't lose her vision. But after she retired, she would read to people who were visually impaired or suffered from dyslexia, because she wanted them to be able to have the same experience she did.

AT: And something that keeps coming up when we're talking about women in science is that when there is a new science, so like I see this with the ENIAC programmers and other computer programmers of the very early years, is that before it's established that women aren't allowed to do a thing, before we have that preconception of "this is what a (blank) looks like." It's easier for women to break in in those early years before those barriers are put up.

CL: Yeah, I can definitely see that, especially with Dr. Roman being the first. They sought her out not because she was a woman and trying to like reach some diversity quota, because NASA wasn't even NASA by then. It was still like an idea. They sought her out because of her research and her tenacity and her determination. That's the reason they allowed her to come to OSS. And it wasn't easy for her to get there, but once she got in there, she kind of helped set the stage for everything else.

AT: And so when we're talking about the pre-NASA years, so the career that she built that allowed her to say, "well, you should hire me." And they were just like, "cool." Obviously, she had to have been doing some pretty impressive stuff before NASA. And I mean, just getting a

doctorate in astronomy from the University of Chicago in 1949, I can't imagine there were a lot of women who were able to get science doctorates at that time.

CL: Oh, yeah. No, it was very difficult back then. I actually have a photo from 1946. It's one of the first Congregation of Astronomers. And I think there's maybe 50 people in the photo and there's three women in it. And they're spread out there to make it look a little a little more broad, but Nancy is in there. And then the person right above her is Chandra, who another space telescope's named after. But there were a couple of minority men in there, but mainly just white men and the three women, and that was it. And I think she's, I did the math, she's maybe 21 or 25 in that photo, so she's still very young. But to know that she was able to be a part of that is like amazing.

AT: And then when she was working at the university-operated Yerkes Observatory, there was only one tenured female astronomer in the entire country. And so that's actually why she left academia because looking at those stats, she was like, "this is probably not the best path for me." And so she went off to work in radio astronomy at the Naval Research Laboratory. And it is interesting how many women scientists of this period worked for the Navy. People like Grace Hopper also worked for the Navy at this time because apparently the Navy was doing lots of science. So good for them. Interestingly, one of the things that she was responsible for at NASA, so was securing and administering grant funding for different missions. So she was the woman getting the money.

CL: Yeah, for many missions, she was the person responsible for getting the funding. And then also helped allocating it.

AT: And so she devoted herself to securing congressional approval and funding for the Hubble Space Telescope. What was the significance of the Hubble Space Telescope?

CL: So Hubble, I believe, was one of the first space-based observatories. So it was something that Nancy was always a big component of, space-based exploration, being able to see the stars from the stars, so being able to see space from space. They knew telescopes like Hubble would be able to change history books if we're able to see the universe not with any of the atmospheric dust or anything in the way that could distort our view of the universe. So she made sure Hubble happened. And Hubble launched in 1990. It's going to be 35 next year. So it was only supposed to be a 15-year-long mission. And because with the extra servicing missions they were able to do, as well as like it just being amazing, it was able to last now going up to 35 years. So yeah, that was the Hubble Space Telescope. She's known as the Mother of Hubble. They didn't really name telescopes after women back then. And then the telescope, the Roman Space Telescope, used to be called WFIRST, the Wide Field Infrared Survey Telescope. But in 2020, it was a mission that was already going to happen, but in 2020 they decided to rename the telescope to the Dr. Nancy Grace Roman Space Telescope. So it's going to be doing similar things to Hubble, but just on a larger scale. And it's going farther away. So it's going to give us amazing images.

The Roman Space Telescope's mirror is actually the same size as Hubble. It's actually one of Hubble's, I believe, backup mirrors that they didn't use. So we're able to take that and they got it down to one-fourth the weight. So it's the same as that mirror size. But because of our detectors, Hubble has one detector. We have 18. We're able to get such a wider field of view. So imagine Hubble a hundred times wider at the same resolution. Those are the images Roman is going to be able to produce. So I believe one of the statistics is what Roman can do in its first six months could take Hubble 2000 years to do. So that's how fast we're going to be able to survey the sky. So it's an amazing way to continue off the science that we learned from Hubble, but now to do it on such a larger scale.

And Hubble is right above the Earth. So like you can actually see Hubble sometimes the night sky as it goes by. Roman is going to Lagrange point 2, the same place as the James Webb Space Telescope. So about a million miles away. So we won't have to worry about the Earth coming by every 45 minutes when we're trying to take our photos. I like to say that any space telescope is her legacy because without her continued advocacy and being someone who knew the importance of it and like fought so hard to make sure Hubble and other space telescopes happened, we would not know the universe as we know it today. History books wouldn't have been written, some of them, without some of the components that she fought for.

AT: At one point she was asked about her accomplishments and she said, "Hubble has brought astronomy into everyday life in a much more general way than it was before. The fact that it exists is something I'm proud of." So it was very much that, the recurring theme here seems to be not just that she wanted us to know more and she wanted the science to be done, but also she wanted everyone to be able to access it.

CL: Yes, that was one of her big things. Whenever I talk about her, I talk about that, her legacy of Hubble, but then also what comes after Hubble, the data that we get. It takes a lot to put it up there, but then it takes even more to get the data back and analyze it and actually see these amazing images.

AT: As someone who works on social media and outreach, you are very much continuing her legacy as well in the sense that your job is to make what the scientists are doing more accessible to the public. So how do you do that?

CL: So I don't have a science background at all. I got my bachelor's in communications and my master's in reporting on public affairs. I used to want to be a TV reporter growing up, but then after grad school, I realized that's something I didn't want to do. It was a very expensive lesson learned, but I'm glad I learned it. And I was still looking for jobs, TV jobs in different places, and I saw that NASA had a newsroom position open. And I didn't even know NASA had a newsroom, like that's not something you think of. It was a newsroom internship position open. So I went to apply and I couldn't get in since I'd technically just graduated grad school and you had to be an active student. So I found the executive producer's email and I emailed him directly. And I was like, "I would love this opportunity. I can't get through the website, but here's my resume and my web page with all my information on it." And really he called me, I think like a couple hours later,

and was like, "I love your initiative. Let's give this a go." So I got into NASA that way. And one thing I realized, I started in the newsroom at NASA. So I would help get different scientists, engineers, and sometimes astronauts out to different media agencies across the globe. And one thing I noticed was that we weren't reaching specific, we were reaching the basic news channels, like people at six in the morning, like across the country. But I knew that there were specific audiences out there that we weren't tapping that might not know they're interested in science and space. So I was like, why don't we reach out to different influencers and YouTubers and tap into their audience? Because we know they have a large following. So I started doing that with the newsroom. They really enjoyed that, extended my internship a couple of months and offered me a full-time position.

Whenever I go into posting on social media, I always try to think of the people who might not know they're interested in space or might not know they're interested in science or whatever I'm talking about. So it gets a little hard. Like I said, I don't have a science background. So whenever I ask the engineers to tell me something, I'm like, "imagine you're telling it to like a third grader. Tell that to me and I can tell other people." Because I'm like, technically I don't understand it. So I need you to be able to bring it down a little bit so I can help the general public understand it and actually know, like it's like getting their foot wet to see if they're interested in it. And if it's something that's very exciting and interesting, then we can pull them in to teach them a little bit more about things.

It's hard to be able to tell people about the things we're doing without using the jargon sometimes. So like sometimes I have to be able to teach people about the jargon so that I can use it in further language. But if I just take what the scientist gives me and put it out there, it's not going to hit the audience we want it to hit. It might hit other scientists or astronomers who are in a similar field as them, but it might not hit the people who we're trying to reach, which are people who might not know about the different science that we're doing. So I need to be able to bring it down to like the ABCs of astrophysics and Roman. So then once they're hooked in, then we can bring out the big guns like exozodiacal dust.

AT: Well, because I would imagine a lot of people who, as you mentioned, like you don't have a science background. So I'm sure you can relate when people maybe feel intimidated by what the scientists are saying. And so the fact that you're able to make it more accessible in that way is really powerful, I think.

CL: Yeah, like I never saw NASA as an avenue for me. Like I never thought, it could be there, but it was just never something that crossed my mind because I always wanted to do like news and communication side. And I never really thought of that as NASA. But because now that I'm in it, I always try to help other interns or just people who I run into at different conferences I go to. And they're like, "oh, you're kind of similar background to me. And we're kind of like the same person." I'm like, "yeah, and you can come work at NASA." I never thought I would be here. And you can come here too. My resume was pink when I applied, I was in my Elle Woods era. So I'm like, "if I can do that, y'all can come here too." When I first started at as an intern, I had an amazing mentor, Michelle Handleman. She still works here now in the newsroom. And one thing she told me was she's like, "in these meetings, whenever you hear like an acronym or

something you don't know, write it down. And then afterwards, you can ask the scientists or look it up." So I had a journal just full of all the different acronyms and words I didn't know. And I think one thing I really love about working at Goddard is how open everyone is to answering questions because I'm someone that will ask a million and three questions if I don't know something. And every single scientist and engineer I ran into are so amazing to just like take the time and sit with me to actually teach me about it so then I can help teach others. I'm just not the typical person you think will be working at NASA, especially someone who didn't really like, I always looked at the stars, but I never really thought about them that much. But now that I'm here, I didn't realize how much I love astrophysics and just NASA until I got here. I opened my eyes knowing that this was a door that I even didn't even think was possible. I didn't even know it was there, I uncovered it and I'm so glad that I was able to go through it because now I found this new love for something that I didn't know I had.

AT: So you're exactly the kind of person that Nancy Grace Roman would want at NASA.

CL: Yeah, I hope so. She passed away in 2018. I was an intern during that time. When we first did the renaming, I did not know who Dr. Nancy Grace Roman was when we were still WFIRST. I'm like, "oh, we're going to change the name. I kind of like WFIRST, it's like winners first, I like the acronym." But then when I started doing research on Dr. Nancy Grace Roman, I'm like, "why don't people know about her?" Like sometimes I get teary-eyed when I'm talking about her because she's just this amazing woman that did so much for science and space and NASA. And a lot of people don't know about her. So I try to make it my mission to teach people about Dr. Nancy Grace Roman when I'm talking about the telescope as well, because we would not have that without her. So she inspired me as well to know that she went through so much and persevered and was able to get to where she was. Some people I talk to that knew her, they were like, "yeah, a lot of people didn't like her because she was very" like, I don't want to use the term aggressive, but that's kind of how they would describe her. But I'm like, she had to be, to be in this field, to be taken seriously. Like she couldn't be like how I am now, you know, like I'm silly and goofy. And I'm silly and goofy because women like her were able to put their foot down and allow someone who's silly and goofy to come in and be like my natural self in there. So she had to be someone who was strong-willed. But I also heard like a lot of good things. It's back and forth, but I love her.

AT: So one of your projects is around the idea that when you started on the team, a lot of people said that your symbol looked like the alien from Space Invaders. So where did that lead?

CL: Like I said, I don't have a science background, so I always try to find other connections with things. And everyone would always bring up that our logo, which is the 18 Roman detectors, are kind of in this weird shape, look like the alien in Space Invaders. And I'm like, "why don't we play into that? Everyone keeps saying that. Why don't we play into that? I'll actually create a game that people can play, kind of bouncing off that idea." And at first they were like, "haha yeah, let's create a game." And I'm like, "can I actually do research for it?" And they were like, "yeah." And I was like, "okay." And I started doing research. And I pitched it to them. And they're like, "oh, we

love this.” I’m like, “oh my god, can we make it?” And then they were like, yeah. And I’m like, “oh my gosh, I have to figure out how to make this game.” So we found a developer that actually created the Hubble 30th birthday game, like what Hubble saw on your birthday. And I reached out to him. And I told him about this idea. And he loved it. He’s like, “oh my god, I would love to do like an 8-bit style video game, kind of playing homage to the retro style while also talking about what the telescope is going to bring us through the future.”

So it took about a year to go from an idea to actually the demos, to putting it together. And then we released it, June or July 2022, I believe. So it’s the Roman Space Observer Game where you have one minute to try to capture as many astronomical objects as possible as the Roman detectors. And it’s a lot of fun. If you ever play the game, the music, I can’t listen to it anymore, but I love it so much. We actually put it into a mini arcade cabinet that we bring to different conferences with us. So it’s actually a mini arcade cabinet that goes on our table, looks just like the game and people can play it. It brings in a lot of parents too, because parents are like, “I remember playing that game when I was young.” And then they bring their kids over and they’re teaching them like, “oh, this reminds me of Space Invaders.” I’m like, “well it’s Roman Space Observer. And while they’re playing it, they’re trapped for a minute. So I’m like, “you’re trapped here to play for a minute while I tell you about Roman.”

We’re actually going to be debuting in a couple of weeks a life-size version in our visitor center. So we made a life-size arcade cabinet of the Roman space observer game, where now people can come to the visitor center and play it. But I just thought it was a fun way to teach people about the different astronomical objects Roman will be able to find in a way that could reach a different audience. So instead of asking people to meet us where we are, I like to meet people where they are. So let’s meet gamers and people who might not know they’re interested in science in an area that they are in currently instead of hoping that they’ll come to us. So I wanted to go to them. And that’s what we did with the game. And it went while, we streamed on Twitch, we have a black hole version that comes out during Black Hole Week or Black Hole Friday, where you have to capture more black holes and all that fun stuff. But yeah, it’s really fun. I love playing video games myself. I stream and play almost every day. I’ve been playing games at first since I was young. I have my PlayStation 1 with me still. And I just loved that I was able to meld some new love that I have, which was NASA and Roman and an old love and create something that people can enjoy.

AT: I think we’re also getting into STEAM in this context where a lot of people know STEM is science, technology, engineering, and math. And STEAM is when you add art to that, which a lot of people don’t necessarily associate that type of creativity with science. And you’re clearly a very creative person.

CL: Yeah, I’m 100%, I always try to tell people I’m trying to put the A in STEAM, like they don’t want to put it in there. They want to keep it STEM. But I’m like, without science communicators, without people like me who do social media and outreach, the public wouldn’t know this. And we are an agency that’s funded by the public, we are for them. And we need to tell them all the amazing work we’re doing. And I can help us do that in fun and creative ways, instead of just putting out a document with a bunch of jargon on there being like, this, this, this. Where it’s like,

“hey, play this game. And this game is based off a telescope that we're currently building and launching in 2027 that's going to change our perspective of the universe.”

AT: The Roman Space Observer video game is available to play online at roman.gsfc.nasa.gov/game. Join us next time on the Infinite Women podcast. And remember, well behaved women rarely make history.