Blueshift - May 2010

In the AstroZone

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Sara Mitchell: Welcome to the May 20, 2010, episode of Blueshift, brought to you from NASA's Goddard Space Flight Center. I'm Sara Mitchell.

Most of us here at Blueshift Central perform various duties associated with Education and Public Outreach, or EPO for short. When we say - as we do every show - that we bring astrophysics to you, we really mean it.

To that end, we'll bring posters, family activities, and ourselves just about anywhere we can share the astrophysics research done here at Goddard. And we aren't alone, because our counterparts elsewhere in NASA and in other astronomy-interested groups are just as passionate about the science they promote as we are.

For more, here's Francis Reddy from... the Amazon?!

[SFX: Amazonian birds, water sounds]

Francis: I'm standing at the river's edge, a place where the Amazon has flooded the adjacent forest. Inches from my feet, several freshwater stingrays hunt for food in this newly expanded habitat.

[SFX: crowd sounds]

But I'm not viewing this scene in the Amazon. I'm in Amazonia, an exhibit at the National Zoo in Washington, DC. I'm here as a volunteer for AstroZone on a bitter cold January 2nd. AstroZone is a four-hour open house where families, teachers and kids can meet scientists and enjoy hands-on astronomy activities. The humid air inside the exhibit is a welcome change...

Girl No. 1: We walked all the way here. It's flippin' cold outside!

Girl No. 2: Is my red nose? Is my nose red?

Francis: Right off the bat, I met a celebrity of both the astronomy and podcasting worlds.

Pamela Gay: Hi, my name is Dr. Pamela Gay, and I'm on the faculty of Southern Illinois University, Edwardsville, and I'm also the Executive Director of Astrosphere New Media, which produces Astronomy Cast.

Francis: What is AstroZone?

Pamela: AstroZone is a twice yearly public outreach event. It's sponsored, mostly through federal grant money, to help us get the results of science out to the public. Twice a year we get all the astronomers who can together to go to American Astronomical Society meetings. These are our biggest two professional meetings. And many of us are interested in communicating what we do out to the public. And since we're all in one place, it's a perfect opportunity to get together and share our results, with one

another, and, through AstroZone, with anyone else who's willing to come out and listen. And this year we're actually at the National Zoo, which is an amazing backdrop.

Francis: Tell me about Astronomy Cast.

I work on the Astronomy Cast podcast with Fraser Cain, who is producer of Universe Today. Each week we put out a facts-based journey through the Universe. We take on topics as diverse as why Pluto isn't a planet to how the Universe is going to end in a few trillion years, or many trillion years as the case may be. Each show is about 30 minutes. They're available online, either through our website astronomycast.com or through iTunes.

Francis: What about astronomy most grabs you?

One of the most amazing things about astronomy is how we can actually understand it. For all the amazing things that we're able to understand there's even more that we can't understand. And so every day is a chance to learn something that's just been discovered, to gain a new bit of insight into this crazy and amazing universe. The coolest thing is the stuff that we're finding that we never imagined. Science fiction has nothing on the actual Universe. But it's just this combination of being able to understand so much and yet understand so little all at the same time. It's really amazing.

Francis: Now, on to the Thirty Meter Telescope exhibit...

Charles Blue: I'm Charles Blue. I'm with the 30 meter telescope project headquartered in Pasadena, CA. The 30 meter telescope is going to be the world's most capable and advanced optical infrared telescope. The plan is to build it on Mauna Kea in Hawaii, and we hope to achieve first light in 2018.

Francis: But how can it compete with space telescopes when it's looking through Earth's mucky atmosphere?

Charles: It will be the first telescope to have something called adaptive optics actually built in during construction. And what adaptive optics does is it's able to measure the blurring, the fluctuations of Earth's atmosphere, and by measuring that it can correct for the blurring of Earth's atmosphere, so in a sense it can render an image as sharply as if the telescope were in space.

Francis: How does it compare with the largest telescopes in the world, such as the Keck telescopes in Hawaii?

Charles: 30 meters is on the order of about 100 feet, to give you some sense of scale. So it's very large. I'd say the largest telescopes now are about 10 meters across. A 30 meter telescope will be three times that in diameter, giving it nine times the collecting area of todays ground-based telescopes.

Francis: What do you hope to see with it?

Charles: We should be able to see the very very faint objects that are in the distant universe, so at the era of first light, looking at some of the first stars and first galaxies. One thing we hope to be able to do is actually take a look at some of the first galaxies. See are they rotating? How are they behaving? And track that, and sort of do a picture book of the history of the Universe to see what were the early

galaxies like, and how did they evolve to become like today's Milky Way galaxy is as we see it.

Francis: From Earth to Earth orbit. I'm now at the exhibit for NASA's Chandra X-ray Observatory.

Dillon Foight: My name is Dillon Foight. I'm a mission planner for the Chandra space telescope working at the Harvard-Smithsonian Astrophysical Observatory. Chandra is one of NASA's four great observatories. Among the likes of Hubble, Compton, and Spitzer, which are the other three. We were launched in 1999 and since then have been observing things in X-rays, which is what separates Chandra from things like Hubble, which observes in the visible. We observe in the X-ray band, which is where you see things that are very energetic and very hot out in the Universe, so you get very exotic and exciting objects. It's a great tool. It's the most sensitive tool in the X-ray that we've ever had.

Francis: What kinds of objects?

Dillon: We look at a lot of supernova remnants. Those are very popular. Galaxies. Black holes. Anywhere where you get very energetic processes, such as the accretion disk around a black hole or where you have very hot gas, which has been discovered by Chandra in between galaxies.

Francis: X-rays go through things. How do you see the universe in X rays?

Dillon: It's actually a very good point. The mirrors of Chandra aren't what you would traditionally think of as a traditional mirror like a traditional telescope or the one in your bathroom. Chandra's mirrors are actually barrel shaped. They're concentric circles pointing toward whatever object you're looking at. And this is because, like you said, X-rays pass through things, but even more than that they're very easily absorbed by things, which is why we need telescopes in space. We can observe them on earth, because our atmosphere absorbs them. But X-rays are only reflected at very low grazing angles, so basically what you have is an X-ray coming in almost parallel to the lens and then just getting grazed ever so slightly and getting turned into the focal plane of the telescope, which is one of the reasons Chandra is a very long telescope. It needs a very long distance for the light to be focused onto the image.

Francis: What are your favorite targets for Chandra?

Dillion: I love supernovae, and supernova remnants, because you can't really get any cooler than an exploding star.

Francis: And really, who can argue with that?

There was plenty more to see at January's AstroZone, so be sure to check it out when it comes to your area. The next event is in Miami, Florida, on May 22. So from noon to 4 p.m. at the Miami Dade Main Library, perhaps we'll see you there!

Sara: To learn more about AstroZone and our other outreach activities, visit our website at: universe.nasa.gov/blueshift. You can also follow us on Twitter at @NASAblueshift.

Tune in next month for another astronomical adventure. I'm Sara Mitchell, bringing the Universe closer to you with Blueshift.

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