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Sara Mitchell: Welcome to Blueshift, brought to you from NASA's Goddard Space Flight Center. I'm Sara Mitchell.

As you may know from the interviews we posted recently on our website, Maggie Masetti and I just came back from a visit to the set of "The Big Bang Theory." In addition to talking to the propmaster and set designer, we also interviewed Dr. David Saltzberg, the show's science consultant. We've been in touch with him since our last visit and it's through him that many of our NASA items have ended up in the set designer's hands. During this visit we finally caught up to him with a microphone, to chat about how he makes sure good science gets on "The Big Bang Theory."

First things first, we wanted to ask about David's background and what he studies.

David: I'm David Saltzberg, and I am a particle physicist. I was an undergraduate at Princeton University where I worked at the Princeton Cyclotron, and a graduate student at the University of Chicago, where I worked at FermiLab. And now I'm a particle physicist at UCLA and I work at the Large Hadron Collider, so as time has gone on, I've gone to higher and higher energies.

Sara: We'd heard that David has had a number of adventures in astrophysics, so we asked him to tell us more about the weirdest places that science has taken him.

David: Probably the most arduous was working in the salt mines. Where everything is salt, everything you touch is salt, all your equipment is covered with salt, if you wipe your eyes, your hands are covered with salt. So now I know why they call hard work, working in a salt mine! I've been to Antarctica three times to launch stratospheric balloons to look for high-energy neutrinos striking the Antarctic ice. One of those trips was actually during the season and they were taping. And the producers and writers sent me script to review in Antarctica and I would send them back from Antarctica. Chuck Lorre [executive producer and co-creator] said he thought they had the only sitcom that was sending their shows to Antarctica for vetting!

Sara: When Maggie and I started talking to David, we realized that we all had a connection - all three of us had been summer interns here at NASA Goddard!

David: Oh yes! I was a summer student. When I was working at the Princeton Cyclotron, it was to measure nuclear physics cross-sections for producing gamma-rays that were important for understanding solar flares. It was run by Carol Crannell. I spent a summer at Goddard as well. That was a really great time. And again, that was balloons, it was a really... I learned a lot from everyone there.

Sara: Then we got down to business and asked him what he does for the show.

David: So, I am the science consultant for "The Big Bang Theory." A few tasks that they give me, I look at the scripts and make sure the science they put in is correct and suggest small changes otherwise. The white boards - the material on the white boards is based off, whenever I can, off the science in the show. So for example for tonight, with Stephen Hawking appearing, if you look at the white boards, they are related to the singularity theorems of the late 1960s and early 1970s.

Sara: Since the science that ends up on the show can be really diverse, we wondered where he gets his

ideas, and how much of it is from his own area of research.

David: Well, science is huge and so it's not just my own stuff. You sometimes get my opinions about things, but science is quite broad. When topological insulators were hot, and still are actually, which is quite far afield from my field of particle physics, we still managed to have Sheldon referring to them.

Sara: Clearly, sometimes David might need a little help, when the science ventures outside of his expertise. So we asked him - where does he turn?

David: I can handle the physical sciences for the most part. And astronomy, which, is a little farther afield, for example, I needed to know the pronunciation of some stars, and Phil Plait, the so-called Bad Astronomer, helped us out with that. So I rely on my astronomer friends and sometimes when it's a quite technical piece on string theory, I talk to my string theory friends. But in life sciences, I'm quite naive so for that I have friends, well, in neuroscience. One at the Salk Institute I've consulted. And the other is a friend of mine who is a physicist who works at understanding the physics of the brain. He's helped me out a lot too. And what's really terrific is that Mayim Bialik, who plays Amy, has a PhD in neuroscience. So she'll stop anything wrong from ever happening.

Sara: While the show's writers aren't scientists themselves, David clearly has a great working relationship with them and they all work hard to keep the science accurate.

David: The science writers never let anything wrong go on the show. They're very adamant. They don't want anyone rolling their eyes or groaning or anything. They always find a way. For example, when they were working on quantum brain dynamic theory, I pointed out that it wasn't really a great topic to them be working on, but I understood it, because they needed something that Sheldon and Leonard's mother would have in common. But then they just changed it to they were disproving quantum brain dynamic theory. Writers always have a way, when you point out what the problem is, to fix it.

Sara: Since we'd just finished talking to the folks who put together the show's amazing sets and props, we also wanted to ask David if he had any influence on making the science sets so impressively accurate.

David: The set decorator came and visited UCLA and saw a bunch of labs, and even graduate student apartments, before designing the pilot. And after. So they used photographs that they took. For example, I think Howard's lab looks terrific. You'll notice things like vacuum flanges covered with aluminum foil, which is quite realistic. And you'll notice things like Kimwipes everywhere. It's the little things.

Sara: We know that not many shows have a science consultant, and sometimes it really shows. We asked David if he could think of any other Hollywood productions that have had good science.

David: One of my favorites is "Real Genius" from 1984. And it takes place at CalTech and there's a lot of laser science in it. And I watched it, for some reason recently, and thought, "Wow, they must have had a terrific science consultant!" And I found out that that was Martin Gundersen at USC, who is a plasma and laser physicist. So I sent him a fan letter! Some 25 years after the fact, and I invited him to the show. He came as what they call "Geek of the Week," my guest to the show. And that week, we had a tribute to "Real Genius." The white boards were the same as the white boards in "Real Genius." And he recognized that.

Sara: When we visited the set a couple of years ago, we'd actually seen those tribute white boards! During our latest visit, we saw the episode where Sheldon meets Stephen Hawking. Unfortunately, the segment

with Dr. Hawking had been pre-taped, so we didn't get to meet him, but we were curious about how they'd snagged such a high profile scientist for the show, and how David had prepared for the episode.

David: I don't know where the idea came from, I know the writers have been big fans of his for a long time. I went back and tried to reread the Singularity Theorems. Emphasis on "tried to."

Sara: If you go back and listen to our interview with the show's co-creator, Bill Prady, you'll know that one of the things we're really interested in about "The Big Bang Theory" is how it balances being really appealing and accurate for scientific fans but also being enjoyable for people who don't really understand the science.

David: I suspect even if you don't know science, you can sort of tell what's right and what's wrong or I hope. Or if they can, then at least you know it's right. The writers also told me the science dialogue is a bit like, if you watched "I Love Lucy" and don't know Spanish, you'd still know when Ricky Ricardo is angry. Hopefully though, even if the words are not recognizable, people who are interested might Google dark matter, for example, and find out what it's about.

Sara: We were thrilled to finally meet Dr. Saltzberg in person, to get a behind-the-scenes look at how "The Big Bang Theory" keeps science fresh, real, and accurate. If you'd like to read more about our visit, including additional questions we asked David and our interviews with the show's set designer and propmaster, check our our blog at universe.nasa.gov/Blueshift. You can also find us on Twitter and Facebook as NASABlueshift, that's all one word! We'd love to answer your questions and find out what you'd like to know about the astrophysics work that's going on here at Goddard.

I'm Sara Mitchell, bringing the Universe closer to you with Blueshift.