WHAT'S IT LIKE TO BE AN Astrophysicist?

Thanks for taking time for this interview! Please tell our readers a little bit about yourself.

My name is Christopher Moore and I am an astrophysicist. I am currently in graduate school pursuing my Ph. D. in astrophysics at the University of Colorado in Boulder. Graduate school has a lot of class work, teaching responsibilities and big tests.

I have always been interested in how things work and the beauty of stars in the night sky, so physics and astronomy were great choices for me to study in college. Hard work, dedication and a strong curiosity have given me the opportunity to do what I love. Part of my Ph. D. involves a very small satellite (called a CubeSat), the Miniature X-ray Solar Spectrometer (MinXSS, please check out our website! http://lasp.colorado.edu/home/minxss/)

Please tell our readers a little bit about what you do.

I am the Instrument Scientist for MinXSS. In labs here on Earth, I test the performance of the detectors for our satellite and compare their actual performance to a predicted performance based on physical models. It is important to understand how efficiently the detectors can count X-rays and determine each X-ray's energy before we launch MinXSS into space to observe the Sun, because we do not exactly know the amount and energy of the X-rays created from the Sun. So, I shine a known amount of X-rays (of different energies, like a rainbow) on the detector and see how the detector responds. MinXSS will measure X-rays from the Sun after it is launched into space. X-rays are very energetic versions of visible light, and like a rainbow, a bunch of X-rays can have different colors, or energies. The outer atmosphere of the Sun, called the corona, is around 1 million degrees Kelvin (around 2 million degrees Fahrenheit) and this is much hotter than the surface of the Sun, which is near 6,000 degrees Kelvin (10,000 degrees Fahrenheit). The outer atmosphere of the Sun is so hot that it makes X-rays. Thus, I also use physical models to predict the 'rainbow' of X-rays created by the Sun to estimate what our CubeSat will observe.

Why is this work important/how does it apply to every day life for most people?

A big mystery is exactly how the Sun's atmosphere is hotter than its surface. Explosive events like solar flares, create a lot of X-rays and charged particles in a few minutes. We currently do not know exactly how many and the energies of X-rays are released by solar flares. The particles created by solar flares and Coronal Mass Ejections (CMEs, large amounts of matter ejected from the atmosphere of the Sun) can disrupt satellites, harm people onboard polar airplane flights, cause harm to future astronauts on deep space missions and create aurora here on Earth. We have to continue to study these 'solar storms' to better understand them and to predict when they will occur in the future.

What is the coolest thing about your job?

One of coolest parts of my job/career is having fun doing experiments and watching predictions come true. As a student, I get to work on a satellite that is currently in space (the first MinXSS CubeSat launched from the NASA Kennedy Space Center in December 2015), and I think that is really cool. The fact that a piece of equipment that I worked on is in space is amazing. Another unique aspect is the opportunities to travel across the United States for the MinXSS CubeSat and other career opportunities. I have been to Florida, Hawaii, California and many other places, and it is all for science! In my travels, I get to meet people of different backgrounds and cultures and these have been great experiences.

What is a typical day like for you?

Designing, building, testing and operating a satellite takes a team. There have been more than 40 graduate students that have worked on MinXSS under the guidance of professionals and professors. So it depends on the day and what is needed for the MinXSS CubeSat at that time. Normally, I spend time in labs with X-ray sources or special labs called clean rooms were it is necessary to dress in a special suit.

What kind of training does it take to do your job?

To succeed in physics at the graduate school level, it is important to be comfortable with math, be able to solve problems on your own and communicate your ideas effectively. Computer programming skills are becoming more and more important, too. Also, having the ability to understand the basic concepts of a complex idea and then apply it in a situation is necessary. Some of this training happens in school. Other parts must be developed through experience. If you want to study, physics, math, engineering and/or astronomy, learn as much as you can in grade school and high school.

When/How did you know you wanted to be an astrophysicists?

I was always curious about the world around me and liked to build things. As a kid growing up in the Chicagoland area, I did not see many stars at night because of the bright city lights. I knew that the stars were there but did not really know how many were in the sky. One day, when I was about 12 years old, I was on a vacation with my family. We were far from the city lights. When I looked up at the night sky and saw vastly more stars than I did back home, this astonished me. From that point on I was fascinated with space and stars.

What are some challenges you face in your work?

Working on satellites, detectors and the physics of stars requires a wide range of knowledge. Anything can go wrong or break at any time. CubeSats have relatively smaller teams than the big satellite missions, so more workload falls upon each member. Skills in physics, math, computer programing, chemistry and engineering are critical. Learning so much, so fast and then applying it can be a challenge, but I love what I do, so I embrace it.

What do you like to do when you are not working?

I like to hang out with friends, play basketball, flag football, run on the track, lift weights, explore the cities that I visit and make memories that will last forever. I also take time out to help inspire the next generation of scientists and engineers by going to schools and speaking about my experiences and science.

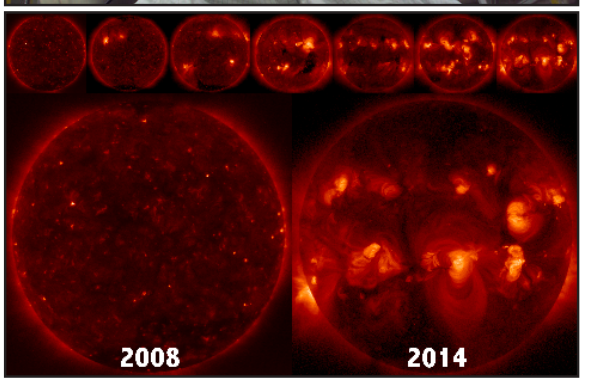

Image of the Sun in X-rays taken by the Hinode X-ray Telescope (XRT), run by the Harvard Smithsonian Astrophysical Observatory (SAO) and the Japanese Aerospace Exploration Agency (JAXA)