

INTERVIEWS WITH A VATICAN ASTRONOMER, A NASA ENGINEER, AND A SCIENCE AUTHOR

By Rachael Yunis, Director of Apologia Science

I first “met” Brother Guy Consolmagno, Director of the Vatican Observatory, through his writing. The book that got me hooked was, *Way to the Dwelling of the Light: How Physics Illuminates Creation*.

The following excerpts from the book’s foreword can easily illuminate the reasons why I used it in my personal homeschool science planning along with Apologia’s *Exploring Creation with Physics*:

A lot of people talk about the “split” between science and religion, as if no scientist could believe in God and no religious person show an interest in Einstein. That’s silly, of course. You obviously don’t have to give up God to study His creation: most of the great scientists in history, including Copernicus, Kepler, Newton, James Clerk Maxwell, Marconi, and Einstein himself, called themselves believers.

Getting to know How God Did It ought to be a wonderful way of celebrating God’s grandeur. It’s traditionally been a form of worship that western religion had always embraced, until the late 19th century...when this canard of a split between science and religion took hold. Science is too important to our lives to ignore. It’s too much fun to leave to the atheists. And it’s too Good not to be used as a way of getting to know the Lord Who Created Heaven and Earth; Who can be found, with His first creation, at home in the Dwelling of Light.



“My job is simply to do good science,” Guy Consolmagno in *Science* magazine.
Photo Credit: Yunis

Being a scientist, homeschooling mom of three boys, and the wife of a NASA engineer (see interview with Sam Yunis) made it easy for me to fall in love with any material I could use to grow my faith *and* my scientific knowledge.



On the streets of Assisi with my husband, Brother Guy, my oldest son, and my Mom.



Contemplating the night sky on the balcony of Galileo's Villa.



The base for Secchi's telescopes. It was here that he began to explore the chemical makeup of planets.

Over the next few years, my family and I continued to read and enjoy Brother Guy's resources. We even had the opportunity to hear him speak when he came to our neck of the woods. His materials helped influence my oldest son, now a junior at Virginia Tech, to study astrophysics, with minors in math and computer science.

We recently had the opportunity to visit Italy and personally meet with Brother Guy and some other incredible scholars (see interview with Christopher Graney) at the Vatican Observatories. We toured historical astronomy sites, such as Galileo's home and the Church of Saint Ignatius where we saw where Angelo Secchi set up his telescopes to view the night sky.

It was an incredible time. We were invited into Brother Guy's meteorite lab and learned more about these objects from the universe. Most importantly, as we grew in knowledge and understanding, we grew in faith. I had the chance to ask Brother Guy some interview questions.

What do you do and why do you do it?

What I do is direct the Vatican Observatory; do scientific research on the origin of meteorites, asteroids, and other small bodies in the solar system; and write popular articles and public talks as a way to reach out to the general public about what we do at the Vatican Observatory, including the bigger issues of faith and science.

Why do I do it? That's actually a profound question. One answer is direct: I've been asked, both indirectly and directly, to do this work by the Pope. When I was assigned to be an astronomer at the Vatican Observatory back in 1993, I was obeying my Jesuit superiors who were themselves responding to continual requests from Popes going back to Pope Leo XIII in 1891. When I was made director of the Observatory in 2015, it was at the direct appointment of Pope Francis himself. In both cases, you could say that the reason for the work was, in the words of Pope Leo, "to show the world that the Church supports good science."

But the other side of the question is more subtle: what gets me up in the



Holding a large and heavy meteorite from Brother Guy's lab.

morning and makes me excited to do the research? And that is simply, the joy that I experience in being close to creation, the fun that I have seeing how all the little bits that I discover fit together with each other. That sense of joy reminds me strongly of the kind of joy that sometimes I can experience when I pray. I identify it as recognizing the presence of God, both in my prayer and as the Creator of the universe that I am studying. So, we do science literally as an act of worship.

What's the coolest thing you've ever seen, contemplated, or experienced in science?

Most of science is not any one great breakthrough but a steady stream of small but fun discoveries. The most recent one I can think of is when I was puzzling, for more than a year, about how the results from the NASA mission to asteroid Vesta could be fit into my long-standing theories about how asteroid Vesta evolved. And there finally came a moment when I realized, my models were wrong. My theory was wrong. I had to come up with a completely new way of looking at the problem. And that was a thrilling, liberating experience.

How does your knowledge of both science and faith affect how you look at the universe?

I am reminded of stories I have read about the children of celebrities, and what happens when they realize that their moms or dads are famous. Every small child thinks their daddy is a rock star; it can come as a shock if it happens that their daddy really is a rock star, with a dozen albums and millions of fans around the world. That's our experience with God the Creator. We know God first as Father, "Abba" — "Daddy", in other words. We know God intimately as someone who loves us. And then we discover that this same God who is so close to us, is also the God who makes black holes and supernovae, and the experience is simply stunning.

What would you have young people contemplate?

Ask yourself exactly these same questions that you have asked me. What are you doing, and why are you doing it? Where do you find joy — which is to say, where does God reveal himself to you? This is a good hint of the sort of work, the vocation, that you should be pursuing. We can't all be astronomers but we can all have our own unique calling. We find that calling by discovering the places where we most often find God: the work that fills us with enthusiasm, the setting that fills us with joy. You have to try out a lot of different possible places and works before you can discover the one that fits your call.

Then, ask yourself, what's the coolest thing you've ever seen? Keep an eye out for it; you don't want to miss it! Sometimes, that experience is recognizing that you had made a mistake. Don't be afraid of mistakes;



Photo: NASA.

recognizing and correcting them can lead to some of the most delightful experiences in life.

And finally, ask yourself how your faith affects the way you view your own universe. If you see the world no differently than someone who doesn't know God, then what's the point of your faith? Your faith is the salt of your life; it should flavor everything you experience, and entice you to want to experience life even more deeply.

LOOKING OUT INTO THE UNIVERSE WITH A NASA ENGINEER

Dr. Sam Yunis has worked on space structure for over 20 years as a NASA engineer, specializing in spacecraft, rocket vibrations, and acoustics. During his career, he has been a part of over 50 spacecraft and 10 different launch vehicles. He had key roles in the analysis and testing of the Cassini mission to Saturn, the Mars Reconnaissance Orbiter, the Pluto New Horizons mission, the STEREO mission to study the sun, the International Space Station, and the Ares 1-X launch vehicle. His favorite memory is being shaken in a centrifuge to better understand human performance during launch. He is currently working with commercial partners to achieve a new US manned capability. I asked Sam what he does at NASA and why:

In general, I work on rocket vibrations to make sure that rockets are designed to survive the controlled explosion that is a rocket launch. I started doing this because I wanted to be on forefront of technology, advancing things rather than just using things. I was very young and naïve when I thought that, but it turned out to be a fantastic approach to a career.

What's the coolest thing you've ever seen, contemplated, or experienced in science?

This will sound cliché, but every day I am wowed by another advancement in science. How can I compare? When I was 10, someone told me that we only use 8% of our brains, and I spent hours trying to activate the other 92% - maybe I could do telekinesis. When I was 20, I pondered how Isaac Newton took millennia of dropping apples and saw science. When I was 30, I saw Hubble Space Telescope pictures of the vast universe. When I was 40, I heard that scientists were making molecular strands of carbon into the mythical material unobtainium. When I was 50, I saw artificial intelligence that could outthink humans. It's all cool.

What would you have young people contemplate?

As a homeschooling dad and speaker, and a mentor at the office, I continuously ask young people to understand that the world is not static, but rapidly changing under human development. If you don't understand that, listen to your parents talk about what it was like when they grew up. Plan to live in a future world, not today's. Take whatever it is you like to do and figure out how you are going to do that in an ever-increasingly automated world. If you want to push the boundaries, don't look at today's boundaries, but the boundaries of the future. If you seek truth and guidance, then it is time to look in all directions.

UNDERSTANDING THE HISTORY OF ASTRONOMY

Mention the name Galileo and most people will think of a telescope. The next thought that typically comes to mind is that historic opponents of the heliocentric (sun at the center) system were mostly motivated by religious reasons.

Author Christopher Graney takes an in-depth historical look at the authoritative science at the time of Galileo, using arguments from noted scientists, such as Tycho Brahe and Giovanni Battista Riccioli, to discuss the *scientific* arguments made against the ideas put forth by Copernicus and Galileo. In *Setting Aside All Authority*, recommended for a high school student's summer reading list, Graney takes you back in time to view the universe as scientists knew it in the time of Copernicus and Galileo. I asked Christopher Graney what he did when he wasn't writing books:

I do science (and particularly astronomy). Doing science includes various things: teaching and outreach (both in a classroom and at a telescope), research and publishing papers and books, working for Brother Guy Consolmagno and the Vatican Observatory, operating a small observatory, being president of a Sigma Xi chapter and bringing speakers to my community, and so forth.

What's the coolest thing you've ever seen, contemplated, or experienced in science?

Hard to say, but when I was young I saw an amazing sun pillar that still comes to mind, 35+ years later, when you ask me this question. If we interpret "thing" more broadly, then I would have to say that learning about the anti-Copernicans of the early 17th century (people such as Riccioli), and learning how they are so different than we think of them as being, has been extremely cool. And it is especially cool when I am reading one of their works and realizing I may be the first person in centuries to read this work thoroughly and seriously, and maybe the first person in centuries to read it at all!

What would you have young people contemplate?

Contemplate the actual universe. Everyone knows what Saturn is, right? The planet with the rings, right? But very few people can find Saturn with their own two eyes. Science for most people is too much a matter of things they read or see on a page or screen, and too much a matter of things they take on authority, and not enough a matter of things they do and know for themselves.