

## UFOs, science literacy and what we can learn from Tibetan monks and nuns: A Q&A with Chris Impey

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When it comes to bringing the otherworldly to this world, few do it as well as **Chris Impey**, Distinguished Professor of astronomy at Steward Observatory. Through massive open online courses, Impey has brought the wonders of the cosmos to tens of thousands across the world. He has written numerous popular science books and textbooks, even a sci-fi novel, and has traveled to India as a visiting scholar many times over the years to teach astronomy and cosmology to Tibetan monks and nuns.

Impey boldly goes where not many professional astronomy scholars dare to go. In [a recent article](#) <sup>[1]</sup> he wrote for *The Conversation*, he discusses UFO sightings and ideas about alien civilizations.

Lo Que Pasa spoke with Impey – who just won the American Astronomical Association's 2021 **Education Prize** <sup>[2]</sup> in recognition of his accomplishments in bringing the universe "to the people" – about the role of science in society, public trust in science and the resurging interest in conspiracy theories such as QAnon.

### **You are very active in science education and science literacy. What prompted you to go in that direction?**

I went through the education system in the U.K., where you don't learn how to teach in grad school. I had to learn how to teach from the ground up. My first realization was that teaching is not as easy as people seem to make it. One of the first things I realized – and it's still very true, unfortunately – was that very few professors, especially in the sciences, where we're supposed to be data-driven and evidence-based, use that approach in their teaching. A lot of research exists on how people learn, and there also is evidence-based pedagogy, which tells us that the mythos of the "brilliant teacher" is really just that – a myth. Many instructors mistakenly believe they can't compete, so why bother. But it's not really about the teacher. It's about the pedagogy and the tools you use and how to engage students in their own learning. So that was my first motivation, the awareness that, wow, there is this whole research field of education here, and not many people are doing it. I decided I wanted to be on the side of evidence and data and teach that way. For many people, taking a general education science class marks the last time they experience a formal science course. The realization that there is an opportunity and an obligation got me involved in researching science education and science literacy.

### **What do you consider major challenges in science literacy in society?**

There are surveys asking people some pretty basic questions that require knowing things like antibodies kill viruses, or that the Earth goes around the sun and takes a year to do it. And on those questionnaires, the respondents only get 60% of the questions right. So those are some pretty big holes in people's knowledge. These surveys also tell us that public science literacy hasn't changed in 30 years. What is different today, of course, is that we're living in the age of misinformation. Conspiracy theories associated with science and health especially have grown in a very unsettling way. So when you have a lack of basic scientific ways of thinking in the general public, and combine that with accelerating exposure to bad ideas and misinformation that often looks plausible, you have a real problem. And the accelerant in this is, of course, social media. A Pew Research Center study shows that about 80% of people get their science information from the internet. Not from documentaries, or a TV show, not by reading a magazine or an online journal. For scientists, it's a call to arms: Nobody can afford to be in the ivory tower or keep their head in the sand on this one, because it's about climate, it's about vaccine, it's about, you know, really important stuff, along with the rest of science.

### **How can scientists win that battle?**

I think it's hard and takes a multipronged effort. We need trustworthy media outlets that reach large audiences. More scientists should be trying to communicate with the general public. Everyone who can do it should be doing some of it. Whether it's a public talk, or writing for *The Conversation* or something like that. It really doesn't take that much time. If all scientists were doing it, it really would make a difference.

### **You are studying machine learning as a way of identifying science misinformation. Can you tell us more?**

I'm working with graduate students on a project in which we train artificial neural networks to automatically detect scientific misinformation on the internet. We do this by hand-curating articles about climate change and dividing them into two groups: 100 articles are legitimate, and the other 100 promote false information about climate change. These are not scholarly articles, but news articles, blog posts, personal web pages and so on. We use those to train the neural network to distinguish facts from misinformation. And then we unleash it on the online content that is out there and measure how good the algorithm is at spotting good information from bad information. We have had some initial success. In areas like climate change or evolution, the neural net spots facts from fiction with 90% accuracy. Fake science is actually easier to identify than fake news. The two products we want to get out of that are a web browser extension and a smartphone app. The browser extension just sits there in the background, and when you look at a science website, it becomes active and

looks at the content. It compares it to what it has learned and flags it in a color-coded way. If the article in question is true, it will show a green flag. If it's misinformation, it will mark it as red, and it'll point to good sources of information on that topic. The smartphone app works in very similar way, but we included a gaming interface to make it more interactive and fun. Users looking at an article online can swipe left for "fake," right for "real" or up for "I don't know." We want to get people to compete, with the idea of using a crowdsourcing approach to train our neural net.

**You recently wrote an article about UFOs and extraterrestrial life for The Conversation that was read 370,000 times and prompted more than 400 comments. What compelled you to write such a piece now?**

When you give a public talk as an astronomer, there are always people who come up to you after the talk and want to share their experiences about UFOs, and you hope it's just a sighting. Because if it's an abduction, it gets a little twitchy. So I've been used to that for years and years. And I'm really interested on an intellectual level in the culture of ufology and what creates these bubbles of belief that seem to go hand in hand with conspiracy theories about the government keeping secrets, etc., etc. But there also are layers of plausibility there. For example, the Navy has released videos that they can't explain.

**The UFO craze seems "vintage" compared with new conspiracy theories such as QAnon. Do you see parallels?**

There is a strong commonality, and not because of the evidence or lack thereof. There obviously is less evidence for the truly outrageous contentions of QAnon than there is for UFOs, where at least there are things people see in the sky they just can't seem to be able to explain. But what it shares is this hermetic thinking that divides the world into believers and nonbelievers. In both cases, the conspiracy theory is weaved around the subject and becomes a convenient way of just avoiding the fact that there is not sufficient evidence.

**You have taught astronomy and science to an extremely wide range of students, from undergraduates to Tibetan nuns and monks. As the teacher, what have you learned?**

What I learned from them (Tibetan nuns and monks) is what you call the purity of learning. They're the best students I can imagine, and I should say that I've had some really fantastic students here at the University. These nuns and monks combine intense curiosity with lightness, and rigor of thinking with dedication. You can't wear them out. But they wear me out, because we have all-day classes, followed by observations, and then discussions about cosmology late into the night over tea. They're fantastic learners. Buddhism and science get along very well because Buddhism has no theology, no set of things you have to believe to be a Buddhist, and so they're very open to any idea. There is no concept, like infinity, or some huge astronomical number that you could throw at them, where they wouldn't go, like, "Oh, yeah, that makes sense. We have that, too." Or the idea that there might be sentient beings on other worlds that are equal to us or better. They're fine with that, too. These are amazing people who've all had individual hardships, and you would never know by the ease with which they laugh and the way they enjoy their learning, and how they just throw themselves into new subjects.

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#### **Links**

[1] <https://theconversation.com/im-an-astronomer-and-i-think-aliens-may-be-out-there-but-ufo-sightings-arent-persuasive-150498> [2] <https://aas.org/grants-and-prizes/education-prize>