Science AMA Series: I'm Charles Day, the editor-in- chief of Physics Today magazine and a former X-ray astronomer. AMA!

Charles-Day [1] and r/Science AMAs[1]

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Abstract

Hello Reddit! I'm Charles Day and I'm the editor-in- chief of Physics Today. The magazine goes out every month to the 100,000 members of the 10 professional societies that belong to the American Institute of Physics. We cover all of physics and its related sciences at a technical level that all physicists can understand. Physics Today also has a comprehensive website, which I encourage you to visit, and a thriving presence on social media. My main responsibilities as editor-in- chief include identifying topics and authors for our expert-written feature articles, editing news stories, writing a monthly editorial, and managing a team of 10 editors. Before I joined Physics Today I worked as an X-ray astronomer at NASA's Goddard Space Flight Center, where helped to run two satellite observatories, ASCA and RXTE. I also studied the million-degree plasmas that swirl around black holes and neutron stars. I'm happy to answer questions about physics, science journalism, the impact of physics on society and the portrayal of physics in the media. I'll start fielding questions at 1pm EST. AMA!

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CHARLES-DAY R/SCIENCE

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Hello and thank you for doing this AMA. How did you get to work at NASA? What was/is you favorite field of research?

Hafornin

I used to do x-ray astronomy, which is expensive, because x rays don't go through the atmosphere. Detectors must be placed on spacecraft. My PhD was on data from EXOSAT, a European spacecraft. The next one to be launched, Ginga, was Japanese -- so I moved to Japan for a postdoc. The next one after that, ASCA, was a Japan-US collaboration -- so I moved to the US to work at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

As for my favorite field of research, I liked neutrons stars the best. Because they have surfaces (unlike black holes) they were more physically interesting to me.

since the day you took the post of Associate Editor till now, what were the most interesting, biggest letdown, and the funniest things happened to you in Physics Today?

also, what according to you is not so commonly known research but has huge potential to change the world in the next century or so like CRISPR?

CSKING444

Most interesting: Reporting on areas of research that would become big and important later. That was the case for cryoelectron microscopy. My first story was in 1999. Three of the field's pioneers were

awarded last year's Chemistry Nobel. I also covered topological insulators when they first burst on the scene.

Biggest letdown: Not winning any awards! Physics Today is bit too technical to be eligible for some magazine awards. Still, it would be nice to be recognized.

Funniest thing: I tried to get a photo of my Airedale terrier Echo on the cover of the September 2017 issue (one of the articles was about animal locomotion). Unfortunately, the photo's resolution wasn't high enough. The art director nixed it.

Research with the hugest potential to change the world: Artificial intelligence. Right now, AI (notably the flavor known as deep learning) is doing some impressive sorting and data processing tasks. Automatically identifying and counting a country's gas storage tanks from space, for example. What I expect will happen is that the algorithms will become sophisticated enough to tackle deep scientific questions, such as how our brains work.

Is there any corruption in the scientific publishing world?

Cormann42

Yes, unfortunately. Fortunately, Retraction Watch looks out for and reports corruption and other misdeeds. One form of corruption is refereeing rings. A journal editor, who is himself a scientific author, could conspire with his friends, who are also scientific authors, to give each other soft reviews and to cite each other's papers.

Reputable scientific publishers are on the lookout for those tricks. They use software to help them detect it.

Hi Charles! I knew you back in the day when you were an X-ray astronomer. (I am one also.) You'd totally fallen off my radar. Congrats on your great position!

Schmucko

Thanks, Schmucko, for your note. I tried guessing which of my former colleagues would call him or herself "Schmucko," but I failed.

I am always excited to see physicists. So, my question is that was this always your dream job? If so, how do you feel about it now that you have earned it and how different it is from your expectations in your childhood/teenage? Also how good it is in terms of a means of earning?

Good day!

datboihasnain

It might sound odd to say this, but I didn't have a dream job when I was growing up. At high school I liked all my subjects. Physics was the one I was interested in the most -- so I did a bachelor's degree in it. Astrophysics was my favorite flavor of physics, so I did a PhD in it.

I didn't realize that I preferred writing up my research more than doing it until six years after I'd finished my first postdoc!

As for earning, Physics Today's editors typically join the magazine after working at a university or government lab. Salaries are comparable.

Hi, thanks for chatting with Reddit!

What do you think is the future of X-Ray astronomy?

ScathedRuins

In general, the answers to questions in astronomy come down to new detector technologies and how to make the best use of them. For x rays, I'm excited about new high-resolution spectrometers. Because they sample spectra so finely, the spectrometers will need big telescopes to collect enough photons. So one answer: the future lines in high-spectral resolution with big collecting area.

That said, ground-based and space-based surveys continue to yield new insights. I'd like to see a new all-sky survey mission in the x-ray band.

What is something unique and interesting about million-degree plasma (beside the fact that it exists)?

adenovato

Galaxies are typically found in gravitationally bound clusters of galaxies -- a bit like a vast 3D solar system. You might think that most of the luminous mass in galaxy cluster is in the galaxies themselves, in stars etc. But it isn't. Most of the luminous mass is found in the million-degree plasma between the galaxies. What's amazing to me is that the plasma has such low density it would qualify as a vacuum on Earth.

If we were to descover aliens, what would you do?

blacknight78900

Depends on the aliens' tech level, don't you think?

Thanks for having us Charles!

What is, in your opinion, the most exciting recent development in the world of physics research? What is the most concerning? And what do you think will have the biggest impact on how we live?

Hayes231

Most exciting? That's tough. In general, I continue to be impressed by many-body systems -- that is, the electrons in topological insulators, superconductors and other exotic states. Plus, cold atoms in optical lattices and other kinds of trap. The variety and richness of many-body phenomena is exciting enough. But some phenomena are likely to end up in applications, like supersensitive gravity detectors.

Most concerning: I worry that physicists, chemists, engineers etc won't together develop cheap, clean, sustainable sources of energy in time to prevent the direst predictions of climate change.

Biggest impact: Physicists and their collaborators in other disciplines are working to discover new drugs and new therapies. That effort could pay off in a big way.

Hello! I am a graduate student with interests in Earth and planetary sciences. In your experience at

NASA (and throughout your career in general), what are the most efficient ways to connect with researchers at NASA (and other organizations) about research opportunities/fellowships/internships? With so many different people working on many different projects in any number of disciplines, trying to connect with the right people who share your interests often feels overwhelming. Thank you for your time!

jman5001

I recommend attending the annual meetings of the American Geophysical Union and the American Astronomical Society's Division of Planetary Sciences. Read the meetings programs to identify people whose work you find interesting and then email them to set up a time to meet and talk. If that sounds daunting, approach the people at the end of their talks.

One big thing that people misunderstand about networking is it's two-way nature. It's not just about getting people to help you. It's also about helping other people. As a graduate student, you are likely an expert in something. You are in position to help even senior people, because you know more about something than they do.

Astronomy seems well funded. The shift of government spending towards NIH took a lot of research dollars away from fundamental physics, physical-chemistry work (plasma, fusion, laser physics, NASA for example). In the next 3-5years where do you think most research dollars will be spent? Are there any mega-science projects on the radar?

McPherson

I'll have to check. But I'm not sure that boost in NIH funding was at the expense of physics and astronomy. The new mega-science projects, like a successor to the LHC, are likely to be international. NASA already has a mega-project approaching the launch pad: the James Webb Space Telescope.

Some new and exciting fields, such as artificial intelligence and quantum computing, don't seem limited by funding at the moment (I could be wrong). The number of people with expertise could be the limiting factor.

For an awe-inspiring megaproject, what about a telescope on the Moon?