Q&A *with* DR. HSIN CYNTHIA CHIANG

Astrophysics and Cosmology

WHY DID YOU CHOOSE THIS CAREER?

Isidor Isaac Rabi is quoted as saying, "I think physicists are the Peter Pans of the human race. They never grow up and they keep their curiosity." I've been fascinated by how the natural world works for as long as I can remember and being able to carry out these studies in my career now, as an adult, is truly a childhood dream come true.

WHAT TRAINING DID YOU UNDERGO, AND WHERE?

I went to school in the United States. As an undergraduate, I studied at the University of Illinois. I initially majored in both physics and art, but physics turned out to be more fun (and easier). I did my PhD in physics at the California Institute of Technology, followed by a postdoctoral fellowship at Princeton University. I additionally spent one year as a winterover scientist at the South Pole station before accepting my current position at the University of KwaZulu-Natal.

WHAT DOES YOUR JOB ENTAIL?

I'm an astrophysicist with an emphasis on cosmology, which means that I study the universe as a whole: how the universe began, what it's made of, and how it's evolving. To answer these questions, I build specialised telescopes that take pictures of the sky at radio and microwave wavelengths.

DESCRIBE AN AVERAGE DAY?

I often tell people that my job is perfect for people who have short attention spans: Every day is a little different, and that's what makes it so fun. My work encompasses everything from hardware development to data analysis. Some days involve cutting metal and drilling holes and other days involve computer programming. The variety keeps it interesting.

WHAT DO YOU ENJOY MOST?

One of the most wonderful aspects of my job is the adventure component. Our telescopes need to be sited in remote locations, where they can have a clean view of the sky. I've been fortunate to have travelled to Antarctica six times to deploy instruments, and I now work on experiments that are based in the Karoo desert.

WHAT IS THE LEAST ENJOYABLE PART OF YOUR JOB?

As a researcher at a university, much of my job requires administrative work, grant writing, etc. in order to ensure that more junior members in our group have the necessary resources. This auxiliary work unfortunately takes time away from actual research, but it's a very important part of the job.

CAREER HIGHLIGHTS?

Cosmology research is often a struggle: We spend most of our time incrementally improving hardware and software, taking one small step at a time. I wouldn't be in this job if this long journey weren't spectacularly fun, but there is something uniquely special about that final scientific payoff at the end. Words can't describe the feeling of seeing something new that nobody else has ever seen before. And for a brief moment, it's yours alone to enjoy.

3 IMPORTANT QUALITIES THAT YOUR POSITION REQUIRES?

Basic mathematics and physics skills are absolutely essential. They build the foundation for cosmology research, and that foundation has to be rock solid. Beyond that, the most important things are perseverance and unrelenting curiosity.

IN 1 SENTENCE, DESCRIBE YOUR JOB?

The sentence I tell other people: I build and use telescopes in order to gain a better understanding of how our universe works. The sentence I tell myself: I solve puzzles and play with toys.

EXPERIENCE VS TRAINING?

Coursework in mathematics and physics is important, but that's only the beginning. It's even more important to develop the independence to pick up other skills that aren't necessarily taught in class. Many of us are self-taught in the basics of engineering, computer programming, etc. The best way to learn is by doing.

ADVICE FOR GRADE 11 AND 12 LEARNERS CONSIDERING THIS CAREER?

Be sure to build a solid background in mathematics and physics. In addition, try to find research opportunities as early as possible: These can take the form of vacation or reading projects, Honours projects, etc.

TYPE OF PERSON THAT WOULD ENJOY THIS KIND OF CAREER?

If you enjoy solving puzzles, that's the first step. If you can't sleep well until you've solved a puzzle, then this job is for you!

POTENTIAL FOR GROWTH - WHERE CAN YOUR CURRENT POSITION LEAD?

Cosmology and Astrophysics research is a great way to develop highly versatile and marketable skills. There are many job opportunities that lie beyond academia and basic research. Many people with Astrophysics PhDs successfully continue on to industry jobs in data science (Google, Netflix, etc.), aerospace engineering, consulting, finance, and even medicine.

WHAT CHALLENGES HAVE YOU HAD TO OVERCOME?

Learning how to do research can be a bit scary at first. Unlike coursework, there are no answers at the back of the book, so it can be difficult to find confidence and a sense of direction. But with practice and with the help of mentors, this skill is one that can be developed.

WHAT QUALIFICATIONS DO I NEED?

Proficiency in mathematics and physics is all that's needed for starters. Everything else can be learned along the way.

WHAT ARE YOUR CAREER GOALS?

South Africa has a flourishing astrophysics community and one of my goals is to help establish locally-based experiments that will deliver internationally competitive, cutting edge science.

Dr. Hsin Cynthia Chiang

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IS CONTINUING EDUCATION AND FURTHER STUDIES IMPORTANT IN YOUR TYPE OF CAREER?

Cosmology research moves at a rapid pace, so it's very important to keep learning every day. There are always new developments, so we continuously educate ourselves about the most recent work that's being done. ■