Case study: medical physics

Making the switch

Changing career path can be daunting but there are big rewards for those who are brave enough to switch. M S Zobaer describes his unexpected journey from dusty plasmas to neuroscience.

What do our brains have to do with dusty plasmas in outer space? Such a question had never occurred to me when I embarked on my BSc in physics at Jahangirnagar University, in my home country of Bangladesh. To me, physics meant particles, mechanics and electricity. As a child I had been curious about how things work, breaking my electric toys to get to the motor and making my own bicycle rear light. This fascination never went away, which is why I decided to study the subject to a higher level.

My introduction to the world of research came in the form of an MSc course at Jahangirnagar University under the supervision of the plasma physicist Abdullah Al Mamun. I worked on modelling nonlinear wave propagation under various conditions in dusty plasmas—clouds of ions, free electrons and charged dust particles in space. While learning about nonlinear wave dynamics, I developed several skills: advanced mathematical techniques, developing computer simulations with the correct parameters, and writing research papers. I enjoyed my MSc project, and felt inspired by my supervisor to continue in academic research.

After completing my MSc, I took a job as a lecturer in physics at the Bangladesh University of Textiles in Dhaka, while looking for a suitable PhD. I had my heart set on doing a theoretical project in astrophysics, plasma or nuclear physics, as I wanted to continue working in a subject closely related to my MSc thesis. PhD programmes are competitive already, but an additional complication for me was that I needed to find one that was fully funded, because my family could not support me financially. In fact, I had to decline the first two PhD offers I received because they came only with a partial scholarship.

Casting the net wide

I began to reach out to different professors, hoping that I could be put in touch with a potential PhD supervisor. Peter A Robinson, a neuroscientist at the University of Sydney, Australia, replied to me suggesting that I could consider other fields besides astrophysics. He talked about nonlinear dynamics in neural models, which are based on physical principles and mathematical derivations.

That reply spurred me to think deeply about my options, as my goal was really to become a researcher in astrophysics. I therefore decided to apply for an International Postgraduate Research Scholarship (IPRS), which is an Australian programme to support international students. As the application for the scholarship; and the application for admission to the PhD programme were combined in one form, I ticked all the programmes offering scholarships that could cover full tuition fees and living costs in Australia.

I was fortunate enough to receive an IPRS, which was my next step to becoming a researcher, but one thing made me hesitate: the offer was to do a PhD in theoretical and computational neuroscience. Despite my conversations with Peter Robinson, I was still not completely convinced I could move into neuroscience. I had always thought of it as a field of medicine, and I was confused about how I could contribute to this area with a background in physics. My parents had similar concerns and were not sure how I could advance my career by starting a project that seemed unrelated to what I had studied so far.

A fresh start

I did some research of my own, and I was surprised to learn that in 1983 the Nobel Prize for Physiology/Medicine had been awarded to scientists for elucidating the transmission of electrical signals along neurons—essentially underpinned by physics principles. I found out that many physicists are involved in neural modelling, and I began to see how I could take the knowledge and skills I had gained while modelling plasma systems and apply them to modelling brain dynamics.

I sought advice from my MSc supervisor who told me that, across all disciplines, being a successful researcher requires...