physicsworld

careers 2026

10th anniversary issue

case studies • employer directory • careers advice

Foreword

Welcome to the ***Australian Physics World Careers 2026***, a guide to the many physics careers available to the Australian physics community.

Nearly all modern technology started in the physics community, and with the modern pace of advancements, there is a growing need for physicists and our skills. Physics is a creative endeavour that pushes the boundaries of knowledge, delving into the unknown to generate new knowledge and technologies that benefit us all. With the second quantum revolution in full swing, the dramatic advances in AI/ML, and the renewed interest in space, physicists are uniquely placed to support and benefit from the opportunities presented.

While it is difficult to exactly define the career path of a physicist, it is always filled with problem-solving, exploration, and wonder. My own career started at the dawn of the quantum computing revolution, moved into computational modelling of quantum systems, evolved into scalable codes on supercomputers, morphed into Unix/Linux system administration of large-scale systems, included building a data-processing start-up company, constructing enormous immersion-cooled data centres, and now classified supercomputing in the national security context.

The Australian Institute of Physics #PhysicsGotMeHere promotions provides many such journeys by a large array of physicists and demonstrates how the skills we possess can be adapted and applied to a vast range of problems.

I hope this guide provides you with inspiration and helps you take the next step in your physics career.

Dr Stuart Midgley MAIP
AIP President

One Step Ahead: Physics Careers Fair

22 October 2026
ThinkTank Science Museum, Birmingham, UK

Hosted by the Institute of Physics, this event connects you with top employers and showcases the diverse opportunities your physics degree can unlock.

- **Hear from industry experts** on real-world applications of physics
- **Explore graduate schemes** and apprenticeships
- **Join interactive panels** and get career advice
- **Network with leading employers** and start building your professional network

Ready to get ahead?
Scan the QR Code to register your interest!

IOP Institute of Physics

Welcome

Helping you plan your future in physics

Tushna Commissariat and **Sarah Tesh**, editors of *Physics World Careers*, look back on a decade of the guide, and help you look ahead to explore your career prospects

It's long been the case that physics students often have no idea of the many career opportunities available to them. Contrary to what most students or even their supervisors may believe, over half of graduates leave academia and move into the private sector. Indeed, many graduates don't realize that their degree can open doors to many sectors – from healthcare, construction and aviation to green energy, education, finance and software development.

To make sure that students and early-career researchers are aware of the myriad of options available to them, Margaret Harris (who was *Physics World* careers editor in 2017) came up with the idea of *Physics World Careers*. Now in its 10th year, it's become an indispensable annual guide containing profiles of physicists working across a variety of fields, and career-development advice, as well as a detailed directory of employers looking to hire physicists. For busy students and postgrads, our guide has become a comprehensive source of careers information.

Over the last decade, *Physics World Careers* has included stories of some of the brightest physicists who share their unique career paths, and offer their advice for those who wish to follow in their footsteps. For example, the 2019 guide featured British astronomer Elizabeth Tasker's move to Japan and her advice on working internationally. The following year we spoke to Pascal Gallo, who co-founded a company to manufacture diamonds for industrial applications. In 2021 we profiled veteran gravitational-wave astronomer and indigenous physicist Corey Grey, while in 2022 we spoke to quantum-physicist and deep-tech entrepreneur Illana Wisby, who has a dual degree in physics and music, and who set up the pioneering UK quantum firm Oxford Quantum Circuits (OQC).

The 2023 guide, meanwhile, featured Sophia Sheik, who was the 10th person ever to finish a dissertation in SETI in the physical sciences, and went on to become a "technosignature" researcher. The guides have also profiled physicists with truly unexpected pathways including Steve Roberts, who built a business around a specialist MRI scanner for horses and Cather Simpson who set up a microfluidics company that uses photonics technology to sort bull sperm by sex for the dairy industry.

This 10th edition of *Physics World Careers* brings you the latest mix of what physicists are doing in 2026. It includes an exclusive article featuring two leaders from the UK's intelligence agency GCHQ (p54), a spotlight on the many jobs in nuclear energy (p50), as well as tips from careers-advice experts (p8). As always, we have a comprehensive "Employer directory", where you can meet the companies and institutions currently hiring physics graduates. If you're ready to start your job search, do explore all the latest opportunities on the Physics World Jobs portal, where you can find vacancies in physics and engineering for people at all career stages.

Physics World Careers is here to shine a light on the full spectrum of the work being done by physicists in various sectors across the globe, and we hope that it helps you and all future generations of physicists on their own career journeys.

Editorial contents

FEATURED EMPLOYERS

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Employer directory

Top careers tips from the experts

Physicists have so many career options that it can be hard to know where to start. Careers experts **Crystal Bailey**, **Tamara Clelford**, **Araceli Venegas-Gomez** and **Tushna Commissariat** offer their tips and advice

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Cornucopia of careers There are many opportunities out there for you if you have a physics degree. Our experts are here to help you find your way.

Studying physics can be so busy and stressful that deciding what you should do after graduating is probably the last thing on any student's mind. Here to help you work out what to do next are four careers experts, who took part a Physics World Live panel discussion in 2025. They all studied physics or engineering – and have thought long and hard about the career opportunities available for physics graduates.

The four experts are:

- **Crystal Bailey**, director of careers, education and inclusive communities at the American Physical Society (APS);
- **Tamara Clelford**, a physics consultant working in aerospace and currently leading a review of the Chartered Physicist standard at the Institute of Physics, which publishes *Physics World*;
- **Araceli Venegas-Gomez**, chief executive and founder of quantum education company QURECA;
- **Tushna Commissariat**, features editor of *Physics World*, who edits the annual *Physics World Careers* and *APS Careers* guides.

The career options for physicists are wide but can also seem overwhelming – so what advice do you have for people starting out on their career journey today?

Crystal Bailey: Finding a fulfilling career means trying to find something that matches your values. I don't just mean what you're interested in or what you like – but who you are as a person. So the first step always starts with self-assessment and self exploration, exploring what it is you really want from your life.

Do you want a job that has good work-life balance? Do you want something with a flexible schedule? Or do you want to make money? Making money is a very righteous and noble thing to want to do it – there's nothing wrong with that. But when I give careers talks and ask the audience if they've asked themselves those questions, almost nobody raises their hand

So I encourage you to reflect on a time when you've been really happy and fulfilled. I don't just mean were you doing, say, a quantum-mechanics problem, but were you with other people? Were you alone? Were you doing something with your hands, building something? Or was it something theoretical? You need to understand what will be a good match for you.

After you've done that self-assessment and understand what you need, I advise you do "informational interviews", which basically involves getting in touch with somebody – online or in person – to ask them what they do day-to-day. What advice do they have? Where's their sector going?

You'll get real insider knowledge and, more importantly, it'll help you build your network – especially if you follow up, say, every six months to thank them for advice and update them of your situation. It'll keep that relationship fresh and serve you later when you're actually looking for jobs in a more targeted way.

Our expert panel

Sound advice From left to right: Crystal Bailey, Tamara Clelford, Araceli Venegas-Gomez and Tushna Commissariat

After getting interested in science at high school, **Crystal Bailey** majored in electrical engineering at the University of Arkansas in Fayetteville but soon realized that "physics was the most beautiful thing ever" and did a PhD in nuclear physics at Indiana University in Bloomington. A chance encounter with someone who was in her Morris-dancing group led to Bailey working as career-programme manager at the American Physical Society, where she now serves as its director of careers, education and inclusive communities.

Having declared aged five that she wanted to be a nuclear physicist, **Tamara Clelford** studied physics and astrophysics at the University of Sheffield in the UK. She has a PhD in antenna design and simulation from Queen Mary, University of London. After a year teaching physics in secondary schools, Clelford then spent a decade working as an antenna engineer in the defence industry. Following a short spell in a start-up, she now works as a freelance physics consultant in the aerospace sector.

Araceli Venegas-Gomez always wanted to work in science or technology and studied aerospace engineering at the Universidad Politécnica de Madrid, before getting a job at Airbus in Germany. However, she always had a passion for physics and in her spare time did a master's in medical physics via distance learning. After taking an online course in quantum physics at the University of Maryland, Venegas-Gomez did a PhD in quantum simulation at the University of Strathclyde, UK. Her experience of business and academia led her to set up QURECA in 2019, which offers resources, careers advice and education to people who want to work in the burgeoning quantum sector.

Tushna Commissariat grew up in Mumbai, India, where gazing up at the few stars she could make out in the big-city skies inspired her to study science. While doing a bachelor's degree in physics at Xavier's College, she did a summer astrophysics placement in Pune, where she quickly realized she wasn't cut out for academia. Instead, Commissariat did a master's in science journalism at City, University of London. After an internship at the International Centre for Theoretical Physics in Trieste, Italy, she joined *Physics World* in 2011, where she now works as careers and features editor.

Tamara Clelford: You need to understand what it is you enjoy. Are you a leader or do you like to be managed? Do you prefer to be told what to do? Do you like working in a team or working alone? Are you theoretical or more experimental? Do you prefer research or the real world? Maybe you just want to work with, say, aeroplanes, which is a perfectly valid reason to do so.

You also need to ask yourself where you want to work. Do you want to work in a big company, a medium-sized firm, or a small start-up? I began in a large defence company, where I could easily switch jobs if something wasn't the right fit. But in a big firm you often get taken off work as priorities change, so I now work for myself, which is fabulous.

> Self-assessment – understanding your skills and talents – is really important
> Araceli Venegas-Gomez

Araceli Venegas-Gomez: The hardest thing is finding out what you like. Your long-term goal might be to get rich or have your own company. Once you work that out, you'll need a short-term plan. It'll probably change but having a plan is a great start. Then ask yourself: are you good at it? That self-assessment – understanding your skills and talents – is really important.

Next, find out what companies are there. Create a LinkedIn profile. Talk to people. Expand your network. Go to careers events. Do mock interviews – maybe not for your dream job but to help you learn how to do them. Learn how to do a CV and apply for jobs. Use all the resources available to you.

Tushna Commissariat: My advice is don't leave your job search until just before you graduate. Start looking at internships and summer jobs as early as you can. I recall interviewing one physicist who sent an e-mail to NASA and got an internship at the age of 15. But on the other hand, remember that even if you land your perfect job, it might not work out, and its always okay to change your mind.

What is the number one skill – over and above technical knowledge – that physicists have?

Crystal Bailey: Physicists often go into well-paid jobs that have "engineering" in the title, working alongside other STEM graduates. In fact, physicists have many of the same scientific and technical skills that make engineers and computer scientists so attractive to employers. But what sets physicists apart is a confidence that they can teach themselves whatever they need to know to go to the next step.

It's a kind of "intellectual fearlessness" that is part of being a physicist. You're used to marching up to the edge of what is known about the universe and taking that next step over to discover new knowledge. You might not know the answer, but you know you can teach yourself how to find the answer – or find somebody who can help you get there.

Tamara Clelford: It might not help us narrow down where we want to work, but physicists are capable of solving a huge range of problems. We can root around a problem, look for its fundamental aspects, and use mathematical and experimental skills to solve it. Whether it's a hardware problem, a software problem or the need to derive an equation, we can do all that.

> As physicists, we have the ability to upskill, to improve and to solve whatever problem we want
> Tamara Clelford

If we're not an expert in a particular area, we know we can go and get the relevant expertise. As physicists, we know where our limits are. We're not going to make stuff up to sound better than we are. We have the ability to upskill, to improve and to solve whatever problem we want.

Araceli Venegas-Gomez: As physicists, we have a multidisciplinarity that we often don't realize we have. If you're, say, a marine engineer, you're going to work in marine engineering. But as a physicist, you can work anywhere there's a job for you.

What's more, physicists don't only solve problems; we also want to know why they exist. It might take us a bit longer to find a solution, but we look at it in a way that engineers might not.

Tushna Commissariat: One of the brilliant things about physicists is that they're absolutely confident that they can come in and fix a problem. You see physicists going into biology and saying "Oh cancer, I can do that". There are physicists who've gone into politics and into sport. I've even seen physicists improving nappies for babies.

At the same time, there's almost a joy in failure: if something doesn't work or goes wrong, it means something exciting and interesting is about to happen. I remember Rolf-Dieter Heuer, who was then director-general of CERN, saying it'll be more exciting if we don't find the Higgs boson because it would have meant the Standard Model of particle physics is broken – which would open up a wealth of possibilities.

> One of the brilliant things about physicists is that they are absolutely confident that they can come in and fix a problem
> Tushna Commissariat

What do you know today that you wish you'd known at the start of your career?

Crystal Bailey: When I went to grad school, I liked physics and thought "I'm good at it and I want to keep doing physics". But I didn't really having a clear reason for staying in academia. I was just doing what I thought was expected of me and didn't even want a career in academia. So I wish I had had more of a sense of ownership and a little more confidence about my career.

> Don't doubt yourself. Don't let anybody tell you that you can't do something
> Crystal Bailey

The key message is: don't doubt yourself. Don't let anybody tell you that you can't do something. It's your life – and what you want is the most important thing. I just wish I had been given a little more encouragement and a little more confidence to go in new directions.

Tamara Clelford: In life, your priorities change and it's very difficult to project into the future. At any particular time, you have certain experience and knowledge, on which you make the best decision you can make. But if, in five or 10 years' time, you realize things aren't working, then change and do something else. Trust your instincts – and change when you need to change.

Araceli Venegas-Gomez: I wish I'd known at the start of my career that everything's going to be okay and there's no need to panic. If you're doing a PhD and you don't finish it, that's fine – I don't think I've ever met a single physicist who's ended up jobless. There are millions of options so remind yourself that everything is going to be okay.

Tushna Commissariat: When you're studying, it's easy to feel you're in a kind of bubble universe of exams, practicals or labs. Setbacks can feel like the end of the world when they really aren't: your marks on a particular test won't determine your entire future. Remember that you gain so many useful skills while studying, whether it's working with other people or doing outreach work, which might seem a waste of time but are great for your CV.

- This article is based on the 9 April 2025 episode of Physics World Live, which you can watch on demand on our website.
- For more information, check out Physics World Jobs and the careers services offered by the Institute of Physics.

Matin Durrani is editor-in-chief of *Physics World*

AUDIO

You can also listen to this podcast with Francesca Doddato who talks to *Physics World*'s Michael Banks about making science careers more accessible to people with disabilities.

Why accommodating neurodivergent scientists is vital

Shutterstock/Double Brain

Vive la difference Neurodivergent people remain over-represented in the sciences, so we must ensure that the needs of these individuals are recognized.

With more neurodivergent people in science than in the general population, it is important to make accommodations in the workplace to help them – and science – thrive. **Meagan Hough** explains

It wasn't until the second year of my undergraduate degree that someone finally put a name to why I'd been struggling with day-to-day things throughout my life – it was Attention Deficit Hyperactivity Disorder (ADHD). It explained so much; my extreme anxiety around work and general life, my poor time management, the problems I had regulating my emotions, and my inability to manage everyday tasks. Being able to put a label on it, and therefore start taking steps to mitigate the worst of its symptoms, was a real turning point in my life.

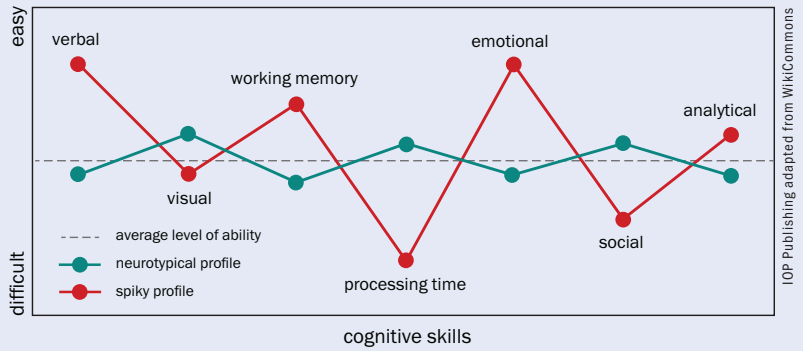
As such, when I started my PhD at the Quantum Engineering Centre for Doctoral Training at the University of Bristol, I got on the (notoriously long) waiting list for an assessment and formal diagnosis. I knew that because of my ADHD, my PhD journey would look a little different compared to the average student, and that I'd have to work harder in some aspects to mitigate the consequences of my symptoms.

People with ADHD exhibit a persistent pattern of inattention, hyperactivity and/or impulsivity that interferes with day-to-day life. It is a type of neurodivergence – when someone's brain functions in a different way to what is considered "typical". Other neurodivergent conditions include autism, dyslexia and dyspraxia, but the term also encompasses mental-health issues, learning difficulties and acquired neurodivergence (for example, after a brain injury).

According to Genius Within, at least 5% of the population have ADHD, 1–2% are autistic, 14% have mental health needs, and many more have other neurodevelopmental conditions. It is also common for those with one neurodivergence to have one or more other co-occurring neurodivergent conditions.

However, if you look specifically at the scientific community, these percentages are much higher. For example, a 2024 survey "Designing Neuroinclusive Laboratory Environments" by HOK (a global design, architecture, engineering and planning firm), found that out of 241 individuals, 18.6% had ADHD and 25.5% were autistic. If neurodivergent people remain highly over-represented in the sciences, then it is imperative that we understand and accommodate the needs of these individuals in work and research environments.

1 Peaks and troughs



A neurodivergent person will have what is known as a "spiky profile" because they can find some cognitive skills easy (peaks) but struggle with others (troughs). Every person has an individual profile – even if two people have the same neurodivergent condition, they will have different strengths and weaknesses.

This example compares a neurodivergent profile (red) with a neurotypical one (green) and an average (dashed), for a small set of cognitive skills:

- Verbal comprehension – how we communicate and understand speech and its meaning
- Visual perception – how we interpret our visual environment and surroundings
- Working memory – our short-term memory that assists us with decision making and problem solving
- Processing speed – how quickly we take in information, interpret it and respond
- Emotional intelligence – how we perceive, use, understand and regulate emotions
- Social – how we develop and maintain social relationships
- Analytical skills – how we solve problems by analysing information.

Spiky skills

One common trait among neurodivergent people is that they have greater strengths and bigger weaknesses across skillsets when compared to neurotypical people. This is known as having a "spiky profile" – it appears as peaks and troughs above and below a "normal" baseline (figure 1). The skillsets commonly included in a profile are analytical, mathematical, motor, situational and organizational skills; relationship management; sensory sensitivities; processing speed; verbal and visual comprehension; and working memory. So while neurodivergent people may be extremely capable at certain skills, they may really struggle with others.

Personally, I have problems with working memory, organization and processing speed, but each of these issues presents differently in certain situations. For example, it's not uncommon for me to reach the end of a meeting with my supervisor and feel that I understand all that was discussed and have no questions – but then I may come up with some important queries sometime later that didn't occur to me at the time. This demonstrates a difference in processing speed, which thankfully can be accommodated for by maintaining an open line of communication between myself and my supervisors.

Meanwhile, for Daisy Shearer – who leads the outreach and education programme at the National Quantum Computing Centre (NQCC) in the UK – autism affects their day-to-day life in other ways. "I experience sensory inputs and emotion regulation differently to neurotypical people, which uses a lot of energy to manage," Shearer explains. "My executive functioning skills [those that help you manage everyday tasks] tend to be poor, as well as my social skills, which I work hard to overcome."

Despite our different neurotypes, Shearer and I also have some symptoms in common. For example, we both struggle with switching between tasks, and time blindness, which means we have difficulty in perceiving and managing time. But while many traits can overlap between neurotypes in this way, even two individuals with the same diagnosis won't have the exact same symptoms or profile.

Furthermore, neurodivergent people can be "dynamically disabled", meaning that our abilities and sensitivities fluctuate day-to-day or even hour-to-hour, regardless of the accommodations and strategies in place. Shearer, for instance, used to be primarily lab-based and would find that environment soothing, but occasionally the lab would become overwhelming when their sensory profile shifted.

Meanwhile for me, one day I may be able to focus and complete multiple large tasks in a day, attend various meetings and answer e-mails in a timely fashion. But on another day – sometimes even the next day – I may only be able to answer half of my e-mails and will flit between tasks, unable to focus deeply on any one thing. This can make monitoring progress and completing milestones difficult, and requires a high degree of flexibility and understanding from those around me.

Accommodating the troughs

So what can the physics community do to help people who are neurodivergent like myself? While we absolutely don't want to be treated leniently – we want our work as physicists to be judged to as high a standard as anyone else's – working with individuals to accommodate them correctly is key to helping them succeed.

That's why in 2019 Shearer founded Neuroinclusion in STEM, after having no openly autistic role models in their physics career to date. The project, which is community-driven, aims to increase the visibility of neurodivergent people in science, technology, engineering and mathematics (STEM), and provide information on best practices to make the fields more inclusive.

Shearer also takes part in many equality, diversity and inclusion (EDI) committees, and gives talks at conferences to highlight how the STEM community can improve the working environment for its neuro-divergent members.

Indeed, Shearer's own set up at the NQCC is a great example of workplace accommodations helping an employee thrive. Firstly, Shearer had a high level of autonomy in defining their role when they joined the NQCC. "It was incredibly helpful when it comes to managing how my brain works," they explain. Shearer also has the flexibility to work from home if they're feeling particularly sensory sensitive, and were consulted in the design of the NQCC's "wellbeing room" – a fully sensorily controllable space that they can use during their work day when feeling overwhelmed by sensory stimuli. Other, small adjustments that have helped include having an allocated desk away from general people-traffic, and colleagues being educated to ensure a more inclusive environment.

For physicists working in a lab – dependent on health and safety measures – it can help

By recognizing all of our unique capabilities and adequately accommodating those additional neurodivergent struggles, we can build systems that empower instead of limit us

to wear headphones or earplugs and have dimmable lights to minimize sensory inputs. Some neurodivergent people also benefit from visual aids and written instructions for experiments and equipment. Personally, as a theorist in an office, I find noise cancelling headphones, and asking colleagues to consider e-mailing rather than interrupting me at my desk, can help reduce distractions.

Reaching the peak

While education and accommodations are key, it's also important to remember the strengths that come with having a neurodivergent spiky profile – the peaks, so to speak. "I have strong analytical, communication and creative skills," explains Shearer, "which make me very good at what I do professionally."

For me, I excel in visual, written and communication skills, and try to use these to my advantage. I'm good at spotting errors in mine and others' work, I'm a concise but detailed writer, and when not working on my PhD, I'm trying to communicate complex ideas in quantum physics to different audiences with varying degrees of understanding of physics and science.

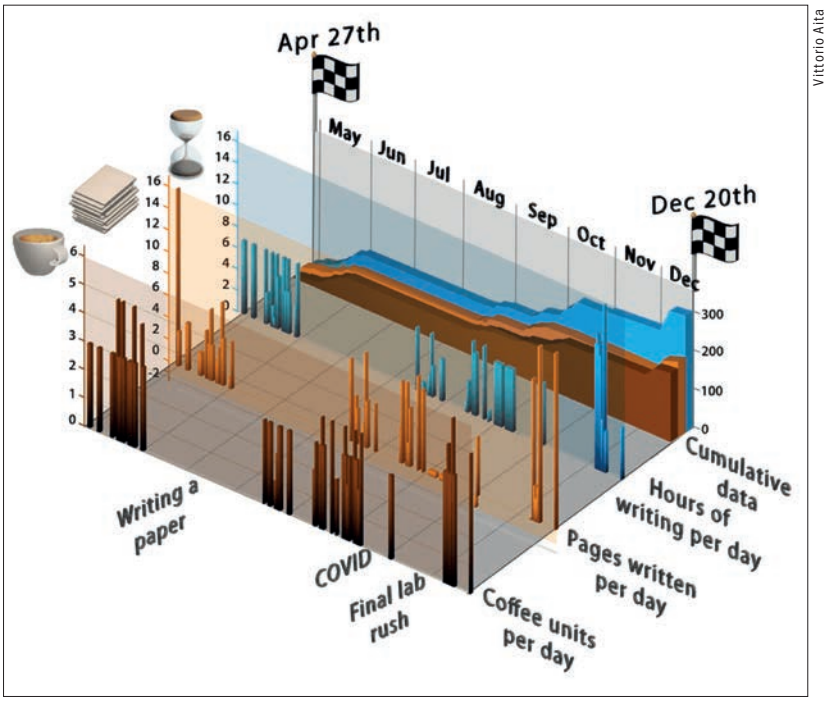
Reminding myself of these strengths is key, as it can be too easy to focus on the negatives that come with being neuro-divergent. By recognizing all of our unique capabilities and adequately accommodating those additional neurodivergent struggles, we can build systems that empower instead of limit us.

I believe Shearer put this best: "By embracing our individual strengths, we can enable everyone to thrive in their professional and personal lives, but that can only come with understanding how to accommodate each other."

Meagan Hough is a PhD student at the University of Bristol, UK

A PhD in cups of espresso

When he started writing up his PhD thesis, **Vittorio Aita** was warned that it would be hard. However, he explains that taking pride in the small things and finding a lighthearted way to track his progress – in cups of espresso – kept him going even when the work was tough



Vittorio Aita

Scientific method When he was writing his PhD thesis, Vittorio Aita logged his progress in hours, pages and cups of espresso.

Every PhD student has been warned at least once that doing a PhD is stressful, and that writing a thesis can make you thoroughly fed up, even if you're working on a topic you're passionate about.

When I was coming to the end of my PhD, this thought began to haunt me. I was enjoying my research on the interaction between light and plasmonic metamaterials, but I worried that the stress of writing my thesis would spoil it for me. Perhaps guided by this fear, I started logging my writing activity in a spreadsheet. I recorded how many hours per day I spent writing and how many pages and figures I had completed at the end of each day.

The immediate benefit was that the spreadsheet granted me a quick answer when, once a week, my supervisor asked me the deeply feared question: "So, how many pages?" Probably to his great surprise, my first answer was "Nine cups of espresso."

The idea of logging my writing activity probably came from my background as an experimental physicist, but the use of espresso cups as a unit goes back to my roots in Naples, Italy. There, we have a relationship with coffee that borders on religious. And so, in a difficult time, I turned to the divine and found my strength in the consumption of coffee.

As well as tracking my writing, I also recorded the number of cups of espresso I drank each day. The data I gathered, which is summarized in the above graph, turned out to be quite insightful. Let's get scientific.

I began writing my thesis on 27 April 2023. As shown by the spacing between entries in the following days, I started at a slow pace, dedicating myself to writing for only two days a week and consuming an average of three units of coffee per day. I should add that it was quite easy to "write" 16 pages on the first day because at the start of the process, you get a lot of pages free. Don't underestimate the joy of realizing you've written 16 pages at once, even if those are just the table of contents and other placeholders.

In the second half of May, there was a sudden, two-unit increase in daily coffee consumption, with a corresponding increase in the number of pages written. Clearly by the sixth entry of my log, I was starting to feel like I wasn't writing enough. This called for more coffee, and my productivity consequently peaked at seven pages in one day. By the end of May, I had already written almost 80 pages.

Readers with an eye for detail will also notice that on the second to last day of May, coffee consumption is not expressed as an integer. To explain this, I must refer again to my Italian background. Although I chose to define the unit of coffee by volume – a unit of espresso is the amount obtained from a reusable capsule, the half-integer value is representative of the importance of the quality of the grind. I had been offered a filtered coffee that my espresso-based cultural heritage could not consider worth a whole unit. Apologies to filter coffee drinkers.

From looking at the graph entries between the end of May and the middle of August, you would be forgiven for thinking that I took a holiday, despite my looming deadline. You would however be wrong. My summer break from the thesis was spent working on a paper.

However, in the last months of work, my slow-paced rhythm was replaced by a full-time commitment to my thesis. Days of intense writing (and figure-making!) were

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Full of beans Vittorio Aita found tracking his espresso consumption while writing his thesis surprisingly motivating.

interspersed with final efforts to gather new data in the lab.

In October some photons from the end of the tunnel started to be detectable, but at this point I unfortunately caught COVID-19. As you can tell from the graph, in the last weeks of writing I worked overtime to get back on track. This necessitated a sudden increase in coffee units: having one more unit of coffee each day got me through a week of very long working days, peaking at a single day of 16 hours of work and six cups of espresso.

I finally submitted my thesis on 20 December, and I did it with one of the most important people in my life at my side: my grandma. I clicked "send" and hugged her for as long as we both could breathe. I felt suddenly lighter and I was filled with a deep feeling of fulfilment. I had totalled 304 hours of writing, 199 pages and an impressive 180 cups of espresso.

With hindsight, this experience taught me that the silly and funny task of logging how much coffee I drank was in fact a powerful tool that stopped me from getting fed up with writing.

More often than not, I would observe the log after a day of what felt like slow progress and realize that I had achieved more than I thought. On other days, when I was disappointed with the number of pages I had written (once even logging a negative number), the amount of coffee I had consumed would remind me of how challenging they had been to complete.

Doing a PhD can be an emotional experience, particularly when writing up the thesis: the self-realization, the pride, the constant need to improve your work, and the desire to convey the spark and pull of curiosity that first motivated you. This must all be done in a way that is both enjoyable to read and sufficiently technical.

All of this can get frustrating, but I hope sharing this will help future students embrace the road to achieving a PhD. Don't take yourself too seriously and keep looking for the fun in what you do.

Vittorio Aita is associate editor at *Nature Communications*

From blackboard to boardroom

iStock/Drazen Zigic

Level up Most physics students aren't thinking about starting a business, but university can be the perfect time to take advantage of additional training and funding opportunities for entrepreneurs.

Got a great idea for a new technology but don't know how to turn it into a product? Want a career in industry but find the world of business confusing? **Robert Phillips** shares his key tips and tricks for developing entrepreneurship skills

What does an idea need to change the world? Physics drives scientific advancements in healthcare, green energy, sustainable mat-erials and many other applications. However, to bridge the gap between research and real-world applications, physicists need to be equipped with entrepreneurship skills.

Many students dream of using their knowledge and passion for physics to change the world, but when it comes to developing your own product, it can be hard to know where to start. That's where my job comes in – I have been teaching scientists and engineers entrepreneurship for more than 20 years.

Several of the world's most successful companies, including Sony, Texas Instruments, Intel and Tesla Motors, were founded by physicists, and there are many contemporary examples too. For example, Unitary, an AI company that identifies misinformation and deepfakes, was founded by Sasha Haco, who has a PhD in theoretical physics. In materials science, Aruna Zhuma is the co-founder of Global Graphene Group, which manufactures single layers of graphene oxide for use in electronics. Zhuma has nearly 500 patents, the second largest number of any inventor in the field.

In the last decade quantum technology, which encompasses computing, sensing and communications, has spawned hundreds of start-ups, often spun out from university research. This includes cybersecurity firm ID Quantique, super sensitive detectors firm Single Quantum, and quantum computing firm D-Wave. Overall, about 8–9% of students in the UK start businesses straight after they graduate, with just over half (58%) of these graduate entrepreneurs founding firms in their subject area.

However, even if you aren't planning to set up your own business, entrepreneurship skills will be important no matter what you do with your degree. If you work in industry you will need to spot trends, understand customers' needs and contribute to products and services. In universities, promotion often requires candidates to demonstrate "knowledge transfer", which means working with partners outside academia.

Taking your ideas to the next level

The first step of kick-starting your entrepreneurship journey is to evaluate your existing experience and goals. Do you already have an idea that you want to take forward, or just want to develop skills that will broaden your

Robert Phillips

Science meets business Researchers at the University of Manchester participating in an entrepreneurship training event.

career options?

If you're exploring the possibilities of entrepreneurship you should look for curricular modules at your university. These are normally tailored to those with no previous experience and cover topics such as opportunity spotting, market research, basic finance, team building and intellectual property. In addition, in the UK at least, many postgraduate centres for doctoral training (CDTs) now offer modules in business and entrepreneurship as part of their training programmes. These courses sometimes give students the opportunity to take part in live company projects, which are a great way to gain skills.

You should also look out for extracurricular opportunities, from speaker events and workshops to more intensive bootcamps, competitions and start-up weekends. There is no mark or grade for these events, so they allow students to take risks and experiment.

Like any kind of research, commercializing physics requires resources such as equipment and laboratory space. For early-stage founders, access to business incubators – organizations that provide shared facilities – is invaluable. You would use an incubator at a relatively early stage to finalize your product, and they can be found in many universities.

Accelerator programmes, which aim to fast-track your idea once you have a product ready and usually run for a defined length of time, can also be beneficial. For example, the University of Southampton has the Future Worlds Programme based in the physical sciences faculty. Outside academia, the European Space Agency has incubators for space technology ideas at locations throughout Europe, and the Institute of Physics also has workspace and an accelerator programme for recently graduated physicists and especially welcomes quantum technology businesses. The Science and Technology Facilities Council (STFC) CERN Business Incubation Centre focuses on high-energy physics ideas and grants access to equipment that would be otherwise unaffordable for a new start-up.

More accelerator programmes supporting physics ideas include Duality, which is a Chicago-based 12-month accelerator programme for quantum ideas; Quantum Delta NL, based in the Netherlands, which provides programmes and shared facilities for quantum research; and Techstars Industries of the Future, which has locations worldwide.

Securing your future

It's the multimillion-pound deals that make headlines but to get to that stage you will need to gain investors' confidence, securing smaller funds to take your idea forward step-by-step. For example, to protect your intellectual property with a patent, make a prototype or road test your technology.

Since early-stage businesses are high risk, this money is likely to come from grants and awards, with commercial investors such as venture capital or banks holding back until they see the idea can succeed. Funding can come from government agencies like the STFC in the UK, or US government scheme America's Seed Fund. These grants are for encouraging innovation, applied research and for finding disruptive new technology, and no return is expected. Early-stage commercial funding might come from organizations such as Seedcamp, and some accelerator programmes offer funding, or at least organize a "demo day" on completion where you can showcase your venture to potential investors.

While you're a student, you can take advantage of the venture competitions that run at many universities, where students pitch an idea to a panel of judges. The prizes can be significant, ranging from £10k to £100k, and often come with extra support such as lab space, mentoring and help

filing patents. Some of these programmes are physics-specific, for example the Eli and Britt Harari Enterprise Award at the University of Manchester, which is sponsored by physics graduate Eli Harari (founder of SanDisc) awards funding for graphene-related ideas.

Finally, remember that physics innovations don't always happen in the lab. Theoretical physicist Stephen Wolfram founded Wolfram Research in 1988, which makes computational technology including the answer engine Wolfram Alpha.

Making the grade

There are many examples of students and recent graduates making a success from entrepreneurship. Wai Lau is a Manchester physics graduate who also has a master's of enterprise degree. He started a business focused on digital energy management, identifying energy waste, while learning about entrepreneurship. His business Cloud Enterprise has now branched out to a wider range of digital products and services.

Computational physics graduate Gregory Mead at Imperial College London started Musicmetric, which uses complex data analytics to keep track of and rank music artists and is used by music labels and artists. He was able to get funding from Imperial Innovations after making a prototype and Musicmetric was eventually bought by Apple.

AssestCool Thermal Metaphotonics technology cools overhead power lines – reducing power losses – using novel coatings. It entered the Venture Further competition at the University of Manchester and has now had a £2.25m investment from Gritstone Capital.

Entrepreneurship skills are being increasingly recognized as necessary for physics graduates. In the UK, the IOP Degree Accreditation Framework, the standard for physics degrees, expects students to have "business awareness, intellectual property, digital media and entrepreneurship skills".

Thinking about taking the leap into business can be daunting, but university is the ideal time to think about entrepreneurship. You have nothing to lose and plenty of support available.

Robert Phillips is a senior lecturer at the University of Manchester, UK. He has a PhD in biochemistry and now teaches entrepreneurship modules to scientists and engineers

The joy of networking

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It's good to talk Networking sessions are a staple part of most scientific meetings, but making a success of them can be tough.

Scientific meetings and conferences are all about mixing with other people, but networking isn't easy. **Honor Powrie** gives her tips if you're either attending or organizing such events

Dear reader, I'm going to let you in on a secret. I get anxious every time I see the word "networking" on a meeting or conference agenda. I'm nervous whether anyone will talk to me and – if they do – what I'll say in reply. Will I end up stuck in a corner fiddling on my phone to make it seem like I want to join in but have something more important to do?

If you feel this way – or even if you don't – please read on because I have some something important to say for anyone who attends or organizes scientific events.

Now, we all know there are many benefits to networking. It's a good way to meet like-minded people, tell others about what you're doing, and build a foundation for collaboration. Networking can also boost your professional and personal development – for example, by identifying new perspectives and challenges, finding a mentor, connecting with other organizations, or developing a tailor-made support system.

However, doing this effectively and efficiently is not necessarily easy. Networking can also soak up valuable time. It can create connections that lead nowhere. It can even be a hugely exploitative and one-sided affair where you find yourself under pressure to share personal and/or professional information that you didn't intend to.

Top tips

Like most things in life, what you get from networking depends on what you put in. To make the most of such events, try to think about how others are feeling in the same situation. Chances are that they will be a bit nervous and apprehensive about opening the conversation. So there's no harm in you going first.

A good opening gambit is to briefly introduce yourself, say who you are, where you work and what you do, and seek similar information from the other person. Preparing a short "elevator pitch" about yourself makes it easier to start a conversation and reduces the need to think on the spot. (Fun fact: elevator pitch gets its name from US inventor Elisha Otis, who needed a concise way of explaining his device to catch a plummeting elevator.)

Make an effort to remember other people's names. I am not brilliant at this and have found that double checking and using people's names in conversation is a good way to commit them to memory. Some advance preparation also helps. If possible, study the attendee list, so you know who else might be there and where they're from. Be yourself and try to be an active listener – listen to what others are saying and ask thoughtful questions.

Don't feel the need to stick with one person or group of people for the whole time. Five minutes or so is polite and then you can move on and mingle further. Obviously, if you

are making a good connection then it's worth spending a bit more time. But if you are genuinely engaged, making plans to follow up post event should be straightforward.

Decide the best way to share your contact details. It could be an iPhone air drop, taking a photo of someone's name badge, sending an e-mail, or swapping business cards (seems a bit unecological these days). If there are people you want to meet, don't be afraid to seek them out. It's always a nice compliment to approach someone and say: "Ah, I was hoping to speak to you today; I've heard a lot about you."

On the flip side, avoid hanging out with your cronies, by which I mean colleagues from the same company or organization or people you already know well. Set yourself a challenge to meet people you've never met before. Remember few of us like being left out so try to involve others in a conversation. That's especially true if someone's listening but not getting the chance to speak; think of a question to bring that person into the discussion.

Of course, if someone you meet doesn't seem to be relevant to you, don't be afraid to admit it. I'm sure they won't be offended if you don't follow up after the meeting. And to those who are already comfortable with networking, remember not to hog all the limelight and to encourage others to participate.

Over the years the benefits of networking have changed, but most recently I have met some great peer mentors, people whom I can share cross-industry experience and best practice with

Let me end with a message to organizers, which – I'll be honest – is the main reason I'm writing this article. I have recently attended conferences and events where the music is so loud that people, myself included, have gone with the smokers to the perishing cold outside simply so we can hear each other speak. Am I getting old or is this defeating the object of networking? Please, no more loud music!

I also urge event organizers to have places where people can connect, including tables and seating areas where you can put your plates and drinks down. There's nothing worse than trying to talk while juggling cutlery to avoid a quiche collapsing down the front of your shirt. Buffets are always better than formal sit-down dinners as it provides more opportunity for people to mix. But remember that long queues for food can arise.

So what has networking ever done for me? Over the years the benefits have changed, but most recently I have met some great peer mentors, people whom I can share cross-industry experience and best practice with. And, if I hadn't been at a certain Institute of Physics networking event last year and met Matin Durrani, the editor of *Physics World*, then I wouldn't be writing this article for you today.

I'll let you, though, be the judge of whether that was a success. [Editor's note: it certainly was…]

Honor Powrie is an engineer who is now senior director for data science and analytics at GE in Southampton, UK. She is writing here in a personal capacity

Physics beyond the classroom

Many schools and colleges encourage their students to do work experience to see what the working world is like. **Naeya Mistry**, who is doing an A-level in physics, recently got a placement at the Institute of Physics to find out more about its activities and learn how physics can be applied beyond school

IOP

Insights and innovation Student Naeya Mistry (centre left) met quantum-startup founder David Curry (centre right) as part of her work experience at the Institute of Physics, organized by Katherine Platt (left) and Anne Crean (right).

AUDIO To explore how quantum physics can be taught to the masses, *Physics World*'s Hamish Johnston speaks to Arjan Dhawan, Aleks Kissinger and Bob Coecke.

Year 12 students (aged 16 or 17) often do work experience while studying for their A-levels. It can provide valuable insights into what the working world is like and showcase what potential career routes are available. And that's exactly why I requested to do my week of work experience at the Institute of Physics (IOP).

I'm studying maths, chemistry and physics, with a particular interest in the latter. I'm hoping to study physics or chemical physics at university so was keen to find out how the subject can be applied to business, and get a better understanding of what I want to do in the future. The IOP was therefore a perfect placement for me and here are a few highlights of what I did.

Monday

My week at the IOP's headquarters in London began with a brief introduction to the Institute with the head of science and innovation, Anne Crean, and Katherine Platt, manager for the 2025 International Year of Quantum Science and Technology (IYQ). Platt, who planned and supervised my week of activities, then gave me a tour of the building and explained more about the IOP's work, including how it aims to nurture upcoming physics innovation and projects, and give businesses and physicists resources and support.

My first task was working with Jenny Lovell, project manager in the science and innovation team. While helping her organize the latest round of the IOP's medals and awards, she explained why the IOP honours the physics community in this way and described the different degrees of achievement that it recognizes.

Next I got to meet the IOP's chief-executive-officer Tom Grinyer, and unexpectedly the president-elect Michele Dougherty, who is a space physicist at Imperial College London. They are both inspiring people, who gave me some great advice about how I might go about my future in physics. They talked about the exciting opportunities available as a woman in physics, and how no matter where I start, I can go into many different sectors as the subject is so applicable.

To round off the day, I sat in a meeting about how the science and innovation team can increase engagement, before starting on a presentation I was due to make on Thursday about quantum physics and young people.

Tuesday

My second day began with a series of meetings. First up was the science and innovation team's weekly stand-up meeting. I then attended a larger staff meeting with most of IOP's employees, which proved informative and gave me a chance to see how different teams interact with each other. Next was the science and innovation managers' meeting, where I took the minutes as they spoke.

I then met data science lead, Robert Cocking, who went through his work on data insights. He talked about IOP membership statistics in the UK and Ireland, as well as age and gender splits, and how he can do similar breakdowns for the different areas of special interest (such as quantum physics or astronomy). I found the statistics around the representation of girls in the physics community, specifically at A-level, particularly fascinating as it applies to me. Notably, although a lower percentage of girls take A-level physics compared to boys, a higher proportion of those girls go on to study it at university.

The day ended with some time to work on my presentation and research different universities and pathways I could take once I have finished my A-levels.

Wednesday

It was a steady start to Wednesday as I continued with my presentation and research

IOP

Top people Naeya Mistry (centre) got some valuable advice from the chief executive officer of the Institute of Physics, Tom Grinyer (right), and the president-elect, Michele Dougherty (left).

with Platt's help. Later in the morning, I attended a meeting with the public engagement team about *Mimi's Tiny Adventure*, a children's book written by Toby Shannon-Smith, public programmes manager at IOP, and illustrated by Pauline Gregory. The book, which is the third in the Mimi's Adventures series, is part of the IOP's Limit Less campaign to engage young people in physics, and will be published later this year to coincide with the IYQ. It was interesting to see how the IOP advertises physics to a younger audience and makes it more engaging for them.

Platt and I then had a video call with the *Physics World* team at IOP Publishing in Bristol, joining for their daily news meeting before having an in-depth chat with the editor-in-chief, Matin Durrani, and feature editors, Tushna Commissariat and Sarah Tesh. After giving me a brief introduction to the magazine, website and team structure, we discussed physics careers. It was good hear the editors' insights as they cover a broad range of jobs in *Physics World* and all have a background in physics. It was particularly good to hear from Durrani as he studied chemical physics, which combines my three subjects and my passions.

Thursday

On Thursday I met David Curry, founder of Quantum Base Alpha – a start-up using quantum-inspired algorithms to solve issues facing humanity. We talked about physics in a business context, what he and his company do, and what he hopes for the future of quantum.

I then gave my presentation on "Why should young people care about quantum?". I detailed the importance of quantum physics, the major things happening in the field and what it can become, as well as the careers quantum will offer in the future. I also discussed diversity and representation in the physics community, and how that is translated to what I see in everyday life, such as in my school and class.

As a woman of colour going into science, technology, engineering and mathematics (STEM), I think it is important for me to have conversations around diversity of both gender and race, and the combination of the two. After my presentation, Curry gave me some feedback, and we discussed what I am aiming to do at university and beyond.

Friday

For my final day, I visited the University of Sussex, where I toured the campus with Curry's daughter Kitty, an undergraduate student studying social sciences. I then met up again with Curry, who introduced me to Thomas Clarke, a PhD student in Sussex's ion quantum technologies group. We went to the physics and maths building, where he explained the simple process of quantum computing to me, and the struggles they have implementing that on a larger scale.

Clarke then gave us a tour of the lab that he shares with other PhD students, and showed us his experiments, which consisted of multiple lasers that made up their trapped ion quantum computing platform. As we read off his oscilloscope attached to the laser system, it was interesting to hear that a lot of his work involved trial and error, and the visit helped me realize that I am probably more interested in the experimental side of physics rather than pure theory.

My work experience week at the IOP has been vital in helping me to understand how physics can be applied in both business and academia. Thanks to the IOP's involvement in the IYQ, I now have a deeper understanding of quantum science and how it might one day be applied to almost every aspect of physics – including chemical physics – as the sector grows in interest and funding. It's been an eye-opening week, and I've returned to school excited and better informed about my potential next career steps.

Naeya Mistry is a student based in Milton Keynes, UK

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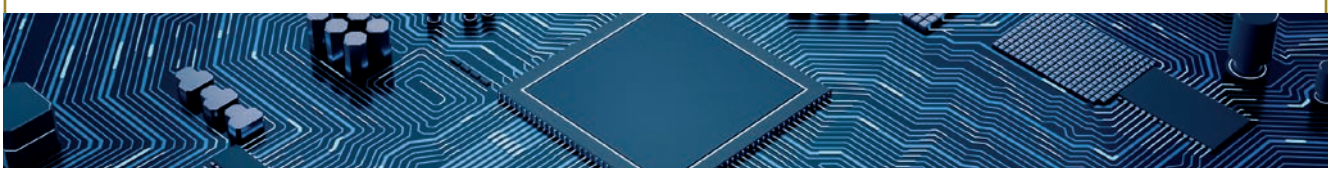

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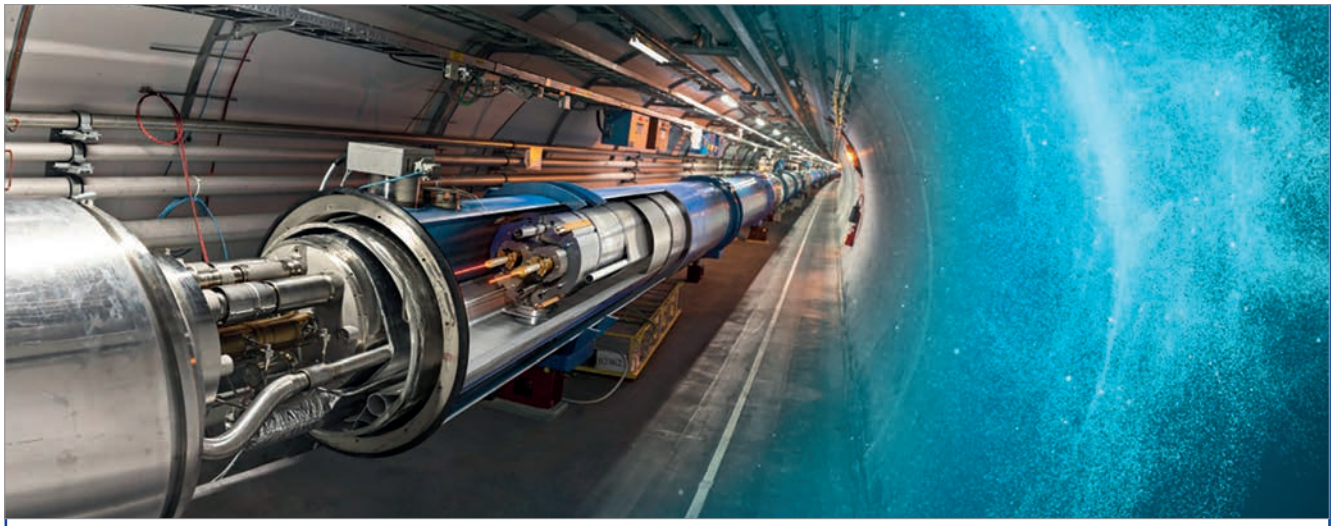

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#1 World's most international university

CITY UNIVERSITY OF HONG KONG (CITYUHK): DEPARTMENT OF PHYSICS

CityUHK is a young, fast-growing research university. The Department of Physics was founded in 2017, building on the outstanding tradition of the former Department of Physics and Materials Science. The last Research Assessment Exercise conducted by the Research Grants Council of Hong Kong, ranked CityUHK's physics second in Hong Kong.

Why work with us

The department aspires to become the leader in the Asia-Pacific region. Our existing faculty conducts world-class research, and our teaching curriculum is internationally benchmarked. Hong Kong, Asia's gateway to the world, provides excellent postgraduate student support, attracting top students from China, south-east Asia, and elsewhere in the world. As a truly international city, Hong Kong offers a unique lifestyle where East meets West, tradition meets contemporary, and mountains meet the ocean. Our compensation package is internationally competitive and commensurate with experience.

Training and development

Incoming faculty will have a major role to play in shaping the future of the department. Generous support is provided to successful candidates, allowing them to quickly set up research groups. International collaboration is strongly encouraged, with funding support available at all levels: national, university, college and department. The Greater Bay Area initiative – which aims to transform the Pearl River region encompassing Hong Kong, Macau and nearby cities in Guangdong, to an international centre of innovation – offers unparalleled opportunities for new researchers to excel.

What we are looking for

We are looking for candidates with a strong research record and promising teaching ability, with the goal to establish a world-class research programme. Applicants of all experience levels are welcome. Exceptional young talents eligible for competing for the Presidential Assistant Professors Scheme are particularly encouraged to apply. An initial appointment will normally be made on a fixed-term contract; the appointee can apply for substantiation or tenure during the second contract. Outstanding candidates can be appointed at higher ranks with tenure. Applicants in underrepresented groups are strongly encouraged to apply.

Profile can be viewed at
physicsworldjobs.com

LOCATION
Hong Kong

NUMBER OF EMPLOYEES
100

RESEARCH AREAS FOR RECRUITMENT
Experimental physics:
- Quantum materials' synthesis, particularly with expertise in single crystal growth
- Ultrafast science and spectroscopy

Theoretical and computational physics:
- High-energy physics/astrophysics/cosmology
- Machine learning/first-principles calculations/large-scale simulations

DESIRED DEGREE DISCIPLINES/CLASS
A PhD in physics or a related field

HOW TO APPLY
For further details, visit **www.cityu.edu.hk/hro/en/job/current/academic.asp?ref=uac-a460**

CLOSING DATE
All year round

CONTACT
Department of Physics
City University of Hong Kong
Tat Chee Avenue
Kowloon
Hong Kong
Tel +852 3442-9140
E-mail phy.head@cityu.edu.hk
cityu.edu.hk/phy

Elekta

Hope for everyone dealing with cancer.

At Elekta, we are driven to deliver cutting-edge, precision radiation therapy, to openly collaborate and help clinicians provide the best possible life outcomes for every patient.

We don't just build technology, we build hope.

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Elekta

At Elekta, we are united by a singular purpose: to ensure that every person, everywhere, has access to the highest standard of cancer care. As a global leader in radiotherapy, Elekta partners with clinicians and healthcare organizations to deliver innovative solutions that improve outcomes and bring hope to patients and families facing cancer. For more than 50 years, our diverse team, 4500 strong, has blended scientific expertise, compassion and creativity to tackle the complexities of cancer treatment. United in our mission, we rise to every challenge, pioneering advances in adaptive radiation therapy because for us, it's personal.

Why join us

At Elekta, you'll be part of a supportive and inclusive culture that values teamwork, continuous learning and personal growth. Our treatment solutions and oncology informatics solutions are designed to enhance care delivery and streamline clinical workflows.

Whether your background is in engineering, physics, software, logistics or training, we offer a wide range of opportunities to match your aspirations. You'll work with technologies like MR imaging, radiation physics, and advanced software systems, including AI applications – all within a collaborative environment that encourages diverse perspectives.

Learning and development

We're committed to helping you grow. Elekta offers:

- Personal development programmes to build confidence and leadership skills.
- Access to scientific workshops, conferences and technical training.
- Mentorship and coaching networks.
- Support for industry-recognized qualifications (e.g. CEng, Chys).

We welcome individuals who are curious, adaptable, and eager to learn, even if you don't meet every listed requirement.

Graduate opportunities

Our Graduate Scheme is ideal for recent physics and engineering graduates. With structured rotations and support for professional memberships (IOP, IET, IMechE), it's a great way to explore different career paths and build a strong foundation.

Who we are looking for

We're looking for collaborative problem-solvers who thrive in multidisciplinary teams. Strong communication skills and a passion for improving patient care are essential. If you're motivated by purpose and want to contribute to a global mission, we'd love to hear from you.

Profile can be viewed at
physicsworldjobs.com

LOCATIONS
Main offices in Sweden, the UK, the Netherlands, China and the US

NUMBER OF EMPLOYEES
4500

POSITIONS RECENTLY RECRUITED FOR
We recruit for a variety of positions across our business – from research and development, through manufacturing and supply, to customer management, sales and service

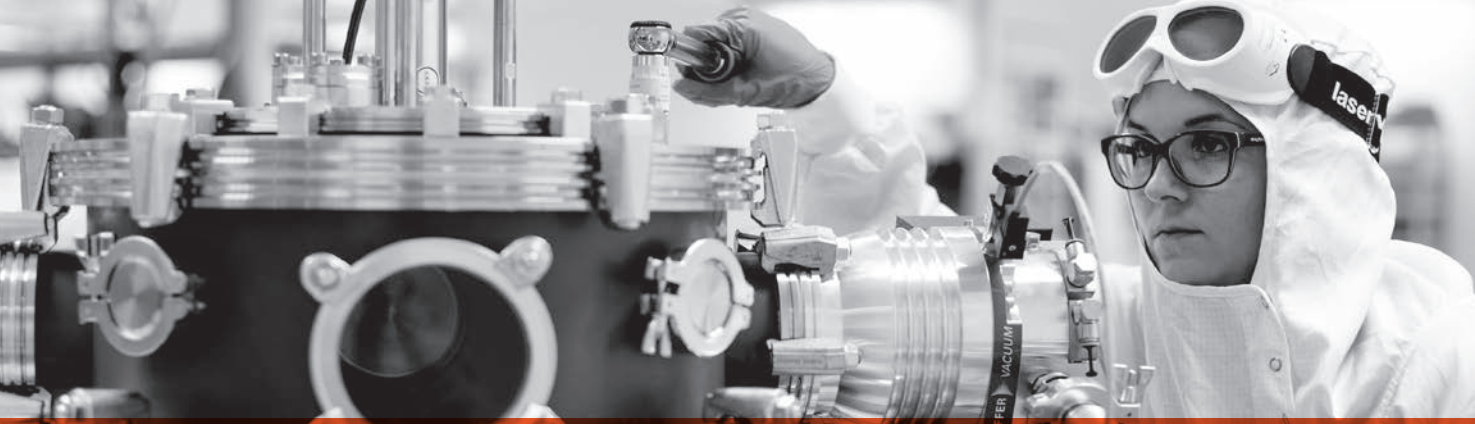
DESIRED DEGREE DISCIPLINES/CLASS
Undergraduate or postgraduate degree in medical physics, accelerator physics, imaging, mechanical engineering, electronics, software engineering and system engineering, or relevant experience. Some technical roles may require professional qualifications

PRE-REQUISITES
Eligibility to work in the job's location is preferred

HOW TO APPLY
Please visit **elekta.com/careers**

CLOSING DATE
All year round

CONTACT
Elekta Limited
Cornerstone
London Road
Crawley RH10 9BL
UK
Tel +44 (0)1293 544 422
E-mail info@elekta.com
elekta.com



JOIN US!

The future is in laser technologies

The ELI Beamlines Facility is a leading laser research centre and part of ELI (Extreme Light Infrastructure) pan-European Research Infrastructure hosting the world's most intense lasers. ELI provides unique tools of support for scientific excellence in Europe. ELI Beamlines developed and operates four leading-edge high-power femtosecond laser systems reaching unprecedented intensities.

The ELI ERIC is a specific legal form designed to facilitate the establishment and operation of Research Infrastructures of European interest. ERICs are participated by States and international organisations as members. As a main statutory mission, ELI ERIC is responsible for making the ELI Facilities available to the scientific community as a single international organisation, with unified governance and management.

The Czech Republic hosts the ELI ERIC statutory seat in Dolní Břežany, in the South of Prague, at the ELI Beamlines facility.

Our research groups are expanding and recruiting physicists and engineers.

In our team we therefore have the following positions available:

- **Junior Scientist**
- **Senior Scientist**
- **Laser Physicist**
- **Junior Engineer**
- **Senior Engineer**
- **Technician**
- **Safety Systems Engineer**
- **Control System Specialist**
- **Safety Engineer**
- **Optical Engineer**
- **X-ray Scientist**
- **Linux Systems Engineer**

For more information see our website **www.eli-beams.eu** and send your application, please.

eli

ELI Beamlines is part of the European ELI laser centre, the world's first international laser facility. ELI Beamlines is open to an international and interdisciplinary user community from academia and industry. Mandated by the international scientific laser community and implemented in the Czech Republic, Hungary and Romania, ELI drives international laser research and laser-based applications to new frontiers, and fulfils important missions for regional socio-economic development.

About us

The main mission of ELI Beamlines is to provide a user-oriented infrastructure for performing revolutionary scientific experiments across many different disciplines. It combines advanced synchronized ultra-intense short-pulse lasers with secondary sources of particles and X-rays.

The ELI Beamlines facility provides research opportunities at a number of world-class secondary sources, each one driven by ultra-intense lasers. These secondary sources, partially based on entirely new concepts, produce pulses of radiation and particles of the highest intensity and beam quality, including electromagnetic radiation over a broad spectral range and charged particles such as electrons, protons and ions. These will enable a wealth of novel applications.

The ERIC is a specific legal form designed to facilitate the establishment and operation of research infrastructures of European interest. ERICs are participated by States and international organizations as members. As a main statutory mission, ELI ERIC is responsible for making the ELI facilities available to the scientific community as a single international organization, with unified governance and management.

The Czech Republic hosts the ELI ERIC statutory seat in Dolní Břežany, in the South of Prague, at the ELI Beamlines facility. A second facility, ELI-ALPS, is hosted by Hungary in Szeged. The Czech Republic and Hungary are joined by Italy and Lithuania as founding members, while Germany and Bulgaria are founding observers. A third ELI facility is under construction in Romania in the field of nuclear photonics and is expected to complement the current ELI ERIC facilities in the future. More information can be found on the ELI ERIC websites.

Why work for us

ELI Beamlines brings together people from all over the world. If you want to participate in the largest laser research project in the world, apply through the offer of employment at www.eli-beams.eu. We are interested in people of various professions and specializations. We can offer interesting and challenging work, dedicated training, plus the chance to work with smart people in a pleasant working environment.

The future is in laser technologies. Are you interested? Join us!

Profile can be viewed at **physicsworldjobs.com**

LOCATION
Czech Republic

NUMBER OF EMPLOYEES
350

POSITIONS RECENTLY RECRUITED FOR
Scientists, engineers, PhD students and technicians

DESIRED DEGREE DISCIPLINES/CLASS
From apprenticeship to PhD in a wide variety of domains

PRE-REQUISITES
Eligible to work in the EU

HOW TO APPLY
Apply online at **www.eli-beams.eu**

CLOSING DATE
All year round

CONTACT
ELI Beamlines
Za Radnicí 835
Dolní Břežany
Czech Republic 252 41
Tel +420 601560322
E-mail jana.zeniskova@eli-beams.eu
www.eli-beams.eu

ESRF
The European Synchrotron

JOIN THE WORLD'S MOST PIONEERING SYNCHROTRON LIGHT SOURCE

The ESRF – the European Synchrotron - is a not-for-profit research institute situated in the heart of the French Alps. Staff from 38 different countries work together to advance science and address societal challenges.

WE ARE RECRUITING

SCIENTISTS, ENGINEERS, TECHNICIANS, MANAGERS, POSTDOCS, STUDENTS, ADMINISTRATIVE STAFF

The ESRF operates the world's first 4th generation high-energy synchrotron, the Extremely Brilliant Source (EBS).
It is a centre of excellence for fundamental and innovation-driven research in condensed and living matter science.
The ESRF is an international cooperation between 20 partner countries.

We offer competitive salaries and a substantial benefits package.

Apply online

esrf.fr
in esrf_the europeansynchrotron

The ESRF is a landmark for fundamental and innovation-driven research, providing scientists from all over the world with the most brilliant X-rays to reveal the structure of materials and the mechanisms of life, down to atomic resolution.

Why work for us

For more than 30 years, the ESRF has enabled major scientific breakthroughs in the understanding of living and condensed matter. The Extremely Brilliant Source (EBS), the ESRF's 4th generation high-energy synchrotron, is opening new vistas for X-ray science. EBS provides a growing community of scientists with unique facilities to tackle the complex global challenges facing our society.

As a leader in the field of synchrotron science and technology, scientific and technical interdisciplinarity are at the core of the ESRF's success.

Training and development

Our unique and vibrant setting appeals to early-career scientists, engineers and technical staff, allowing them to train and develop their scientific and technical abilities.

This fertile environment drives the transfer of expertise to other research projects, to industry and to society. We dedicate a significant part of our yearly budget to training staff.

Our human resources policy encourages internal mobility and many of our staff members have the opportunity to change jobs during their career.

Graduate schemes

The ESRF supports many initiatives and public events aimed at sharing knowledge of science and engaging with a diverse range of audiences, including high-school students and younger children. The ESRF offers educational programmes for students of all levels.

Each year, the HERCULES European School, the Joint Universities Accelerator School (JUAS), and the International Summer Student Programme organized jointly with the Institut Laue-Langevin, offer introductory lectures and specialized courses, practical sessions, tutorials and visits to other European research facilities.

What we are looking for

We are looking for passionate and curious individuals who are eager to collaborate in an eminently international open environment. We welcome people who want to contribute to a better understanding of the world around us and to inspire and drive progress. We welcome people in many different disciplines (e.g. science, engineering, management, administration) who contribute through their diversity and professional skills to push the frontiers of science.

Profile can be viewed at
physicsworldjobs.com

LOCATION
Grenoble, France

NUMBER OF EMPLOYEES
700+ staff members; several hundred on scientist, graduate and student contracts

MAIN AREAS OF RESEARCH
The ESRF has defined seven EBS Science goals, in line with UNESCO's objectives for sustainable development and with the global challenges identifed by the EU's Horizon Europe research and innovation programme:

- Health innovation, overcoming diseases and pandemics
- Materials for tomorrow's innovative and sustainable industry
- Clean energy transition, sustainable energy storage and clean hydrogen technologies
- Planetary research and geoscience
- Environmental and climatic challenges
- Bio-based economy and food security
- Humanity and world cultural heritage

POSITIONS RECENTLY RECRUITED FOR
Scientists, postdocs, PhD students, engineers, technicians, administration, management

DESIRED DEGREE DISCIPLINES/CLASS
From apprenticeship to PhD, in various disciplines (e.g. science, engineering, management, administration)

HOW TO APPLY
Apply online at **esrf.gestmax.eu/search**. For further information contact **recruitment@esrf.fr**

CLOSING DATE
All year round

CONTACT
European Synchrotron Radiation Facility (ESRF)
71, avenue des Martyrs
Grenoble 38000
France
Tel +33 04 76 88 20 00
www.esrf.fr

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

Innovating Today, Imagining Tomorrow

The Hong Kong University of Science and Technology (HKUST) is a dynamic and young research university with a diverse international student body and faculty who relentlessly pursue excellence in teaching and research. Situated on a hillside overlooking scenic Clear Water Bay at the eastern edge of Hong Kong and the southeastern coast of China, HKUST has rapidly established itself as a leading institution on the academic world map. Since the university's founding in 1991, the physics department has grown from 9 to 33 faculty members and now has over 170 research graduate students. The department's research areas have also expanded to include condensed matter experiments and advanced materials; cold atoms, optics and quantum information; condensed matter theory, statistical and computational physics, particle physics and cosmology; soft matter and biological physics; and wave functional materials and physics.

The physics department promotes the pursuit of cutting-edge research by cultivating a collaborative, supportive, and cohesive environment. For example, the IAS Center for Fundamental Physics focuses on theoretical and experimental research about the origin, fate, and fundamental building blocks of the universe, and it has participated in several global endeavors, including the ATLAS collaboration at CERN. The emphasis of the Center for Metamaterials Research is on the design, fabrication, and characterization of different metamaterials to explore novel wave phenomena and to manipulate light and sound in ways not possible before. The Center for Complex Quantum Systems brings together a team working across several core areas with focuses on quantum materials and devices, quantum control, and software. The recently established Center for Theoretical Condensed Matter Physics strives to foster a dynamic research atmosphere and encourage international academic collaboration in a major subfield of physics. The newly established IAS Center for Quantum Matter aims to build an international hub for quantum science research, education, and innovation, fostering interdisciplinary study of quantum matter and driving advancements in quantum technologies.

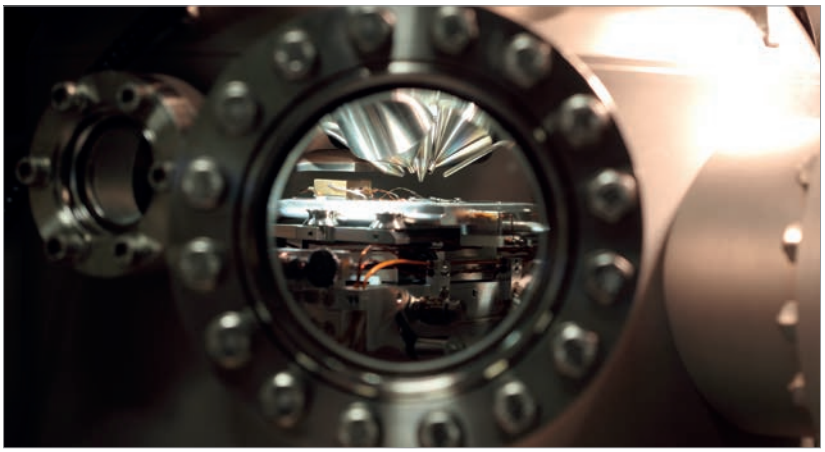
The physics department's research efforts are supported by critical infrastructure, specialized equipment, high-performance computer clusters, and services provided by the university's Central Research Facilities. For example, the Materials Characterization and Preparation Facility offers advanced characterization tools, sample and materials preparation apparatus, and a helium liquefier. The Nanosystem Fabrication Facility has state-of-the-art equipment for developing innovative micro/nano devices and systems.

The department's goals for future growth are to enhance existing core strengths and build up world-class capabilities in rapidly developing areas aligned with university initiatives, such as big data and renewable energy and new energy materials. To achieve these goals, the department will strive to continuously attract outstanding new faculty members at all ranks, with plans to recruit several faculty members in the next few years.





THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY: DEPARTMENT OF PHYSICS



The Hong Kong University of Science and Technology (HKUST) is a dynamic and young research university with a diverse international student body and faculty. Since the university's founding in 1991, the physics department has grown from nine to 33 faculty members and now has more than 170 research graduate students.

Why work for us

Situated on a hillside overlooking scenic Clear Water Bay at the eastern edge of Hong Kong and the southeastern coast of China, HKUST has rapidly established itself as a leading institution on the academic world map. The HKUST physics faculty members are currently working on a broad range of research areas, from the smallest to the largest scale. Their cutting-edge research is supported by critical infrastructure, specialized equipment, high-performance computer clusters, and services provided by the university's Central Research Facilities.

Training and development

The physics department promotes the pursuit of cutting-edge research by cultivating a collaborative, supportive and cohesive research-intensive environment and the development of talent. The department has an inclusive academic/administrative committee structure that focuses on research strategy and planning; faculty recruitment and mentoring, professional review and advancement; and postgraduate studies and affairs. In addition, the department has implemented a number of mechanisms to promote faculty diversity and to enhance the integration and professional development of junior faculty members.

Graduate schemes

The physics department manages and offers research postgraduate degrees (MPhil and PhD) in physics and in nanoscience and technology with an annual enrolment of 40–50 students. The department also manages two one-year taught Master of Science programmes: (1) MSc in Data-Driven Modeling and (2) MSc in Physics, each with an annual enrolment of approximately 60 students. Our postgraduate programmes are built upon our long-standing practices for educational enrichment, quality assurance and career development. They prepare students to attain a broad horizon of careers from academic institutions to hi-tech industries.

What we are looking for

The department's goals for future growth are to enhance existing core strengths and build up world-class capabilities in rapidly developing areas aligned with university initiatives, such as data science, new energy materials, and quantum technologies. To achieve these goals, the department will strive to continuously attract outstanding new faculty members at all ranks, with plans to recruit several outstanding faculty members in the next few years.

Profile can be viewed at **physicsworldjobs.com**

LOCATION
Hong Kong

NUMBER OF EMPLOYEES
c. 60

MAIN AREAS OF RESEARCH
Cold atoms, optics and quantum information; condensed-matter experiments and advanced materials; condensed-matter theory, statistical and computational physics; particle physics and cosmology; soft matter and biological physics; wave functional materials and physics

POSITIONS AVAILABLE
We seek candidates in (1) experimental particle physics; (2) observational cosmology; (3) theoretical particle physics and cosmology; (4) experimental condensed matter physics; (5) theoretical and computational physics; and (6) quantum science and technology

DESIRED DEGREE DISCIPLINES/CLASS
Must possess a PhD in physics or related field and provide evidence of strong research productivity

HOW TO APPLY
Apply online:
physics.hkust.edu.hk/jobs

CLOSING DATE
1 June 2026

CONTACT
Department of Physics
The Hong Kong University of Science and Technology (HKUST)
Clear Water Bay, Kowloon
Hong Kong
Tel +852 2358 7500
E-mail physjobs@ust.hk
physics.hkust.edu.hk

中国科学院高能物理研究所
Institute of High Energy Physics
Chinese Academy of Sciences

RECRUITMENT OF OVERSEAS HIGH-LEVEL TALENTS

The Institute of High Energy Physics (IHEP), a Chinese Academy of Sciences research institute, is the largest laboratory for the study of particle physics in China.

Working at IHEP are more than 1500 full-time staff, and more than 1000 postdocs and graduate students. Particle physics is a very collaborative and international field, and we have partnerships and experiment collaborations with dozens of universities and research institutions across China and worldwide.

IHEP is always searching for more excellent scientists and engineers, at all career stages, to join us in exploring this amazing universe. We have long-term and short-term opportunities available in our world-class research programmes, which include the fields of high energy physics, particle astrophysics, computer science, cosmology, synchrotron radiation, and advanced accelerator physics. In particular, IHEP is making strong efforts to internationalize our faculty members from different culture and ethnic backgrounds. We welcome all applicants worldwide.

I. Preferred research directions

• Experimental particle physics, including neutrino physics, e^+e^- collider experiments, and high-energy frontier, as well as R&D of advanced high-energy physics instrumentation • Accelerator science and technology, including innovative theoretical research and cutting-edge technological R&D for particle colliders, advanced light sources, and industrial/medical applications of accelerators • Theoretical particle physics and cosmology • High-energy astrophysics and instrumentation for X-ray/gamma-ray/neutrino astronomy and cosmic rays, and CMB experiments and science • Modern X-ray research at the High Energy Photon Source (HEPS), including Beamline Methodology and Instrumentation, Beamline Engineering, Control/Computing and Data Analysis, AI for X-ray Science • Radiotherapy and nuclear medicine • Applications of synchrotron radiation in Environmental science, Life science, Material science, and Nanoscience • Positron annihilation spectroscopy and its application • Computer Science, including Computing and storage, Scientific software, AI and QC computing • X-ray science and advanced X-ray instrumentation (diffraction, fluorescence, Compton scattering) • Materials and condensed matter science • Neutron scattering science and instrumentation

II. Positions and requirements

Position 1: Full Professors
- Professor or equivalent position from a well-known overseas university or research institute
- Possess broad international influence in one's academic field and grasp key technologies; be able to solve key technological problems; be an academic and technical leader

Position 2: Associate Professors
- Not less than three years of continuous postdoctoral work experience at a well-known overseas university or research institute
- Preferably under 40 years old
- Tenure-Track Associate Professor positions are available

Position 3: Tenure-Track Assistant Professors
- Not less than two years of continuous postdoctoral work experience at a well-known university or research institute
- Preferably under 35 years old

Position 4: Key Technologists
- Research experience from a well-known overseas or domestic university or research institute
- Significant technological achievements.
- Preferably under 40 years old

III. Benefits for all positions

• Sufficient start-up funding • Competitive salary and housing subsidy • Well-furnished apartments to rent • Relocation expenses • All standard benefits: insurance package, etc. • Help to settle down and enroll children into kindergarten and school

IV. How to apply

Please submit your Curriculum Vitae to **lianggj@ihep.ac.cn**.

Inquiries

Mr. Liang, E-mail: **lianggj@ihep.ac.cn**, Tel: (86) 010-8823 8366

english.ihep.cas.cn • english.ihep.cas.cn/csns

INSTITUTE OF HIGH ENERGY PHYSICS – CHINESE ACADEMY OF SCIENCES

The Institute of High Energy Physics (IHEP), a Chinese Academy of Sciences research institute, is China's biggest laboratory for the study of particle physics. We want to understand the universe better at the most fundamental level – from the smallest subatomic particles to the large-scale structure of the cosmos. We also want to use the knowledge and technology that comes from our research for the good of humanity. As well as theoretical and experimental research into particle and astroparticle physics, we have a broad range of research in related fields such as accelerator technologies and nuclear analysis techniques. The institute also provides beam facilities for researchers in other fields of study.

Why work for us

Working at IHEP are more than 1500 full-time staff, as well as more than 1000 postdocs and graduate students. Particle physics is a very collaborative and international field, and we have partnerships and experiment collaborations with dozens of universities and research institutions across China and worldwide.

IHEP is always searching for more excellent scientists and engineers, at all career stages, to join us in exploring this amazing universe. In particular, IHEP is making strong efforts to internationalize our faculty members from different culture and ethnic backgrounds. We welcome all applicants worldwide.

We have doctoral programmes in six scientific fields, as well as engineering doctoral programmes in nuclear technology and computer technology. We also offer five full-time professional master's degree programmes in engineering. For those at a later stage in their careers, we offer formal postdoctoral training in physics and in nuclear science and technology.

Recruitment objectives

Based on the needs of the research areas and the disciplines development of IHEP, we are now publicly recruiting overseas outstanding talents and scholars of relevant disciplines who possess research abilities and innovation awareness.

What we are looking for

We are always looking for more scientists and engineers, at all career stages, to join us in exploring this amazing universe. Whether you are a student, postdoc or established career scientist, why not consider bringing your skills to IHEP? There are long- and short-term opportunities available in our world-class research programmes, including high-energy physics, particle astrophysics, cosmology, synchrotron radiation and advanced accelerator physics.

Profile can be viewed at **physicsworldjobs.com**

LOCATION
Beijing, China

NUMBER OF EMPLOYEES
1500+

MAIN AREAS OF RESEARCH
Experimental particle and nuclear physics, theoretical physics, astronomy and astrophysics, nuclear technology, multidisciplinary research, accelerators, neutron physics and condensed-matter physics

POSITIONS RECENTLY RECRUITED FOR
Postdoctoral, tenure-track, research, senior research

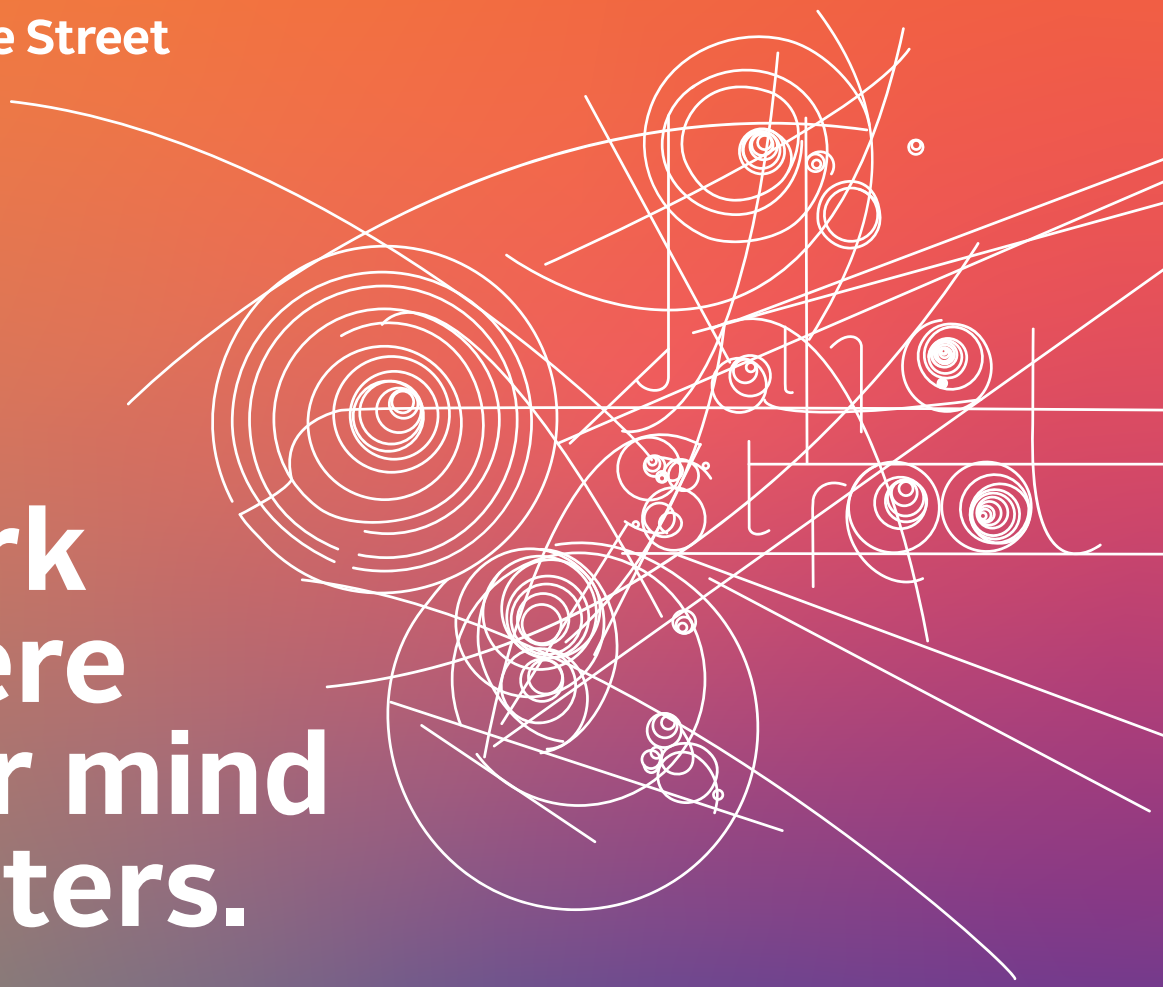
DESIRED DEGREE DISCIPLINES/CLASS
Minimum 2.1

HOW TO APPLY
Contact **lianggj@ihep.ac.cn**

CLOSING DATE
All year round

CONTACT
Institute of High Energy Physics, CAS
19B Yuquan Road
Shijingshan District
Beijing
China 100049
Tel +86 10 88238366
E-mail lianggj@ihep.ac.cn
english.ihep.cas.cn

Jane Street



Work where your mind matters.

Jane Street is a global trading firm with offices in London, New York, Hong Kong, Singapore, and Amsterdam. Our approach is rooted in technology and rigorous quantitative analysis, but our success is driven by our people.

We are always recruiting top candidates and we invest heavily in teaching and training. You don't need finance experience to work with us; we look for curious people of any background with a passion for critical thinking and creative problem solving. In other words, people like you!

Explore our open roles:

The design featured above is inspired by the spiral and line formations created from bubble chambers, which slow down and trap particles to show their paths. The negative space within the bubble chamber formation reveals the Jane Street logo.

Jane Street

Jane Street works differently. We are a quantitative trading firm active on more than 200 trading venues across 45 countries. As a liquidity provider and market maker, we help form the backbone of global markets. Our approach is rooted in technology and rigorous quantitative analysis, but our success is driven by our people.

Why work for us

Work at Jane Street is exciting and challenging. We trade in incredibly competitive, rapidly evolving environments, and feedback on successes and failures is quick and tangible. This allows for constant evaluation and improvement of our strategies and performance.

Our culture prizes intellectual humility, openness and curiosity. Staying humble allows us to question our assumptions and to update our views based on new information. Being curious and asking "why" are critical. We talk openly about mistakes because that's the best way to learn from them.

Training and development

We invest heavily in teaching and training. There's a library and a classroom in every office, because deepening your understanding of something is considered real work. Guest lectures, classes and conferences round out the intellectual exchanges that happen every day. People grow into long careers at Jane Street because there are always new and interesting problems to solve, systems to build, and theories to test. More than 20 years after our founding, it still feels like we're just getting started.

What we are looking for

If you've never thought about a career in finance, you're in good company. Many of us had little to no experience in economics or finance before working here. We look for curious people from any background with a passion for critical thinking and creative problem solving. In other words, people like you.

Profile can be viewed at
physicsworldjobs.com

LOCATIONS
London, UK; New York, US; and Hong Kong

NUMBER OF EMPLOYEES
3000

POSITIONS RECENTLY RECRUITED FOR
Quantitative trader, quantitative research, machine learning research

PRE-REQUISITES
Eligible to work in the UK

HOW TO APPLY
View current vacancies and apply online
www.janestreet.com/join-jane-street/open-roles/

CLOSING DATE
All year round

CONTACT
Jane Street
2 & A Half Devonshire Square
Premier Place
London EC2M 4UJ
UK
Tel +44 (0)20 3787 3200
www.janestreet.com

IMPRS for Quantum Science and Technology
INTERNATIONAL MAX PLANCK RESEARCH SCHOOL

MCQST

Munich Quantum Valley

Join the Quantum Community in Bavaria

Revolutionize quantum science and technology within a broad, collaborative, and rapidly developing reseach community. Our close network of institutions and research organizations offers educational and research opportunities for scientists from various fields at all career stages.

- **IMPRS-QST** is a joint graduate program uniting the Max Planck Institute of Quantum Optics, Ludwig Maximilian University of Munich, and the Technical University of Munich.

  IMPRS-QST serves as a platform for early-career quantum researchers, fostering collaboration, scientific exchange both in Germany and internationally, and comprehensive transferable skills development. In partnership with MCQST, IMPRS-QST offers several highly competitive doctoral fellowships annually, supporting exceptional young scientists as they pursue their PhDs within leading partner research groups..

  Find more at imprs-quantum.mpg.de!

- **MCQST** is a Cluster of Excellence funded by the German Research Foundation (DFG, Deutsche Forschungsgemeinschaft). More than 500 scientists from various disciplines are working on an ambitious research program that covers all areas of quantum science and technology from basic research to applications.

  MCQST encourages interdisciplinary collaborations and offers support programs on all career levels ranging from bachelor's students up to independent researchers. With a multitude of different events and outreach formats, MCQST is a driving force when it comes to community building.

  Find more at mcqst.de!

- **MQV** is an initiative supported by the Bavarian state government, uniting quantum activities in Bavaria under one umbrella. Its vision is to create an ecosystem for quantum technologies that combines research, technology development, and education in academia with industry.

  MQV focuses on developing competitive quantum computers and aims to fabricate systems with up to 1000 qubits within 5 to 10 years and develop fault-tolerant quantum computers in the long term. MQV provides annual doctoral scholarships to talented physicists, computer scientists, and engineers to do their PhD in quantum-related fields at any Bavarian university.

  Find more at munich-quantum-valley.de!

Shape the future with us in the Bavarian Quantum Community!

We are comprised of several organizations: the International Max Planck Research School for Quantum Science and Technology (IMPRS-QST), the Munich Center for Quantum Science and Technology (MCQST), and the Munich Quantum Valley (MQV). Together, we form a collaborative quantum science and technology hub in Bavaria. In cooperation with multiple research institutions and industry partners, we unite to advance quantum computing, attracting experts in physics, mathematics, computer science and engineering. We also provide a dynamic platform for students and professionals in quantum science.

Why study with us

MQV and MCQST, as well as other partners, offer a comprehensive educational environment for quantum studies. Various universities within the network provide specialized bachelor and master courses and programmes, doctoral and postdoc fellowships, and research internships, emphasizing the integration of research, technology development, and education in quantum science and technology. All three programmes offer unique opportunities for collaboration, diversity and career advancement in quantum fields, making Munich a perfect destination for early quantum science studies.

Training and development

In Munich, students and professionals have access to multiple training and development opportunities. IMPRS-QST graduate school focuses on doctoral training across quantum disciplines. MCQST offers support structures on all career levels, summer bachelor programmes, master's and doctoral programs, as well as opportunities for postdocs, and equal opportunity programmes. MQV offers a wide choice of research groups and provides annual doctoral fellowships. These programmes collectively offer a comprehensive pathway for those aiming to excel in the quantum science and technology sector.

What we are looking for

We're looking for dedicated researchers with strong analytical and problem-solving skills, particularly in physics, engineering, mathematics, computer science, or related fields. The ability to work in international multidisciplinary teams, a strong fundamental or applied research background, and commitment to scientific excellence are key. If you show passion for discovery in quantum computing, quantum communication, or quantum materials and if you're ready to push the boundaries of quantum science and technology, join us!

Profile can be viewed at
physicsworldjobs.com

LOCATION
Munich, Bayern, Germany

NUMBER OF RESEARCHERS
15+ academic institutions

MAIN AREAS OF RESEARCH
IMPRS-QST: atomic physics and quantum optics, solid-state physics, quantum information theory, and quantum many-body systems.
MCQST: quantum information theory, quantum simulation, quantum computing, quantum communication, quantum metrology and sensing, quantum matter, and explorative research in quantum science.
MQV: quantum computing technologies including superconducting qubits, neutral-atom qubits, trapped-ion qubits, quantum computing theory, and applications

POSITIONS RECENTLY RECRUITED FOR
All institutions within our network regularly recruit a variety of positions across research fields and job levels

DESIRED DEGREE DISCIPLINES/CLASS
From interns to trainees, from students to graduates, from PhD to postdoc, from postdoc to management positions – all in a wide variety of specializations

HOW TO APPLY
Please find information about our campaigns on IMPRS-QST, MCQST, and MQV websites and social media

CLOSING DATE
All year round

CONTACT
Munich Quantum Valley
Leopoldstr. 244
Munich 80807
Germany
Tel +49 89 208039-172
E-mail info@munich-quantum-valley.de
munich-quantum-valley.de

oxford ionics
an IonQ company

Quantum is now
Join us to pioneer its future

At Oxford Ionics, an IonQ company, we're on a mission to build the world's most powerful quantum computers, capable of redefining how we solve some of today's most pressing problems.

We were founded on the premise that, in order to unlock powerful quantum computing, we needed to combine scale with ultra-high performance. So we flipped the traditional way of building trapped-ion quantum computers on its head.

Instead of relying on lasers to manipulate our qubits, we developed a novel technology called 'Electronic Qubit Control'. This fundamental innovation allows us to trap and control our qubits through electronics integrated directly onto a silicon chip.

Through this approach, we are able to produce our systems via the standard semiconductor industry while also achieving record-breaking performance – including 99.99% two-qubit gate fidelity.

We're looking for ambitious individuals excited by the opportunity to join us as we rewrite the rulebook and pioneer the future of quantum computing.

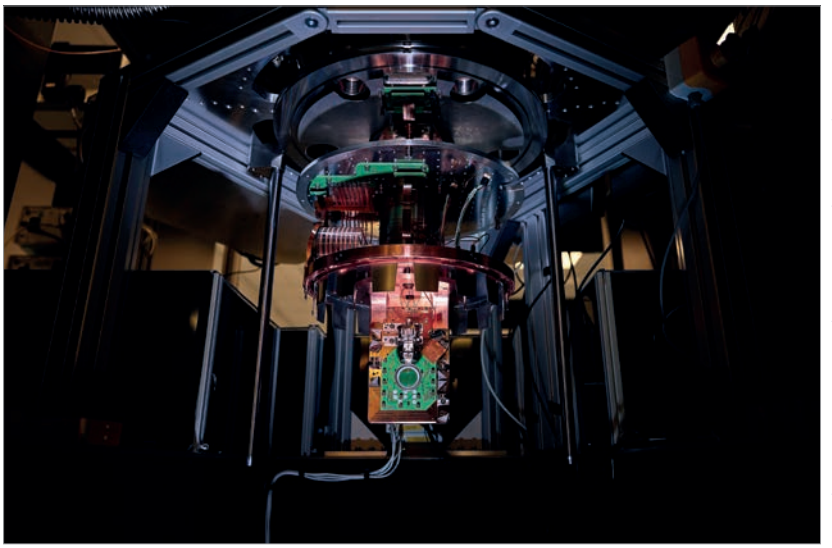
Our teams are made up of a diverse set of talent across departments like physics, engineering, software, architecture, and go-to-market. Common roles include:

- Quantum Scientists
- Quantum System Scientists
- Software Engineers
- Mechanical Engineers

Ready to make history? Join our team today

Check out all available opportunites on our website at **www.oxionics.com/careers**

oxford ionics
an IonQ company



At Oxford Ionics, an IonQ company, we're building the world's most powerful quantum computers – revolutionizing how organizations solve era-defining challenges. We've pioneered a patented technology that controls trapped-ion qubits with electronics instead of lasers, allowing us to combine the might of the semiconductor industry with record-breaking quantum performance.

Why work for us

We've never let the precedent of "how things used to be done" define us. Every day, our team is innovating new solutions and tackling complex problems. This philosophy is the foundation of our success, yielding the highest-performing quantum computing platform in the world – produced entirely on mass-manufacturable technology. Along with a highly competitive package, joining us means working alongside an ambitious team of experts across a range of disciplines as we raise the pace and reshape the future of the industry.

Training and development

Our people are at the heart of everything we achieve. As we work towards our mission to unlock fault-tolerant quantum computing, we are passionate about investing in our employees' learning and development throughout their journey with us. We offer a comprehensive range of benefits designed to support you both professionally and personally. This includes an annual budget for learning opportunities, whether that's through attending or presenting at industry conferences or through funded training programmes.

What we are looking for

We're looking for dedicated individuals operating at the cutting edge of their fields, whether that's in physics, engineering, software, or go-to-market. Our employees are focused on unleashing the power of quantum computing to solve real-world challenges for our customers. We work with clarity of vision, clear communication, and ruthless prioritization to go where no one has gone before – delivering record-breaking technology along the way. If you're passionate about forging a new path in quantum computing, we want you to join us.

Profile can be viewed at
physicsworldjobs.com

LOCATIONS
Oxford, UK; Zurich, Switzerland; Boulder, Colorado, US

NUMBER OF EMPLOYEES
100+

MAIN AREAS OF RESEARCH
Quantum computing, quantum physics, ion trapping, AMO physics

POSITIONS RECENTLY RECRUITED FOR
We have recently recruited for several positions, including quantum scientist, optical scientist, packaging engineer and software engineer

DESIRED DEGREE DISCIPLINES/CLASS
Physics, computer science, quantum physics and engineering

HOW TO APPLY
View **www.oxionics.com/careers**

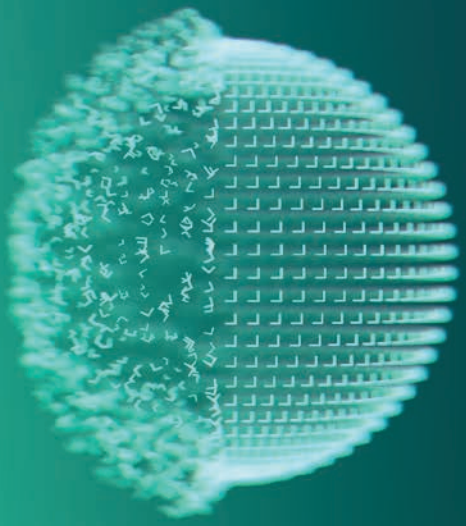
CLOSING DATE
All year round

CONTACT
Oxford Ionics, an IonQ company
Oxford Technology Park, Unit 6A
Technology Drive
Oxford OX5 1GN
UK
E-mail info@oxionics.com
www.oxionics.com

Are you ready to tackle quantum's biggest challenge?

Collaborate with our team of world-leading scientists and engineers to achieve something that has never been done before: build an integrated platform for real-time quantum error correction.

Riverlane is the world leader in Quantum Error Correction (QEC)



Areas of focus

Our teams require a range of talent, from entry level interns and graduates, to highly experienced team members. Typical roles include:

- Quantum Scientists and Researchers
- Software Engineers (including Embedded, System Software & Compiler)
- Hardware Engineers (FPGA, ASIC, Verification)
- Project & Programme Managers
- Product Management

Today's quantum computers are overwhelmed by system errors, making it impossible to unlock their full potential. To truly realise the transformative power of quantum technology, we need to reduce these errors by 10,000x. At least.

Riverlane builds QEC tools and technology that correct quantum errors in real-time. It's a complex challenge that requires dedicated and diverse talent. This is where you come in.

You don't necessarily need quantum experience—just a curious mind, a love for solving challenging problems and a desire to make a real impact.

At Riverlane, every day presents an exciting new challenge. Our technical teams collaborate to publish world-changing research and file important patents to help us deliver this ground-breaking technology.

Your work will push the boundaries of what's possible. Together, we'll shape the future of computing.

Are you ready for the challenge?

Apply today!

Check out our current opportunities at **www.riverlane.com/jobs**

river lane

Riverlane is the world leader in quantum error correction (QEC). We are building the QEC technology and tools that accelerate the quantum computing industry's path to utility-scale systems that can transform multiple industries.

Why work for us

Join us to shape the future of computing. As part of our award-winning team, you'll contribute to our unique, inclusive culture that values diverse perspectives and fosters collaboration. With a generous benefits package, Riverlane empowers you to reach your full potential in a supportive environment of continuous learning, where everyone's ideas and experiences drive innovation. You'll gain exposure to the world's leading quantum computing companies – our partners – pushing the boundaries of every type of quantum computer and redefining what's possible.

Training and development

Riverlane offers a fantastic environment for professional growth. We recognize everyone learns differently, so we offer a range of learning opportunities to help you develop and achieve your full potential. From on-the-job learning and regular technical talks, to external events and conferences, coaching and much more, we support you to develop your skills in a way that works for you. Our clear career development frameworks ensure you receive regular feedback and have a transparent path to accelerate your career.

Graduate schemes

We offer summer internships for bachelor's, master's, and PhD students (10–12 weeks), along with longer PhD internships (3–6 months), providing hands-on experience at the cutting edge of quantum computing. Our graduate scheme is designed for STEM graduates to develop their quantum engineering skills, with the chance to grow into future leaders in the quantum industry. Join us for an unparalleled opportunity to kickstart your career and make quantum computing useful, sooner.

What we are looking for

At Riverlane, our greatest strength is our people. We seek curious, collaborative individuals who are passionate about advancing error-corrected quantum computing. Prior quantum experience is not always required – if you're eager to learn and love solving complex problems, we want to hear from you! We value collaboration, openness, pioneering spirits, curiosity and a user-focused mindset. Join us to help build the future of quantum computing, where your skills and ideas will make a real impact.

Profile can be viewed at
physicsworldjobs.com

LOCATIONS
Cambridge, UK; Cambridge, Boston, US; Delft, The Netherlands

NUMBER OF EMPLOYEES
160+

MAIN AREAS OF RESEARCH
Quantum error correction, quantum decoding, quantum algorithms, fault tolerant applications

POSITIONS RECENTLY RECRUITED FOR
Quantum error correction researcher; engineering roles, including: testing engineer, embedded software, FPGA/ASIC, digital design; graduates and interns

DESIRED DEGREE DISCIPLINES/CLASS
We hire at all levels, and previous qualifications and experience will depend on the role and level of seniority. A background in quantum computing is often not required. Our technical roles typically require a background in computer science, physics or maths. Please see our website for specific job requirements

PRE-REQUISITES
Eligible to work in the UK or US

HOW TO APPLY
View **www.riverlane.com/jobs**

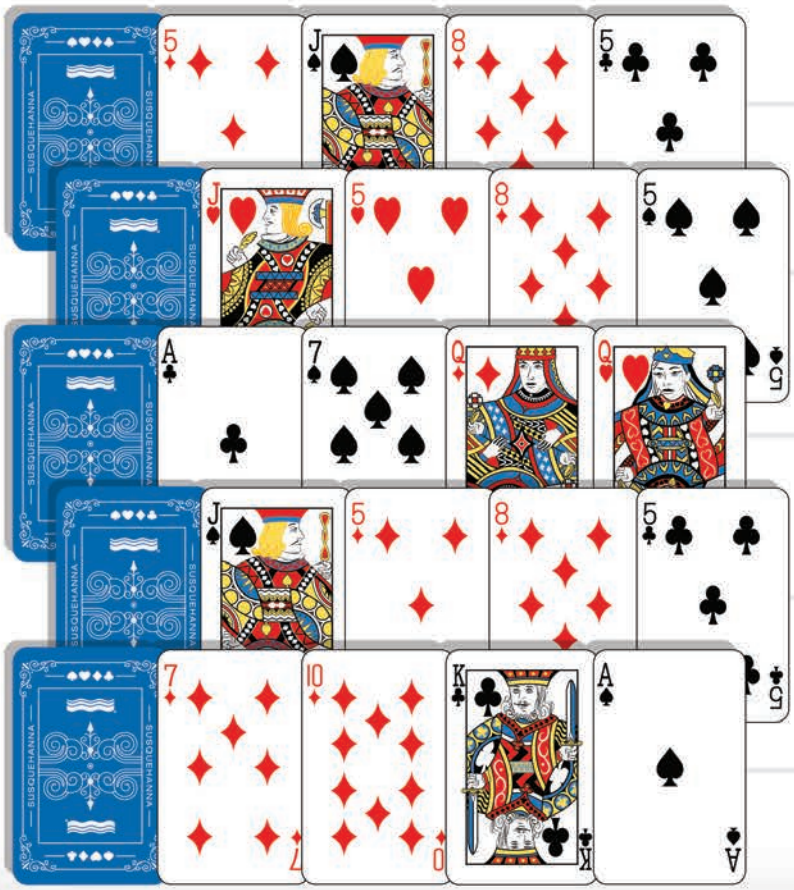
CLOSING DATE
All year round

CONTACT
Riverlane
St Andrew's House
59 St Andrew's Street
Cambridge CB2 3BZ
UK
E-mail team@riverlane.com or jobs@riverlane.com
www.riverlane.com

LIKE PUZZLES? WE DO, TOO.

Here's an interesting fact: given five random cards, you can select and arrange four out of the five cards such that someone else can deduce the identity of the unused card. The following sets of cards all use the same encoding scheme. Can you figure out the last hidden card and the pattern?

Attending the Global Physics Summit? Stop by our Career Fair table to solve another puzzle.



Hidden Card
Jack of Diamonds

Hidden Card
King of Hearts

Hidden Card
Two of Clubs

Hidden Card
Two of Spades

Hidden Card
?

"At Susquehanna, I still get to do all of the things that I loved about grad school."

"Before I joined Susquehanna, I was a PhD student in high energy theoretical physics. To some extent, finance is another approach to understand the world, much like physics in many ways. Both fields involve research that requires understanding underlying mechanisms, identifying relationships between variables, and constructing models to describe and predict their behaviors. As a result, transitioning from academia to the finance industry was quite seamless for me."

- Susquehanna Quant

Learn more about careers in quant

SUSQUEHANNA

Susquehanna is a global quantitative trading firm powered by scientific rigour, curiosity and innovation. Our culture is intellectually driven and highly collaborative, bringing together researchers, engineers and traders to design and deploy impactful strategies in our systematic trading environment. To meet the unique challenges of global markets, Susquehanna applies machine learning and advanced quantitative research to vast datasets in order to uncover actionable insights and build effective strategies. By uniting deep market expertise with cutting-edge technology, we excel in solving complex problems and pushing boundaries together.

Why work for us

Working at Susquehanna allows you to apply your quantitative skills and systematic thinking to trading environments. Our employees are constantly testing their theories in real-time; we give you ample space to think deeply about the questions you are contemplating and provide a variety of tools to solve complex problems. Beyond the work, we pride ourselves on fostering a collaborative and meritocratic structure where people are rewarded based on impact.

Training and development

As a quant, you will begin your career in the Quantitative Research + Systematic Trading Program, which bridges the gap between academia and industry. You will gain insights into financial markets to ensure a well-rounded understanding of the industry. We teach you how to gather, analyse, and interpret financial data using internal data sets. This foundation prepares you to develop practical strategies for real-world application. Our trading floor serves as an unlimited source of discussion for learning and development.

What we are looking for

Susquehanna hires STEM PhDs who are interested in applying their research, analysis and development skills to the financial markets. Quantitative researchers develop the building blocks of trading strategies, requiring exceptional attention to detail and a relentless drive for deeper understanding. Quantitative systematic traders enhance and integrate the building blocks that our researchers develop to monetise strategies and manage risk. Both roles require skill in mathematics, statistics and programming to aid in solving complex problems in our trading environment.

Profile can be viewed at
physicsworldjobs.com

LOCATIONS

Dublin, Ireland; London, UK; Philadelphia, New York, US, Sydney, Australia

POSITIONS RECENTLY RECRUITED FOR

Quantitative trader,
quantitative systematic trader,
quantitative researcher,
machine learning researcher,
quantitative data engineer,
software developer

HOW TO APPLY

View our open roles at
sig.com/careers

CLOSING DATE

All year round

CONTACT

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International Centre
Memorial Road, IFSC
Dublin 1
D01 T6T0
Ireland
Tel +353 1 802 8000
sig.com

What can a physicist do in the nuclear energy industry?

With the push to move away from fossil fuels, the UK is turning to nuclear power. New reactors are being built and new technology is being developed, but there is a skills shortage. **Sarah Tesh** talks to six physicists working across the nuclear energy industry, highlighting how a background in physics can open many doors in this expanding sector

EDF Energy

Big energy The 245-tonne domed roof has been lowered onto the first of two new reactors being built at Hinkley Point C.

Nuclear power in the UK is on the rise – and so too are the job opportunities for physicists. Whether it's planning and designing new reactors, operating existing plants safely and reliably, or dealing with waste management and decommissioning, physicists play a key role in the burgeoning nuclear industry.

The UK currently has nine operational reactors across five power stations, which together provided 12% of the country's electricity in 2024. But the government wants that figure to reach 25% by 2050 as part of its goal to move away from fossil fuels and reach net zero. Some also think that nuclear energy will be vital for powering data centres for AI in a clean and efficient way.

While many see fusion as the future of nuclear power, it is still in the research and development stages, so fission remains where most job opportunities lie. Although eight of the current fleet of nuclear reactors are to be retired by the end of this decade, the first of the next generation are already in construction. At Hinkley Point C in Somerset, two new reactors are being built with costs estimated to reach £46bn; and in July 2025, Sizewell C in Suffolk got the final go-ahead.

Rolls-Royce, meanwhile, has just won a government-funded bid to develop small modular reactors (SMR) in the UK. Although currently an unproven technology, the hope is that SMRs will be cheaper and quicker to build than traditional plants, with proponents saying that each reactor could produce enough affordable emission-free energy to power about 600,000 homes for at least 60 years.

The renaissance of the nuclear power industry has led to employment in the sector growing by 35% between 2021 and 2024, with the workforce reaching over 85,000. However – as highlighted in a 2025 members survey by the Nuclear Institute – there are concerns about a skills shortage. In fact, the Nuclear Skills Plan was detailed by the Nuclear Skills Delivery Group in 2024 with the aim to address this problem.

Supported by an investment of £763m by 2030 from the UK government and industry, the plan's objectives include quadrupling the number of PhDs in nuclear fission, and doubling the number of graduates entering the workforce. It also aims to provide opportunities for people to "upskill" and join the sector mid-career. The overall hope is to fill 40,000 new jobs by the end of the decade.

Having a degree in physics can open the door to any part of the nuclear-energy industry, from designing, operating or decommissioning a reactor, to training staff, overseeing safety or working as a consultant. We talk to six nuclear experts who all studied physics at university but now work across the sector, for a range of companies – including EDF Energy and Great British Energy–Nuclear. They give a quick snapshot of their "nuclear journeys", and offer advice to those thinking of following in their footsteps.

Design and construction

Michael Hodgson, lead engineer, Rolls-Royce SMR

Michael Hodgson

My interest in nuclear power started when I did a project on energy at secondary school. I learnt that there were significant challenges around the world's future energy demands, resource security, and need for clean generation. Although at the time these were not topics commonly talked about, I could see they were vital to work on, and thought nuclear would play an important role.

I went on to study physics at the University of Surrey, with a year at Michigan State University in the US and another at CERN. After working for a couple of years, I returned to Surrey to do a part-time master's in radiation detection and instrumentation, followed a few years later by a PhD in radiation-hard semiconductor neutron detectors.

Up until recently, my professional work has mainly been in the supply chain for nuclear applications, working for Thermo Fisher Scientific, Centronic and Exosens. Nuclear power isn't made by one company, it's a combination of thousands of suppliers and sub-suppliers, the majority of which are small to medium-sized enterprises that need to operate across multiple industries. My job was primarily a technical design authority for manufacturers of radiation detectors and instruments, used in applications such as reactor power monitoring, health physics, industrial controls, and laboratory equipment, to name but a few. Now I work at Rolls-Royce SMR as a lead engineer for the control and instrumentation team. This role involves selecting and qualifying the thousands of different detectors and control instruments that will support the operation of small modular reactors.

> A career in nuclear energy can take many forms. The industry is comprised of a range of sectors and thousands of organizations forming a complex strucutre

Beyond the technical knowledge I've gained throughout my education, studying physics has also given me two important skills. Firstly, learning how to learn – this is critical in academia but it also helps you step into any professional role. The second skill is the logical, evidence-based problem solving that is the cornerstone of science, which is a powerful tool in any work setting.

A career in nuclear energy can take many forms. The industry is comprised of a range of sectors and thousands of organizations that altogether form a complex support structure. My advice for any role is that knowledge is important, but experience is critical. While studying, try to look for opportunities to gain professional experience – this may be industry placements, research projects, or even volunteering. And it doesn't have to be in your specific area of interest – cross-disciplinary experience breeds novel thinking. Utilizing these opportunities can guide your professional interests, set your CV apart from your peers, and bring pragmatism to your future roles.

Reactor operation

Katie Barber, nuclear reactor operator and simulator instructor at Sizewell B, EDF

Katie Barber

I studied physics at the University of Leicester simply because it was a subject I enjoyed – at the time I had no idea what I wanted to do for a career. I first became interested in nuclear energy when I was looking for graduate jobs. The British Energy (now EDF) graduate scheme caught my eye because it offered a good balance of training and on-the-job experience. I was able to spend time in multiple different departments at different power stations before I decided which career path was right for me.

At the end of my graduate scheme, I worked in nuclear safety for several years. This involved reactor physics testing and advising on safety issues concerning the core and fuel. It was during that time I became interested in the operational response to faults. I therefore applied for the company's reactor operator training programme – a two-year course that was a mixture of classroom and simulator training. I really enjoyed being a reactor operator, particularly during outages when the plant would be shutdown, cooled, depressurised and dissembled for refuelling before reversing the process to start up again. But after almost 10 years in the control room, I wanted a new challenge.

> A graduate training scheme is an excellent way to get an overview of the business, and gain experience across many different disciplines

Now I develop and deliver the training for the control-room teams. My job, which includes simulator and classroom training, covers

everything from operator fundamentals (such as reactor physics and thermodynamics) and normal operations (e.g. start up and shutdown), through to accident scenarios.

My background in physics gives me a solid foundation for understanding the reactor physics and thermodynamics of the plant. However, there are also a lot of softer skills essential for my role. Teaching others requires the ability to present and explain technical material; to facilitate a constructive debrief after a simulator scenario; and to deliver effective coaching and feedback. The training focuses as much on human performance as it does technical knowledge, highlighting the importance of effective teamwork, error prevention and clear communications.

With Hinkley Point C construction progressing well and the recent final investment decision for Sizewell C, now is an exciting time to join the nuclear industry. A graduate training scheme is an excellent way to get an overview of the business, and gain experience across many different departments and disciplines, before making the decision about which area is right for you.

Nuclear safety

Jacob Plummer, principal nuclear safety inspector, Office for Nuclear Regulation

Jacob Plummer

I'd been generally interested in nuclear science throughout my undergraduate physics degree at the University of Manchester, but this really accelerated after studying modules in applied nuclear and reactor physics. The topic was engaging, and the nuclear industry offered a way to explore real-world implementation of physics concepts. This led me to do a master's in nuclear science and technology, also at Manchester (under the Nuclear Technology Education Consortium), to develop the skills the UK nuclear sector required.

My first job was as a graduate nuclear safety engineer at Atkins (now AtkinsRealis), an engineering consultancy. It opened my eyes to the breadth of physics-related opportunities in the industry. I worked on new and operational power station projects for Hitachi-GE and EDF, as well as a variety of defence new-build projects. I primarily worked in hazard analysis, using modelling and simulation tools to generate evidence on topics like fire, blast and flooding to support safety case claims and inform reactor designs. I was also able to gain experience in project management, business development, and other energy projects, such as offshore wind farms. The analytical and problem solving skills I had developed during my physics studies really helped me to adapt to all of these roles.

> It's a great time to join the nuclear industry with a huge amount of activity and investment across the nuclear lifecycle. I'd advise early-career professionals to cast the net wide when looking for roles

Currently I work as a principal nuclear safety inspector at the Office for Nuclear Regulation. My role is quite varied. Day to day I might be assessing safety case submissions from a prospective reactor vendor; planning and delivering inspections at fuel and waste sites; or managing fire research projects as part of an international programme. A physics background helps me to understand complex safety arguments and how they link to technical evidence; and to make reasoned and logical regulatory judgements as a result.

It's a great time to join the nuclear industry with a huge amount of activity and investment across the nuclear lifecycle. I'd advise early-career professionals to cast the net wide when looking for roles. There are some obvious physics-related areas such as health physics, fuel and core design, and criticality safety, but physics skills and experience are valued across the nuclear industry, from hazards and fault assessment to security, safeguards, project management and more. Don't be limited by the physicist label.

Waste and decommissioning

Becky Houghton, principal consultant, Galson Sciences Ltd

Egis

My interest in a career in nuclear energy sparked mid-way through my degree in physics and mathematics at the University of Sheffield, when I was researching "safer nuclear power" for an essay. Several rabbit holes later, I had discovered a myriad of opportunities in the sector that would allow me to use the skills and knowledge I'd gained through my degree in an industrial setting.

My first job in the field was as a technical support advisor on a graduate training scheme, where I supported plant operations on a nuclear licensed site. Next, I did a stint working in strategy development and delivery across the back end of the fuel cycle, before moving into consultancy. I now work as a principal consultant for Galson Sciences Ltd, part of the Egis group. Egis is an international multi-disciplinary consulting and engineering firm, within which Galson Sciences provides specialist nuclear decommissioning and waste management consultancy services to nuclear sector clients worldwide.

> Whichever part of the nuclear fuel cycle you end up in, the work you do makes a difference

Ultimately, my role boils down to providing strategic and technical support to help clients make decisions. My focus these days tends to be around radioactive waste management, which can mean anything from analysing radioactive waste inventories to assessing the environmental safety of disposal facilities.

In terms of technical skills needed for the role, data analysis and the ability to provide high-quality reports on time and within budget are at the top of the list. Physics-wise, an understanding of radioactive decay, criticality mechanisms and the physico-chemical properties of different isotopes are

fairly fundamental requirements. Meanwhile, as a consultant, some of the most important soft skills are being able to lead, teach and mentor less experienced colleagues; develop and maintain strong client relationships; and look after the well-being and deployment of my staff.

My advice to anyone looking to go into the nuclear energy is to go for it. There are lots of really interesting things happening right now across the industry, all the way from building new reactors and operating the current fleet, to decommissioning, site remediation and waste management activities. Whichever part of the nuclear fuel cycle you end up in, the work you do makes a difference, whether that's by cleaning up the legacy of years gone by or by helping to meet the UK's energy demands. Don't be afraid to say "yes" to opportunities even if they're outside your comfort zone, keep learning, and keep being curious about the world around you.

Uranium enrichment

Mark Savage, nuclear licensing manager, Urenco UK

Mark Savage

As a child, I remember going to the visitors' centre at the Sellafield nuclear site – a large nuclear facility in the north-west of England that's now the subject of a major clean-up and decommissioning operation. At the centre, there was a show about splitting the atom that really sparked my interest in physics and nuclear energy.

I went on to study physics at Durham University, and did two summer placements at Sellafield, working with radiometric instruments. I feel these placements helped me get a place on the Rolls-Royce nuclear engineering graduate scheme after university. From there I joined Urenco, an international supplier of uranium enrichment services and fuel cycle products for the civil nuclear industry.

> I would always recommend anyone interested in working in nuclear energy to look for work experience

While at Urenco, I have undertaken a range of interesting roles in nuclear safety and radiation physics, including criticality safety assessment and safety case management. Highlights have included being the licensing manager for a project looking to deploy a high-temperature gas-cooled reactor design, and presenting a paper at a nuclear industry conference in Japan. These roles have allowed me to directly apply my physics background – such as using Monte Carlo radiation transport codes to model nuclear systems and radiation sources – as well as develop broader knowledge and skills in safety, engineering and project management.

My current role is nuclear licensing manager at the Capenhurst site in Cheshire, where we operate a number of nuclear facilities including three uranium enrichment plants, a uranium chemical deconversion facility, and waste management facilities. I lead a team who ensure the site complies with regulations, and achieves the required approvals for our programme of activities. Key skills for this role include building relationships with internal and external stakeholders; being able to understand and explain complex technical issues to a range of audiences; and planning programmes of work.

Some form of relevant experience is always advantageous, so I would always recommend anyone interested in working in nuclear energy to look for work experience visits, summer placements or degree schemes that include working with industry.

Skills initiatives

Saralyn Thomas, skills lead, Great British Energy – Nuclear

Great British Energy – Nuclear

During my physics degree at the University of Bristol, my interest in energy led me to write a dissertation on nuclear power. This inspired me to do a master's in nuclear science and technology at the University of Manchester under the Nuclear Technology Education Consortium. The course opened doors for me, such as a summer placement with the UK National Nuclear Laboratory, and my first role as a junior safety consultant with Orano.

> Get involved now – the UK's nuclear sector is seeing significant government commitment, but there is a major skills gap

I worked in nuclear safety for roughly 10 years, progressing to principal consultant with Abbott Risk Consulting, but decided that this wasn't where my strengths and passions lay. During my career, I volunteered for the Nuclear Institute (NI), and worked with the society's young members group – the Young Generation Network (YGN). I ended up becoming chair of the YGN and a trustee of the NI, which involved supporting skills initiatives including those feeding into the Nuclear Skills Plan. Having a strategic view of the sector and helping to solve its skills challenges energized me in a new way, so I chose to change career paths and moved to Great British Energy – Nuclear (GBE-N) as skills lead. In this role I plan for what skills the business and wider sector will need for a nuclear new build programme, as well as develop interventions to address skills gaps.

GBE-N's current remit is to deliver Europe's first fleet of small modular reactors, but there is relatively limited experience of building this technology. Problem-solving skills from my background in physics have been essential to understanding what assumptions we can put in place at this early stage, learning from other nuclear new builds and major infrastructure projects, to help set us up for the future.

To anyone interested in nuclear energy, my advice is to get involved now. The UK's nuclear sector is seeing significant government commitment, but there is a major skills gap. Nuclear offers a lifelong career with challenging, complex projects – ideal for physicists who enjoy solving problems and making a difference.

Sarah Tesh is a features and careers editor at *Physics World*

Working in intelligence and cybersecurity at GCHQ

Two leaders from GCHQ – the UK's intelligence, security and cyber agency – talk to **Tushna Commissariat** about their unique careers, as well as their advice on how to join them

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Future proof Curiosity, problem-solving and resilience are the key qualities for a career in intelligence.

As a physics graduate or an early career researcher looking for a job, you might not think of the UK's primary intelligence and security agency – Government Communications Headquarters (GCHQ) – as somewhere you might consider. But GCHQ, which covers counter-terrorism, cybersecurity, organized crime and defence support for the UK, hires a vast number of physicists. Indeed, to celebrate the 2025 International Year of Quantum Science and Technology, the agency has hosted many internal talks, informational campaigns and more.

GCHQ works with the Secret Intelligence Service (MI6), MI5, as well as the armed forces, a number of international partners, and firms in the private sector and academia. To find out more about a career at GCHQ – working with cutting-edge technology to identify, analyse and disrupt threats to the UK – *Physics World* speaks to two people with academic backgrounds who have a long career at the organization. They tell us about the benefits, the difficulties and the complexity of working at an intelligence agency.

Nia is the deputy director for science at GCHQ, where she has worked for the past 15 years. After studying physics at university, she joined GCHQ as a graduate and has since contributed to a wide range of scientific and technological initiatives in support of national security. She is a Fellow of both the Institute of Physics (IOP), which publishes *Physics World*, and the Institution of Engineering and Technology (IET).

Cheryl leads GCHQ's adoption of quantum technologies. Following a degree in engineering, her career began as an apprentice at an avionics company. Since then, she has had many roles across research and development at GCHQ and across broader UK government departments, with a focus on understanding and implementing emerging technology. Cheryl is a Fellow of the IET and a Member of the IOP.

When did your interest in science first develop?

Nia My fascination with science was nurtured from a young age, largely inspired by my parents. My mum was a physics teacher, and my dad is a passionate historian with an insatiable curiosity about the world. Growing up in an environment rich with books, experiments and discussions about how things work – whether exploring astrophysics, geology or ancient Egypt – instilled in me a lifelong desire to understand our universe. My mum's electronics, mechanics and physics lessons meant there were always breadboards, crocodile clips and even a Van de Graaff generator in the house, transforming learning into an exciting tangible experience.

Cheryl As a child I was always interested in nature and in how things work. I used to build bug farms in the garden and still have

I've had some amazing and unique opportunities and experiences

Cheryl, GCHQ

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Safety net Maintaining secure communication and anticipating new threats are key to the work carried out at GCHQ.

my old *Observer's* books with the butterflies, etc, ticked off when spotted. Leaning towards my practical side of constantly making things (and foolishly believing my careers teacher that a physics degree would only lead to teaching), I took physics, chemistry and maths A-levels and a degree in engineering.

Could you tell us a bit about your educational background and your career path that led to you work at GCHQ?

Nia I was born and grew up in South Wales and attended a Welsh-language school where I studied physics, maths and chemistry at A-level. I then studied physics at Durham University for four years, before I started working at GCHQ as a graduate. My first role was in an area that is now the National Cyber Security Centre (NCSC). As the cyber security arm of GCHQ, it researches the reliability of semiconductors in national security applications and uses that research to shape policy and security standards. This was great for me as my final year in university was focused on material science and condensed matter physics which came in very useful.

Cheryl My engineering degree apprenticeship was through an aerospace company in Cheltenham, and I worked there afterwards designing test kits for the RAF. It was almost natural that I should at least try a few years at GCHQ as a local employer and I had plans to then move to other R&D labs.

What's it like to work here – what are some of the stresses of working in this kind of an environment and not being able to discuss your job with friends and family? What are some of the best aspects of working at GCHQ?

Nia Working at GCHQ is rewarding and exciting especially as we look at the most exciting developments in emerging technologies. It can also be challenging especially when navigating the complexities of global security challenges amid an unpredictable geopolitical landscape. There are days when media reports or international events feel overwhelming, but knowing that my work contributes towards safeguarding the UK's interests today and into the future offers a strong sense of purpose.

The most rewarding aspect, by far, is the people. We have some of the brightest, most dedicated experts – mentors, colleagues, friends – whose commitment inspires me daily. Their support and collaboration make even the most demanding days manageable.

Cheryl At GCHQ I found that I have been able to enjoy several very different "careers" within the organization, including opportunities to travel and to develop diverse skills. This, together with a flexibility to change working patterns to suit stages of family life, has meant I have stayed for most of my career.

I've had some amazing and unique opportunities and experiences. In the Cheltenham area it's accepted that so many people work here and is widely respected that we cannot talk about the detail of what we do.

What role does physics and especially quantum science play in what you do? And what role does physics play when it comes to the national security of the UK?

Nia As deputy director of science at GCHQ, my role involves collaborating with experts to understand how emerging technologies, including quantum science, impact national security. Quantum offers extra-ordinary potential for secure communication and advanced sensing – but it equally threatens to upend existing security protocols if adversaries harness it maliciously. A deep understanding of physics is crucial – not only to spot opportunities but also to anticipate and counter threats.

Quantum science is just one example of how a fundamental understanding of physics and maths gives you the foundations to understand the broad waterfront of emerging technologies coming our way. We work closely with government departments, academia, industry and start-ups to ensure the UK remains at the forefront of this field, shaping a resilient and innovative security ecosystem.

Cheryl I first came across quantum science, technologies and quantum computing around 15 years ago through an emerging technology analysis role in R&D; and I watched and learned keenly as I could see that these would be game changing. Little did I know at the time that I would later be leading our adoption of quantum and just how significant these emerging technologies for sensing, timing and computing would grow to be.

The UK national ecosystem developing around quantum technologies is a great mix

Maintaining a hunger to learn and adapt is what will set you apart

Nia, GCHQ

of minds from academia, industry and government departments and is one of the most collegiate, inspiring and well-motivated communities that I have interacted with.

For today's physics graduates who might be interested in a career at GCHQ, what are some of the key skills they require?

Nia Many people will have heard of historic tales of the tap on the shoulder for people to work in intelligence agencies, but as with all other jobs the reality is that people can find out about careers at GCHQ in much the same way they would with any other kind of job.

I would emphasize qualities like curiosity, problem-solving and resilience as being key. The willingness to roll up your sleeves, a genuine care for collaborative work, and empathy are equally important – particularly because much of what we do is sensitive and demands trust and discretion. Maintaining a hunger to learn and adapt is what will set you apart.

Cheryl We have roles where you will be helping to solve complex problems – doing work you simply won't find anywhere else. It's key to have curiosity, an open mind and don't be put off by the fact you can't ask too many questions in advance!

What sort of equality, diversity and inclusion initiatives do you have at GCHQ and how are you looking to get more women and minorities working there?

Nia Diversity and inclusion are mission-critical for us at GCHQ, gathering the right mix of minds to find innovative solutions to the toughest of problems. We're committed to building on our work to better represent the communities we serve, including increasing the number of people from ethnic minority backgrounds and the number of women in senior roles.

Cheryl We are committed to having a workforce that reflects the communities we serve. Our locations in the north-west, in both Manchester and now Lancashire, are part of the mission to find the right mix of minds

What is your advice to today's physics grads? What is it that you know today that you wish you knew at the start of your career?

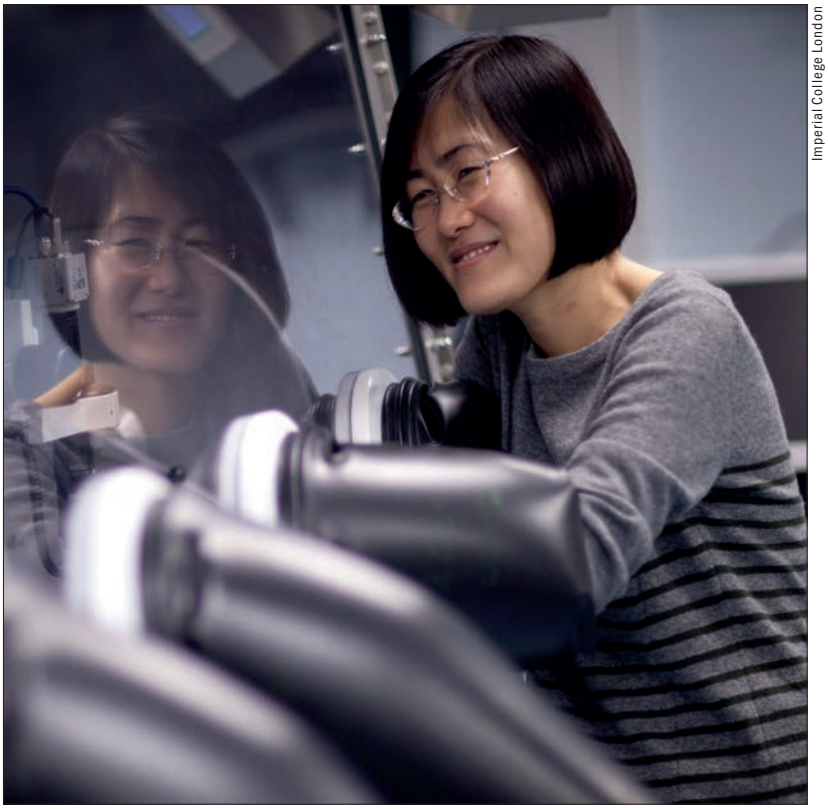
Nia One key lesson is that career paths are rarely linear. When starting out, uncertainty can feel daunting, but it's an opportunity for growth. Embrace challenges and seize opportunities that excite you – whether they seem narrowly related to your studies or not. Every experience contributes to your development. Additionally, don't underestimate the importance of work–life balance. GCHQ offers a supportive environment – remember, careers are marathons, not sprints. Patience and curiosity will serve you well.

Cheryl It takes multidisciplinary teams to deliver game-changers and new ecosystems. Your initial "career choices" are just a stepping stone from which you can forge your own path and follow your instincts.

Tushna Commissariat is features and careers editor of *Physics World*.

Organic magic lighting the way

Ji-Seon Kim, who won the 2023 Nevill Mott Medal and Prize from the Institute of Physics, talks to Laura Hiscott about the transformative potential of carbon-based semiconductors, the need for strong international research collaboration, and the irreplaceable excitement of tangible experiences in the lab



Imperial College London

Semiconductor superstar Ji-Seon Kim is moving to the University of Oxford after almost two decades at Imperial College London.

In a sunny office, Ji-Seon Kim holds up a sheet of stripy plastic. In the middle of dark blue and transparent bands, a small red glow catches the eye, clearly visible even against the bright daylight. There are no sockets or chargers, but that little light is no magic trick.

"It's a printed solar cell from my industrial collaborator," Kim explains. "This blue material is the organic semiconductor printed in the plastic. It absorbs indoor light and generates electricity to power the LED."

Kim is a professor in the Department of Physics at Imperial College London, and was director of the university's EPSRC Plastic Electronics Centre for Doctoral Training, which closed in 2023. She researches carbon-based semiconductors, sometimes called organic, molecular or plastic semiconductors. In 2023 the Institute of Physics (IOP) awarded her the Nevill Mott Medal and Prize in recognition of her "outstanding contributions to the materials physics" of this area.

Yet she came to the field almost by accident. After completing her master's degree in theoretical physics in Seoul in 1994, Kim was about to embark on a theory-focused PhD studying nonlinear optics at Imperial, when her master's supervisor told her about some exciting work happening at the University of Cambridge.

A team there had just created the first organic light-emitting diodes (OLEDs) based on conjugated polymers, successfully stimulating carbon-based molecules to glow under an applied voltage. Intrigued by the nascent field, Kim contacted Richard Friend, who led the research and, following an interview, he offered her a PhD position. Friend himself won the IOP's Isaac Newton Medal and Prize in 2024.

"I spent almost six months learning how to use certain equipment in the lab," Kim recalls of the tricky transition from theory to experimental work. "For example, there's a big glove box you have to put your hands in to make the devices inside it, and I wasn't sure whether I was even able to open the chamber."

But as she found her feet, she became increasingly passionate about the work. "I was really lucky to be in the right place at the right time, just after this new discovery."

Seeing the light

You could hardly find a clearer example of fundamental research moving into consumer applications in recent years than OLEDs – now a familiar term in the world of TVs and smartphones. But when Kim joined the field, the first OLEDs were inefficient and degraded quickly due to high electric fields, heat and oxygen exposure. So, during her PhD, Kim focused on making the devices more efficient and longer lasting.

She also helped to develop a better understanding of the physics underlying the

phenomenon. At the time, researchers disagreed about the fundamental limit of device efficiency. Drawing on her theoretical background, Kim developed innovative simulation work on display device outcoupling, which provided a new way of determining the orientation of emitting molecules and the device efficiency, which is now commonly used in the OLED community.

Kim completed her PhD in 2000 and continued studying organic semiconductors, moving to Imperial in 2007. Besides display screens, she is interested in numerous other potential applications of the materials, including sustainable energy. After all, just as the molecules can emit light in response to injected charges, so too can they absorb photons and generate electricity.

Organic semiconductors have several advantages over traditional silicon-based photovoltaic materials, and with all the promise of these materials, the field has flourished.

Building bridges

Alongside her work at Imperial, Kim was also a visiting professor at KAIST in Korea, and is actively involved in strengthening UK–Korea research ties. In 2016 she co-established the GIST-ICL Research and Development Centre for Plastic Electronics, a collaboration between the Gwangju Institute for Science and Technology and Imperial.

> These days physics is multidisciplinary. For future technology and science, you have to be able to integrate different disciplines

"International interactions are critical not only for scientific development but also for future technology," Kim says. "The UK is really strong in fundamental science, but we don't have many manufacturing sites compared to Asian countries like Korea. For a fundamental discovery to be applied in a commercial device, there's a transition from the lab to the manufacturing scale. For that we need a partner, and those partners are overseas."

Kim is also seeking to build bridges across disciplines. She will soon be moving to the University of Oxford to work on physical chemistry as part of a research initiative focused on sustainable materials and chemistry. She will draw on her expertise in spectroscopic techniques to study and engineer molecules for sustainable applications.

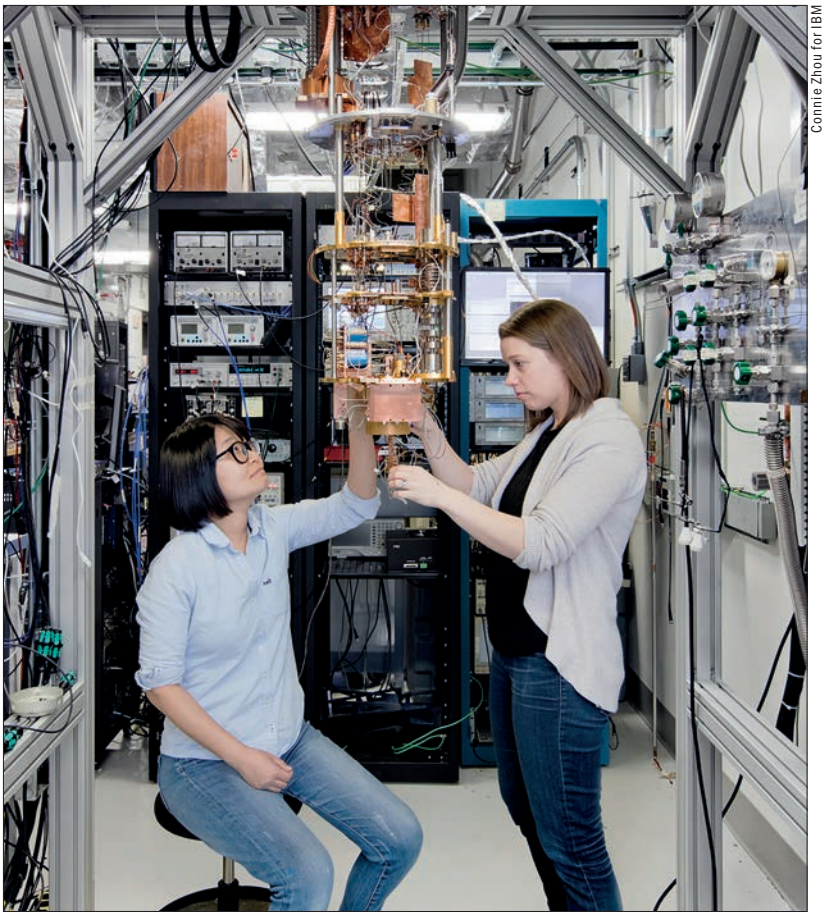
"These days physics is multidisciplinary," she notes. "For future technology and science, you have to be able to integrate different disciplines. I hope I can contribute as a physicist to bridge different disciplines in molecular semiconductors."

But one constant is how Kim mentors undergraduate students. Her advice is to engage them with innovations from the lab, which is why she likes to get out the plastic sheet powering the LED. The emphasis on tangible experience is inspired by the excitement and motivation she remembers feeling when she saw organic semiconductors glowing at the start of her PhD. "Even though the efficiency was so poor that we had to turn the overhead light off and use a really high voltage to see the faint light, that exposure to the real physics was really important," she says. "That was for me a Eureka moment."

Laura Hiscott is a freelance science journalist

Gaining a quantum advantage in the workplace

Sarah Sheldon, an engineering physicist from IBM, talks to Joe McEntee about the company's efforts to open up the next frontier in quantum computing – and why the emerging quantum technology industry is brimming with opportunity for ambitious scientists and engineers



Connie Zhou for IBM

Life lessons Sarah Sheldon (right) enjoys the interdisciplinary nature of quantum technology, which allows her to be "constantly learning something new" from her IBM co-workers.

IBM is on a mission to transform quantum computers from applied research endeavour to mainstream commercial opportunity. It wants to go beyond initial demonstrations of "quantum utility", where these devices outperform classical computers only in a few niche applications, and reach the new frontier of "quantum advantage". That'll be where quantum computers routinely deliver significant, practical benefits beyond approximate classical computing methods, calculating solutions that are cheaper, faster and more accurate.

Unlike classical computers, which rely on the binary bits that can be either 0 or 1, quantum computers exploit quantum binary bits (qubits), but as a superposition of 0 and 1 states. This superposition, coupled with quantum entanglement (a correlation of two qubits), enables quantum computers to perform some types of calculation significantly faster than classical machines, such as problems in quantum chemistry and molecular reaction kinetics.

In the vanguard of IBM's quantum R&D effort is Sarah Sheldon, a principal research scientist and senior manager of quantum theory and capabilities at the IBM Thomas J Watson Research Center in Yorktown Heights, New York. After a double-major undergraduate degree in physics and nuclear science and engineering at Massachusetts Institute of Technology (MIT), Sheldon received her PhD from MIT in 2013 – though she did much of her graduate research in nuclear science and engineering as a visiting scholar at the Institute for Quantum Computing (IQC) at the University of Waterloo, Canada.

At IQC, Sheldon was part of a group studying quantum control techniques, manipulating the spin states of nuclei in nuclear-magnetic-resonance (NMR) experiments. "Although we were using different systems to today's leading quantum platforms, we were applying a lot of the same kinds of control techniques now widely deployed across the quantum tech sector," Sheldon explains.

"Upon completion of my PhD, I opted

Connie Zhou for IBM

Computing reimagined Quantum scientists and engineers at the IBM Thomas J Watson Research Center are working to deliver IBM's Quantum Development Roadmap and a practical path to error-corrected quantum computers by 2029.

instinctively for a move into industry, seeking to apply all that learning in quantum physics into immediate and practical engineering contributions," she says. "IBM, as one of only a few industry players back then with an experimental group in quantum computing, was the logical next step."

Physics insights, engineering solutions

Sheldon currently heads a cross-disciplinary team of scientists and engineers developing techniques for handling noise and optimizing performance in novel experimental demonstrations of quantum computers. It's ambitious work that ties together diverse lines of enquiry spanning everything from quantum theory and algorithm development to error mitigation, error correction and techniques for characterizing quantum devices.

"From algorithms to applications," says Sheldon, "we're investigating what can we do with quantum computers: how to extract the optimum performance from current machines online today as well as from future generations of quantum computers – say, five or 10 years down the line."

A core priority for Sheldon and colleagues is how to manage the environmental noise that plagues current quantum computing systems. Qubits are all too easily disturbed, for example, by their interactions with environmental fluctuations in temperature, electric and magnetic fields, vibrations, stray radiation and even interference between neighbouring qubits.

The ideal solution – a strategy called error correction – involves storing the same information across multiple qubits, such that errors are detected and corrected when one or more of the qubits are impacted by noise. But the problem with these so-called "fault-tolerant" quantum computers is they need millions of qubits, which is impossible to implement in today's small-scale quantum architectures. (For context, IBM's latest Quantum Development Roadmap outlines a practical path to error-corrected quantum computers by 2029.)

"Ultimately," Sheldon notes, "we're working towards large-scale error-corrected systems, though for now we're exploiting near-term techniques like error mitigation and other ways of managing noise in these systems." In practical terms, this means implementing quantum architectures without increasing the number of qubits – essentially, integrating them with classical computers to reduce noise through increasing samples on the quantum computer combined with classical processing.

Strength in diversity

For Sheldon, one big selling point of the quantum tech industry is the opportunity to collaborate with people from a wide range of disciplines. "My team covers a broad-scope R&D canvas," she says. There are mathematicians and computer scientists, for example, working on complexity theory and novel algorithm development; physicists specializing in quantum simulation and incorporating error suppression techniques; as well as quantum chemists working on simulations of molecular systems.

"Quantum is so interdisciplinary – you are constantly learning something new from your co-workers," she adds. "I started out specializing in quantum control techniques, before moving onto experimental demonstrations of larger multiqubit systems while working ever more closely with theorists."

External research collaborations are also mandatory for Sheldon and her colleagues. Front-and-centre is the IBM Quantum Network, which provides engagement opportunities with more than 250 organizations across the "quantum ecosystem". These range from top-tier labs – such as CERN, the University of Tokyo and the UK's National Quantum Computing Centre – to quantum technology start-ups like Q-CTRL and Algorithmiq. It also encompasses established industry players aiming to be early-adopting end-users of quantum technologies (among them Bosch, Boeing and HSBC).

"There's a lot of innovation happening across the quantum community," says Sheldon, "so external partnerships are incredibly important for IBM's quantum R&D programme. While we have a deep and diverse skill set in-house, we can't be the domain experts across every potential use-case for quantum computing."

Opportunity knocks

Notwithstanding the pace of innovation, there are troubling clouds on the horizon. In particular, there is a shortage of skilled workers

Make no mistake, students able to integrate quantum computing capabilities into their research projects will be at the leading edge of their fields in the coming decades

in the quantum workforce, with established technology companies and start-ups alike desperate to attract more physical scientists and engineers. The task is to fill not only specialist roles – be it error-correction scientists or quantum-algorithm developers – but more general positions such as test and measurement engineers, data scientists, cryogenic technicians and circuit designers.

Yet Sheldon remains upbeat about addressing the skills gap. "There are just so many opportunities in the quantum sector," she notes. "The field has changed beyond all recognition since I finished my PhD." Perhaps the biggest shift has been the dramatic growth of industry engagement and, with it, all sorts of attractive career pathways for graduate scientists and engineers. Those range from firms developing quantum software or hardware to the end-users of quantum technologies in sectors such as pharmaceuticals, finance or healthcare.

"As for the scientific community," argues Sheldon, "we're also seeing the outline take shape for a new class of quantum computational scientist. Make no mistake, students able to integrate quantum computing capabilities into their research projects will be at the leading edge of their fields in the coming decades."

Ultimately, Sheldon concludes, early-career scientists shouldn't necessarily overthink things regarding that near-term professional pathway. "Keep it simple and work with people you like on projects that are going to interest you – whether quantum or otherwise."

Joe McEntee is a consultant editor based in South Gloucestershire, UK

The physics of biology

After doing a PhD in theoretical condensed-matter physics, **Lisa Manning** has built a career applying the principles of maths and physics to biological phenomena from cancer to embryogenesis. She talks to Katherine Skipper about her wide-ranging work and how she encourages early-career researchers to broaden their horizons

Syracuse University

Physics on the move Lisa Manning applies her background in theoretical physics to a wide range of problems in biology, from cancer to embryogenesis.

At a conference in 2014, bioengineer Jeffrey Fredberg of Harvard University presented pictures of airway cells taken from people with asthma. To most people, the images would have been indistinguishable – they all showed tightly packed layers of cells. But as a physicist, Lisa Manning saw something no one else had spotted; she could tell, just by looking, that some of the model tissues were solid and some were fluid.

Animal tissues must be able to rearrange and flow but also switch to a state where they can withstand mechanical stress. However, whereas solid-liquid transitions are generally associated with a density change, many cellular systems, including Fredberg's cells, can change from rigid to fluid-like at a constant packing density.

Many of a tissue's properties depend on biochemical processes in its constituent cells, but some collective behaviours can be captured by mathematical models, which is the focus of Manning's research. At the time, she was working with postdoctoral associate Dapeng Bi on a theory that a tissue's rigidity depends on the shape of the cells, with cells in a rigid state touching more neighbouring cells than those in a fluid-like one. When she saw the pictures of the cells from people with asthma she knew she was right. "That was a very cool moment," she says.

Manning – now the William R Kenan, Jr Professor of Physics at Syracuse University in the US – began her research career in theoretical condensed-matter physics, completing a PhD at the University of California, Santa Barbara, in 2008. The thesis was on the mechanical properties of amorphous solids – materials that don't have long-ranged order like a crystal but are nevertheless rigid. Amorphous solids include many plastics, soils and foods, but towards the end of her graduate studies, Manning started thinking about where else she could apply her work.

"I was looking for a project where I could use some of the skills that I had been developing as a graduate student in an orthogonal way," Manning recalls. Inspiration came from of a series of talks on tissue dynamics at the Kavli Institute for Theoretical Physics, where she recognized that the theories she had worked on could also apply to biological systems. "I thought it was amazing that you could apply physical principles to those systems," she says.

Manning has been at Syracuse since completing a postdoc at Princeton University, and although she has many experimental collaborators, she is happy to still be a theorist. Whereas experimentalists in the biological sciences generally specialize in just one or two experimental models, she looks for "commonalities across a wide range of developmental systems". That principle has led Manning to study everything from cancer to congenital disease and the development of embryos.

"In animal development, pretty universally one of the things that you must do is change from something that's the shape of a ball of cells into something that is elongated," says Manning, who is working to understand how this happens. With collaborator Karen Kasza at Columbia University, she has demonstrated that rather than stretching as a solid, it's energy efficient for embryos to change shape by undergoing a phase transition to a fluid, and many of their predictions have been confirmed in fruit fly embryo models.

More recently, Manning has been looking at how ideas from AI and machine learning can be applied to embryogenesis. Unlike most condensed-matter systems, tissues continuously tune individual interactions between cells, and it's these localized forces that drive complex shape changes during embryonic development. Together with Andrea Liu of the University of Pennsylvania, Manning is now developing a framework that treats cell–cell interactions like weights in a neural network that can be adjusted to produce a desired outcome.

"I think you really need almost a new type of statistical physics that we don't have yet to describe systems where you have these individually tunable degrees of freedom," she says, "as opposed to systems where you have maybe one control parameter, like a temperature or a pressure."

Developing the next generation

Manning's transition to biophysics was spurred by an unexpected encounter with scientists outside her field. Between 2019 and 2023, she was director of the Bio-inspired Institute at Syracuse University, which supported similar opportunities for other researchers, including PhD students and postdocs. "As a graduate student, it's a little easy to get focused on the one project that you know about, in the corner of the universe that your PhD is in," she says.

As well as supporting science, one of the first things Manning spearheaded at the institute was a professional development programme for early-career researchers. "During our graduate schools, we're typically mostly trained on how to do the academic stuff," she says, "and then later in our careers, we're expected to do a lot of other types of things like manage groups and manage funding." To support their wider careers, participants in the programme build non-technical skills in areas such as project management, intellectual property and graphic design.

Manning's senior role has also brought opportunities to build her own skills, with the COVID-19 pandemic in particular making her reflect and reevaluate how she approached mentorship. One of the appeals of academia is the freedom to explore independent research, but Manning began to see that her fear of micromanaging her students was sometimes creating confusion.

The thrill of discovering something is a joy, being for just a moment, the only person in the world that understands something new

"What I realized is that I did have implicit expectations that were based on my culture and background, and that they were distinct from those of some of my students," she says. "Because I didn't name them, I was actually doing my students a disservice." If she could give advice to her younger self, it would be that the best way to support early-career researchers as equals is to set clear expectations as soon as possible.

When Manning started at Syracuse, most of her students wanted to pursue research in academia, and she would often encourage them to think about other career options, such as working in industry. However, now she thinks academia is perceived as the poorer choice. "Some students have really started to get this idea that academia is too challenging and it's really hard and not at all great and not rewarding."

Manning doesn't want anyone to be put off pursuing their interests, and she feels a responsibility to be outspoken about why she loves her job. For her, the best thing about being a scientist is encapsulated by the moment with the asthma-linked cells: "The thrill of discovering something is a joy," she says, "being for just a moment, the only person in the world that understands something new."

Katherine Skipper is a science journalist

From an attic laboratory to the heart of galaxies

Thaisa Storchi Bergmann, who won the L'Oréal-UNESCO For Women in Science prize in 2015, talks to Meghie Rodrigues about extragalactic astronomy, doing high-impact international research, and being a woman in South American physics

Lifelong curiosity Thaisa Storchi Bergmann won the L'Oréal-UNESCO For Women in Science prize in 2015 "for her outstanding work on supermassive black holes in the centres of galaxies and their associated regions of dense gas, dust and young stars surrounding them, as well as their role in the evolution of galaxies".

As a teenager in her native Rio Grande do Sul, a state in Southern Brazil, Thaisa Storchi Bergmann enjoyed experimenting in an improvised laboratory her parents built in their attic. They didn't come from a science background – her father was an accountant, her mother a primary school teacher – but they encouraged her to do what she enjoyed. With a friend from school, Storchi Bergmann spent hours looking at insects with a microscope and running experiments from a chemistry toy kit. "We christened the lab Thasi-Cruz after a combination of our names," she chuckles.

At the time, Storchi Bergmann could not have imagined that one day this path would lead to cosmic discoveries and international recognition at the frontiers of astrophysics. "I always had the curiosity inside me," she recalls. "It was something I carried since adolescence."

That curiosity almost got lost to another discipline. By the time Storchi Bergmann was about to enter university, she was swayed by a cousin living with her family who was passionate about architecture. By 1974 she began studying architecture at the Federal University of Rio Grande do Sul (UFRGS). "But I didn't really like technical drawing. My favourite part of the course were physics classes," she says. Within a semester, she switched to physics.

There she met Edemundo da Rocha Vieira, the first astrophysicist UFRGS ever hired – who later went on to structure the university's astronomy department. He nurtured Storchi Bergmann's growing fascination with the universe and introduced her to research.

In 1977, newly married after graduation, Storchi Bergmann followed her husband to Rio de Janeiro, where she did a master's degree and worked with William Kunkel, an American astronomer who was in Rio to help establish Brazil's National Astrophysics Laboratory. She began working on data from a photometric system to measure star radiation. "But Kunkel said galaxies were a lot more interesting to study, and that stuck in my head," she says.

Three years after moving to Rio, she returned to Porto Alegre, in Rio Grande do Sul, to start her doctoral research and teach at UFRGS. Vital to her career was her decision to join the group of Miriani Pastoriza, one of the pioneers of extragalactic astrophysics in Latin America. "She came from Argentina, where [in the late 1970s and early 1980s] scientists were being strongly persecuted [by the country's military dictatorship] at the time," she recalls. Pastoriza studied galaxies with "peculiar nuclei" – objects later known to harbour supermassive black holes. Under Pastoriza's guidance, she moved from stars to galaxies, laying the foundation for her career.

Between 1986 and 1987, Storchi Berg-

mann often travelled to Chile to make observations and gather data for her PhD, using some of the largest telescopes available at the time. Then came a transformative period – a postdoc fellowship in Maryland, US, just as the Hubble Space Telescope was launched in 1990. "Each Thursday, I would drive to Baltimore for informal bag-lunch talks at the Space Telescope Science Institute, absorbing new results on active galactic nuclei (AGN) and supermassive black holes," Storchi Bergmann recalls.

Discoveries and insights

In 1991, during an observing campaign, she and a collaborator saw something extraordinary in the galaxy NGC 1097: gas moving at immense speeds, captured by the galaxy's central black hole. The work, published in 1993, became one of the earliest documented cases of what are now called "tidal disruption events", in which a star or cloud gets too close to a black hole and is torn apart.

Her research also contributed to one of the defining insights of the Hubble era: that every massive galaxy hosts a central black hole. "At first, we didn't know if they were rare," she explains. "But gradually it became clear: these objects are fundamental to galaxy evolution."

Another collaboration brought her into contact with Daniela Calzetti, whose work on the effects of interstellar dust led to the formulation of the widely used "Calzetti law". These and other contributions placed Storchi Bergmann among the most cited scientists worldwide, recognition of which came in 2015 when she received the L'Oréal-UNESCO Award for Women in Science.

Her scientific achievements, however, unfolded against personal and structural obstacles. As a young mother, she often brought her baby to observatories and conferences so she could breastfeed. This kind of juggling is no stranger to many women in science.

"It was never easy," Storchi Bergmann reflects. "I was always running, trying to do 20 things at once." The lack of childcare infrastructure in universities compounded the challenge. She recalls colleagues who succeeded by giving up on family life altogether. "That is not sustainable," she insists. "Science needs all perspectives – male, female and everything in-between. Otherwise, we lose richness in our vision of the universe."

When she attended conferences early in her career, she was often the only woman in the room. Today, she says, the situation has greatly improved, even if true equality remains distant.

Now a tenured professor at UFRGS and a member of the Brazilian Academy of Sciences, Storchi Bergmann continues to push at the cosmic frontier. Her current focus is the Legacy Survey of Space and Time (LSST), about to begin at the Vera Rubin Observatory in Chile.

Her group is part of the AGN science collaboration, developing methods to analyse the characteristic flickering of accreting black holes. With students, she is experimenting with automated pipelines and artificial intelligence to make sense of and manage the massive amounts of data.

Challenges ahead

Yet this frontier science is not guaranteed. Storchi Bergmann is frustrated by the recent collapse in research scholarships. Historically, her postgraduate programme enjoyed a strong balance of grants from both of Brazil's federal research funding agencies, CNPq (from the Ministry of Science) and CAPES (from the Ministry of Education). But cuts at CNPq, she says, have left students without support, and CAPES has not filled the gap.

"The result is heartbreaking," she says. "I have brilliant students ready to start, including one from Piauí (a state in north-eastern Brazil), but without a grant, they simply cannot continue. Others are forced to work elsewhere to support themselves, leaving no time for research."

She is especially critical of the policy of redistributing scarce funds away from top-rated programmes to newer ones without expanding the overall budget. "You cannot build excellence by dismantling what already exists," she argues.

For her, the consequences go beyond personal frustration. They risk undermining decades of investment that placed Brazil on the international astrophysics map. Despite these challenges, Storchi Bergmann remains driven and continues to mentor master's and PhD students, determined to prepare them for the LSST era.

At the heart of her research is a question as grand as any in cosmology: which came first – the galaxy or its central black hole? The answer, she believes, will reshape our understanding of how the universe came to be. And it will carry with it the fingerprint of her work: the persistence of a Brazilian scientist who followed her curiosity from a home-made lab to the centres of galaxies, overcoming obstacles along the way.

Meghie Rodrigues is a Brazil-based science and environment journalist covering mainly earth and physical sciences, climate change and environmental policy

A unique path to quantum optics

Michelle Lollie transitioned from a career in finance to developing quantum optical systems in industry. She talks to Tushna Commissariat about the American Physical Society (APS) Bridge Program; as well as her unique journey, including the challenges and triumphs of navigating the field as a Black woman

Michelle Lollie

Quantum attraction Although she started out in finance, Michelle Lollie switched careers, moving into quantum optics.

Michelle Lollie is an advanced laser scientist at Quantinuum, supporting the design, development and construction of complex optical systems that will serve as the foundations of world-class quantum computers. Lollie also participates in various diversity, equity, inclusion and accessibility initiatives, advocating for those who are marginalized in STEM fields, particularly in physics. Outside of wrangling photons, you can often find her at home practicing the violin.

Your initial bachelor's degree was in finance, and you went on to work in the field through your 20s before pivoting to physics – what made you take the leap to make this change, and what inspired you to pick physics for your second bachelor's degree?

I had dreams of working in finance since high school – indeed, at the time I was on my way to being the most dedicated, most fashionable, and most successful investment banker on Wall Street. I would like to think that, in some other quantum universe, there's still a Michelle Lollie – investment banker extraordinaire.

So my interest in physics wasn't sparked until much later in life, when I was 28 years old – I was no longer excited by a career in finance, and was looking for a professional pivot. I came across a groundbreaking theory paper about the quantum teleportation of states. I honestly thought that it referred to "Beam me up, Scotty" from *Star Trek*, and I was amazed.

But all jokes aside, quantum physics holds many a mystery that we're still exploring. As a field, it's quite new – there are approximately 100 years of dedicated quantum study and discovery, compared to millennia of classical physics. Perusing the paper and understanding about 2% of it, I just decided that this is what I would study. I wanted to learn about this "entanglement" business – a key concept of quantum physics. The rest is history.

Can you tell me a bit about your PhD pathway? You were a part of the APS Bridge Program at Indiana University – how did the programme help you?

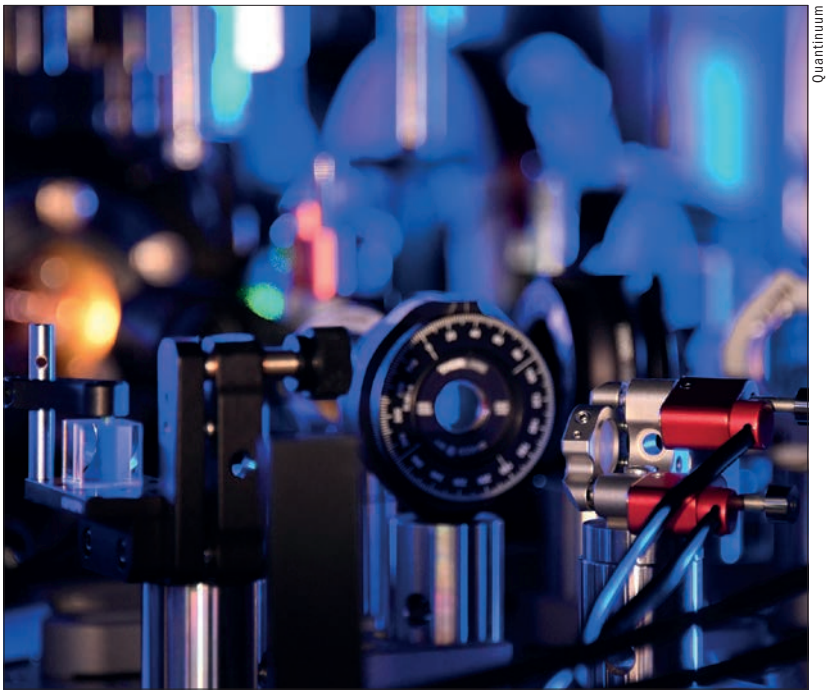
After deciding to pursue a physics degree, I had to pick an academic institution to get said degree. What was news to me was that, for second baccalaureate degrees, funding at a public university was hard to come by. I was looking for universities with a strong optics programme, having decided that quantum optics was for me.

I learned about the Rose-Hulman Institute of Technology, in Terre Haute, Indiana by searching for optical engineering programmes. What I didn't know was that, in

terms of producing top engineers, you'd be hard pressed to find a finer institution. The same can be said for their pure science disciplines, although those disciplines aren't usually ranked. I reached out to inquire about enrolment, was invited to visit and fell in love with the campus. I was funded and my physics journey began.

Prior to graduation, I was struggling with most of my grad-school applications being denied. I wasn't the most solid student at Rose (it's a rigorous place), but I wasn't a poorly performing student, either. Enter the APS Bridge Program, which focuses on students who, for whatever reason, were having challenges applying to grad school. The programme funded two years of education, wherein the student could have more exposure to coursework (which was just what I needed) or have more opportunity for research, after which they could achieve a master's degree and continue to a PhD.

I was accepted at a bridge programme site at Indiana University Bloomington. The additional two years allowed for a repeat of key undergraduate courses in the first year, with the second year filled with grad courses. I continued on and obtained my master's degree. I decided to leave IU to collaborate with a professor at Louisiana State University (LSU) who I had always wanted to work with and had done prior research with. So I transferred to LSU and obtained my PhD, focusing on high-dimensional orbital angular momentum states of light for fibre-based quantum cryptography and communication protocols. Without the Bridge Program, it's likely that you might not be reading this article.



Quantinuum

Tools of the trade At Quantinuum, Michelle Lollie works on the lasers and optics of quantum computers.

I have definitely had to advocate for myself and my presence within the field

You then went on to Louisiana State University where, in 2022, you were the first African American woman to complete a PhD in physics – what was that like?

It's funny, but at the time, no-one was really talking about this. I think, for the individual who has to face various challenges due to race, sexual orientation and preference, gender, immigration status and the like, you just try to take your classes and do your research. But, just by your existence and certain aspects that may come along with that, you are often faced with a decision to advocate for yourself in a space that historically was not curated with you or your value in mind.

So while no-one was going up and down the halls saying "Hey, look at us, we have five Black students in our department!", most departments would bend over backwards for those diversity numbers. Note that five Black students in a department of well over 100 is nothing to write home about. It should be an order of magnitude higher, with 20–30 Black students at least. This is the sad state of affairs across physics and other sciences: people get excited about one Black student and think that they're doing something great. But, once I brought this fact to the attention of those in the front office and my adviser, a bit of talk started. Consequently, and fortuitously, the president of the university happened to visit our lab the fall before my graduation. Someone at that event noticed me, a Black woman in the physics department, and reached out to have me participate in several high-profile opportunities within the LSU community. This sparked more interest in my identity as a Black woman in the field; and it turned out that I was the first Black woman who would be getting a PhD from the department, in 2022. I am happy to report that three more Black women have earned degrees (one master's in medical physics, and two PhDs in physics) since then.

My family and I were featured on LSU socials for the historic milestone, especially thanks to Mimi LaValle, who is the media relations guru for the LSU Physics and Astronomy department. They even shared my grandmother's experience as a Black woman growing up in the US during the 1930s, and the juxtaposition of her opportunities versus mine were highlighted. It was a great moment and I'm glad that LSU not only acknowledged this story, but they emphasized and amplified it. I will always be grateful that I was able to hand my doctoral degree to my grandmother at graduation. She passed away in August 2024, but was always proud of my achievements. I was just as proud of her, for her determination to survive. Different times indeed.

What are some barriers and challenges you have faced through your education and career, if any?

The barriers have mostly been structural, embedded within the culture and fabric of physics. But this has made my dedication to be successful in the field a more unique and customized experience that only those who can relate to my identity will understand. There is a concerted effort to say that science doesn't see colour, gender, etc., and so these societal aspects shouldn't affect change within the field. I'd argue that human beings do science, so it is a decidedly "social" science, which is impacted significantly by culture – past and present. In fact, if we had more actual social scientists doing research on effecting change in the field for us physical scientists, the negative aspects of working in the field – as told by those who have lived experience – would be mitigated and true scientific broadening could be achieved.

What were the pitfalls, or stresses, of following this career random walk?

Other than the internal work of recognizing that, on a daily basis, I have to make space for myself in a field that's not used to me, there hasn't been anything of the sort. I have definitely had to advocate for myself and my presence within the field. But I love what I do and that I get to explore the mysteries of quantum physics. So, I'm not going anywhere anytime soon. The more space that I create, others can come in and feel just fine.

I want things to be as comfortable as possible for future generations of Black scientists. I am a Black woman, so I will always advocate for Black people within the space. This is unique to the history of the African Diaspora. I often advocate for those with cross-marginalized identities not within my culture, but no-one else has as much incentive to root for Black people but Black people. I urge everyone to do the same in highlighting those in their respective cultures and identities. If not you, then who?

What were the next steps for you after your PhD – how did you decide between staying in academia or pursuing a role in industry?

I always knew I was going to industry. I was actually surprised to learn that many physics graduates plan to go into academia. I started interviewing shortly before graduation, I knew what companies I had on my radar. I applied to them, received several offers, and decided on Quantinuum.

You are now an advanced laser scientist with Quantinuum – what does that involve, and what's a "day in the life" like for you now?

Nowadays, I can be found either doing CAD models of beamlines, or in the lab building said beamlines. This involves a lot of lasers, alignment, testing and validation. It's so cool to see an optical system that you've designed come to life on an optical table. Its even more satisfying when it is integrated within a full ion-trap system, and it works. I love practical work in the lab – when I have been designing a system for too long, I often say "Okay, I've been in front of this screen long enough. Time to go get the goggles and get the hands dirty."

What do you know today, that you wish you knew when you were starting your career?

Had I known what I would have had to go through, I might not have ever done it. So, the ignorance of my path was actually a plus. I had no idea what this road entailed so, although the journey was a course in who-is-Michelle-going-to-be-101, I would wish for the "ignorance is bliss" state – on any new endeavour, even now. It's in the unknowing that we learn who we are.

What's your advice for today's students hoping to pursue a career in the quantum sector?

I always highlight what I've learned from Garfield Warren, a physics professor at Indiana University, and one of my mentors. He always emphasized learning skills beyond science that you'll need to be successful. Those who work in physics often lack direct communication skills, and there can be a lot of miscommunication. Be direct and succinct, and leave no room for speculation about what you are saying. This skill is key.

Also, learn the specific tools of your trade. If you're in optics, for example, learn the ins and outs of how lasers work. If you have opportunities to build laser set-ups, do so. Learn what the knobs do. Determine what it takes for you to be confident that the readout data is what you want. You should understand each and every component that relates to work that you are doing. Learn all that you can for each project that you work on. Employers know that they will need to train you on company-specific tasks, but technical acumen is assumed to a point. Whatever the skills are for your area, the more that you understand the minutiae, the better.

● First published in *APS Careers* 2025

Tushna Commissariat is the features editor of *Physics World*

The University of Birmingham has been challenging and developing great minds for more than a century. Characterized by a tradition of innovation, research at the university has broken new ground, pushed forward the boundaries of knowledge and made an impact on peoples' lives. We continue this tradition today and have ambitions for a future that will embed our work and recognition of the Birmingham name on the international stage.

Why study with us

The University of Birmingham has by far the longest-running pedigree of any UK university in teaching nuclear power degree courses. Our physics and technology of nuclear reactors MSc (PTNR) began in 1956, the same year as the world's first commercial nuclear power station, and continues to run to this day. Our MSc in nuclear decommissioning and waste management (NDAWM) is the only decommissioning-focused degree course in the UK. Birmingham also runs the biggest nuclear-engineering undergraduate programme in the UK.

Training and development

Our nuclear programmes have been refined over many years, and stem back to the early pioneers in the field when Otto Frisch (one of the discoverers of fission) and Sir Rudolph Peierls (one of the 20th century's great theoretical physicists) wrote their *Frisch–Peierls Memorandum* at Birmingham. We have a steering group of major UK nuclear-industry companies that provide funding to the MSc courses and guidance on course content and development. They also heavily recruit from us.

Graduate schemes

Our MSc courses are postgraduate programmes intended for graduates from most engineering and physical sciences disciplines.

What we are looking for

Graduates who have a good first- or second-class degree (or equivalent) in physics or a related subject. 2.2 degrees can be considered on a case-by-case basis. PhD possibilities may also exist if the student has funding.

Profile can be viewed at
physicsworld.com/jobs

LOCATION
Birmingham, UK

NUMBER OF RESEARCHERS
The University of Birmingham is the fourth largest university in the UK by student enrolment and therefore comprises a significant number of researchers

DESIRED DEGREE DISCIPLINES/CLASS
Physics or a related subject, at first or 2.1 level, although a 2.2 may be considered on a case-by-case basis

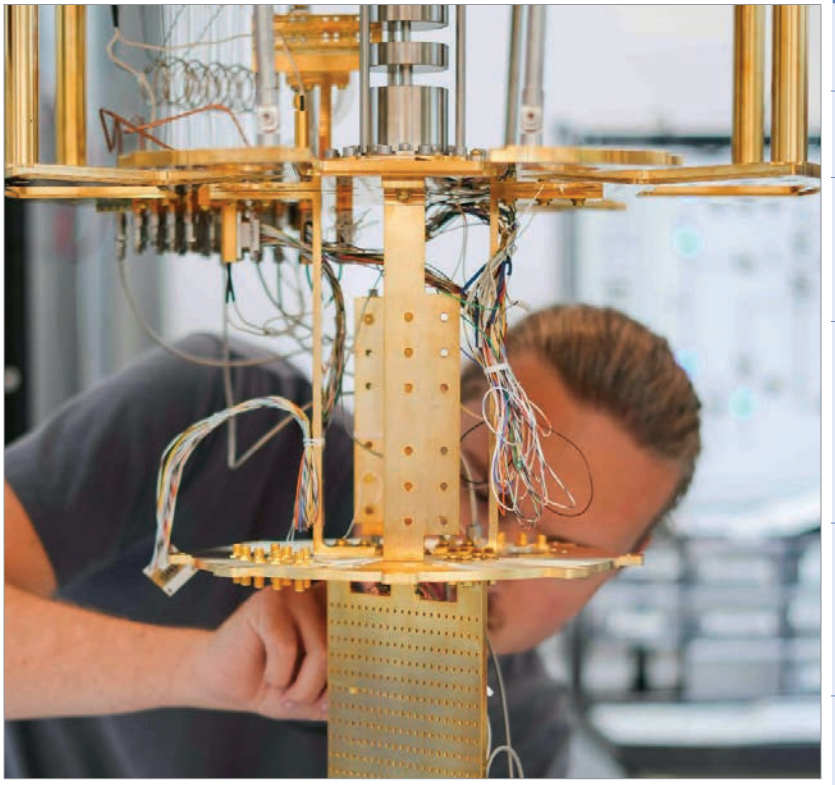
PRE-REQUISITES
Eligible to study in the UK

HOW TO APPLY
Online at **www.birmingham.ac.uk/schools/physics/postgraduate/index.aspx**

CLOSING DATE
All year round

CONTACT
University of Birmingham
Edgbaston
Birmingham B15 2TT
UK
Tel +44 (0)121 414 4660
E-mail p.i.norman@bham.ac.uk
www.birmingham.ac.uk/schools/physics/postgraduate/index.aspx

C12



Founded in January 2020, C12 is a Paris-based quantum computing startup born from the physics lab of École Normale Supérieure (an elite higher education institution based in France). C12 is building large-scale, error-corrected quantum computers using carbon nanotubes. Our approach blends ultra-pure materials and semiconductor technology to solve companies' most complex challenges. C12 has secured over €25m in funding, has 47 employees, and holds private funding.

Why work for us

Our stellar team is made up of the world's most accomplished experts in quantum electronics and carbon nanotube science, coming from all over the world (15+ different nationalities). We are leading quantum's next material breakthrough, and we are just getting started.

C12 is the only startup to develop this type of disruptive technology with carbon nanotubes and an on-chip scalable architecture. We have our own state-of-the-art facilities (labs and ISO-7 certified cleanroom) right in the center of Paris.

Training and development

C12 invests in the professional development of its employees by inculcating collective and mandatory trainings in addition to a yearly dedicated individual budget for personal training.

Still primarily a research company but with a business focus, we pay for the publication of scientific papers by our employees.

The company also sponsors employees to relevant conferences anywhere in the world to gain more knowledge and insights. Furthermore, inventions by our employees are monetarily rewarded.

What we are looking for

Quantum enthusiasts who are seeking to join us on the pathway to bringing quantum computers to full scalability.

Profile can be viewed at
physicsworldjobs.com

LOCATION
Paris, France

NUMBER OF EMPLOYEES
47 and rapidly increasing

MAIN AREAS OF RESEARCH
Quantum computing, carbon nanotubes, nanofabrication, nanoassembly, spin qubits

POSITIONS RECENTLY RECRUITED FOR
Quantum measurement engineer, software engineer, quantum algorithm researcher, cleanroom technician, research engineer in carbon nanotube growth

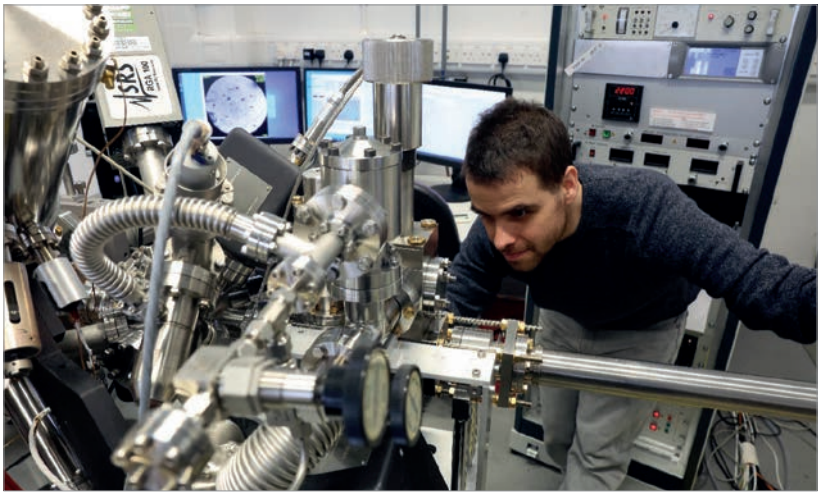
DESIRED DEGREE & DISCIPLINES
This varies according to the role but generally a minimum of a master's degree in the field of physics and engineering. For specific vacancies, a PhD may be required

HOW TO APPLY
Please apply directly on our website at **www.c12qe.com/join-us**

CLOSING DATE
All year round

CONTACT
C12 Quantum Electronics
26 rue des Fossés Saint-Jacques
75005 Paris
France
E-mail careers@c12qe.com
www.c12qe.com

CARDIFF UNIVERSITY: SCHOOL OF PHYSICS AND ASTRONOMY



A physics or astrophysics degree from Cardiff University is a great launchpad for your career.

Why study with us

We aim to equip you with the skills for a rewarding and adaptable professional life as well as giving you a real insight into how the Universe works on the largest and smallest scales. Your learning experience and wellbeing is of the utmost importance to us, which is why we were voted top in the Russell Group for physics in the 2024 National Student Survey (NSS) for: teaching on my course; learning opportunities; assessment and feedback; and, academic support for physics. In Cardiff we work with nanoscale devices at extremely low temperatures, and we apply the latest techniques in high-performance computing, data science and machine learning. We're at the centre of one of the UK's major compound semiconductor clusters, providing placement and job opportunities for our students to drive the next generation of technology used in smartphones, satellites and more. We host the Brain Imaging Group, applying physics to make more accurate measurements of processes in the brain, giving you a unique opportunity to explore digital imaging and medical physics.

Home to one of the largest astronomy groups in the UK, we build crucial parts for space telescopes for NASA and the European Space Agency, and are part of the international research team that made the first ever detection of gravitational waves – a discovery that confirmed Einstein's theory of relativity.

Most of our courses come with the option to add a professional placement year, when you'll be earning a salary while using physics in the workplace. Our graduates work in fields as diverse as the Royal Airforce, Hawk-Eye sports technology, KLA (compound semiconductor manufacturing), Hargreaves Lansdown, GCHQ and the NHS.

Postgraduate opportunities

Specialize in physics, data-intensive physics, astrophysics or compound semiconductor physics with our wide range of taught postgraduate courses. Many of our MSc students join us with backgrounds in engineering or related subjects.

We offer a range of funding support, including Master's Excellence Scholarships, worth £3000 in the form of a tuition fee discount.

Our PhD opportunities include gravitational waves, astronomy, quantum devices and brain imaging and we're the lead university for the Centre for Doctoral Training in Compound Semiconductor Manufacturing, offering fully-funded studentships for selected students.

Profile can be viewed at **physicsworldjobs.com**

LOCATION
Cardiff, UK

NUMBER OF RESEARCHERS
52 academic staff

DESIRED DEGREE DISCIPLINES/CLASS
For undergraduate, generally A*AAA-BBB. For postgraduates, generally 2.1 minimum in a physical science/engineering/mathematics degree

PRE-REQUISITES
Eligible to study in the UK

HOW TO APPLY
Postgraduates apply online at **www.cardiff.ac.uk/physics-astronomy**. Undergraduates apply through UCAS

CLOSING DATE
All year round

CONTACT
Cardiff University: School of Physics and Astronomy
Queen's Buildings North Building
5 The Parade
Newport Road
Cardiff CF24 3AA
UK
Tel +44 (0)29 208 76457
E-mail physics-admissions@cardiff.ac.uk
www.cardiff.ac.uk/physics-astronomy

The European Southern Observatory's (ESO) mission is to design, build and operate the world's most advanced ground-based optical and infrared observatories, and to foster international collaboration for astronomy. Our vision is to advance humanity's understanding of the universe by working with and for the astronomy community, providing it with world-class telescopes and instruments.

Why work for us

You would be working together with our >700 staff members and thousands of collaborators in Europe, Chile, Australia and beyond, developing the largest optical telescope in the world, collaborating on high-tech instruments for our three observatories, operating and maintaining them 24/7, supporting astronomers in their observations, while you carry out research in astrophysics and R&D. You would help us ensure that ESO remains at the forefront of astronomical investigations, infrastructure and instrumentation.

Training and development

ESO promotes a positive learning culture to support its mission, values and goals. Our comprehensive learning and development package includes management and leadership training, behavioural and technical skills training, and language training. We strive to foster a work environment where all staff have opportunities to develop their skills and competencies. We encourage our staff to proactively manage their career advancement and facilitate personal career development in partnership with them.

Postgraduate opportunities

We offer:

- Five- to six-month internships for students at the end of their university studies (master-level or possibly bachelor-level) in astrophysics, engineering and science communication.
- PhD studentships and postdoctorate fellowships in astrophysics and engineering for up to three years.

These programmes are open to all nationalities with a preference for applicants from ESO member states.

What we are looking for

For our postgraduate schemes we are looking for dynamic young individuals with a good deal of team spirit, curiosity and eagerness to learn, who can bring new ideas to our R&D programme. For our staff members, we are looking for motivated, experienced collaborators at various career levels, in different fields, including engineering, administration, finance, procurement, human resources. Astronomers need a PhD, engineers a university diploma.

Profile can be viewed at
physicsworld.com/jobs

LOCATIONS
Germany, Chile

NUMBER OF EMPLOYEES
c. 700

MAIN AREAS OF RESEARCH
Engineering (all fields) and astronomy

POSITIONS RECENTLY RECRUITED FOR
We have recently recruited engineers (e.g. software, electronic, electrical, optical, mechanical), astronomers and administrative personnel

HOW TO APPLY
Please visit **https://recruitment.eso.org**

CLOSING DATE
All year round

CONTACT
European Southern Observatory (ESO)
ESO Headquarters
Karl-Schwarzschildstr. 2
Garching near Munich
Germany
Tel +49 089 32006 0
E-mail vacancy@eso.org
www.eso.org


Credit: ESA/Science

We are the European Space Agency (ESA) and we drive cutting-edge developments that will help shape the future of this planet. Our continuing mission is to explore new worlds while protecting the one we live on. As the only end-to-end space agency, we bring countries across the globe together to investigate, develop and explore the cosmos for the peaceful benefit of everyone. We are dedicated to united space in Europe and united Europe in space.

Why work for us

Are you enthusiastic, curious, a team player and eager to work in an international setting? With its 23 Member States and 3000 staff members working across Europe in nine different locations, ESA is the only space agency of its kind and a unique place to work. Joining ESA means working on pioneering missions in a diverse and welcoming environment with great benefits as well as numerous services and activities provided on site.

Training and development

Working for ESA gives you access to a wide range of courses on different topics, from technical training to project and people management, as well as access to top experts in various space-related disciplines.

Graduate schemes

Our six entry-level and research programmes are the perfect springboard for a career in the space sector.

- **Student Internships** are open to students still enrolled at university. Priority is given to master's students, but bachelor's students can also apply. Applications open in November each year.
- The **ESA Graduate Trainee Programme** is open to recently graduated master's students. Applications open in February each year.
- **National Trainee Programmes** are offered to master's graduates through bilateral agreements between ESA and certain participating countries.
- The **Junior Professional Programme** is designed for master's graduates with 2–3 years of professional experience. As of 2025, 15 Junior Professional positions will be published each year.
- Researchers can apply to ESA for **co-funding for space-related PhD and postdoc research activities**. Apply all year round at ideas.esa.int.
- The **Research Fellowship Programme** accepts applications from postdocs. Vacancies are published throughout the year, except for the Research Fellowships in Space Science, which open for application in August each year.

Who we are looking for

In line with our core business as a space science and technology organization, most ESA staff positions are in engineering and scientific disciplines. However, we also recruit for the business support services that are essential in helping us to achieve our goals.

Browse the positions we're currently recruiting for, or **set up a job alert**, at **jobs.esa.int**.

Profile can be viewed at
physicsworldjobs.com

LOCATIONS
France, the Netherlands, Germany, Spain, Italy, Belgium, UK

NUMBER OF EMPLOYEES
3000

MAIN AREAS OF RESEARCH
All engineering and science disciplines related to the space sector are covered at ESA, but those are not the only areas we recruit in. Check out our latest activities on our website – you may be surprised by the domains we cover and find something there for you, too

DESIRED DEGREE DISCIPLINES/CLASS
The majority of professional roles at ESA require a master's as a minimum. For specific vacancies, a PhD may be required

HOW TO APPLY
Apply online at **jobs.esa.int**

CLOSING DATE
Vacancies are regularly published on our recruiting website. Most standard vacancies remain open for three weeks from the date of publication, while those for our entry-level programmes are usually open for four weeks

CONTACT
ESA Headquarters
8–10 Rue Mario Nikis
CS 45741
75738 Paris Cedex 15
France
Tel +33 1 53 69 76 54
E-mail esacareers@esa.int
www.esa.int

Institute of Physics' offices in King's Cross.

The Institute of Physics (IOP) is the professional body and learned society for physics in the UK and Ireland. We seek to raise public awareness and understanding of physics and support the development of a diverse and inclusive physics community. As a charity, we're here to ensure that physics delivers on its exceptional potential to benefit society.

Why work for us

As a society we face an unprecedented array of challenges. Globally, we need to address a changing climate and a growing population, to decarbonize economies, improve healthcare and ensure water, food and energy supplies. Domestically, we need to develop the next generation of industries to create jobs and improve productivity to safeguard citizens' futures.

Physics has a vital role to play in tackling these issues and helping make the UK and Ireland fit for a new industrial era of science, technology and engineering.

There's never been a more exciting time to join the IOP. We have an ambitious corporate strategy "Building the Future", that seeks to address these challenges, and you'll play a part in helping us to deliver it.

As well as a competitive salary and professional development opportunities, we offer employees a comprehensive benefits package including an excellent pension scheme, private medical insurance and generous annual leave. We also offer a range of other benefits including flexible working, Cycle2Work scheme and gym membership.

Learning and development

We really value our people and recognize the importance of a highly skilled and motivated workforce. We're committed to providing high-quality learning and development opportunities that help support your future career ambitions. As every employee has different needs, we vary programmes to suit you. This includes multi-session programmes, team workshops, and one-to-one coaching – all being a combination of internal and external provision. We also offer employee sponsorship for vocational and professional qualifications that are relevant to individual roles.

Profile can be viewed at
physicsworld.com/jobs

LOCATION
London, UK

NUMBER OF EMPLOYEES
150–175

POSITIONS RECENTLY RECRUITED FOR
We have recruited to a variety of positions across a range of departments including communications and marketing, HR, learning and skills, science and innovation, digital, membership and more

PRE-REQUISITES
Eligible to work in the UK or ROI as appropriate

HOW TO APPLY
Apply at **iopjobs.org/current**

CLOSING DATE
All year round

CONTACT
Human Resources
Institute of Physics
37 Caledonian Road
London N1 9BU
UK
Tel +44 (0)20 7470 4800
E-mail recruitment.london@iop.org
www.iop.org

Institute of Science and Technology Austria

The Institute of Science and Technology Austria (ISTA) is a PhD-granting international institute dedicated to cutting-edge research in mathematical and physical sciences, life sciences, and information and system sciences. ISTA is situated in proximity to Vienna, which is consistently ranked among the most livable cities worldwide.

Why join us

ISTA offers a thriving international and interdisciplinary research environment, with English as the working language. State-of-the-art facilities and scientific support services provide scientists with the necessary resources to push the boundaries of scientific discovery.

ISTA's PhD programme encompasses a unique blend of interdisciplinary coursework and research group rotations, attracting scholars from diverse international backgrounds. Students work closely with outstanding faculty within small research groups. A postdoctoral position offers early-career scientists a valuable opportunity for professional growth. At ISTA, you can prioritize what matters most: conducting high-level fundamental research.

A collaborative atmosphere, generous funding and tailored career-support enables professors to establish and lead successful research groups.

Training and development

PhD students receive support through mentorship and career-development programmes, which focus on training in transferable skills for academia and beyond. They also receive financial support to attend scientific conferences and workshops during their studies.

Postdocs interact closely with colleagues from different fields through joint projects and events, and develop the skills necessary for their next career steps through career-development training and workshops. Tailored leadership and career-development programmes are available for research group leaders.

What we are looking for

Students with a bachelor's or a master's degree in science are encouraged to apply for our PhD programme. All students are offered five-year employment contracts.

Highly qualified candidates who have recently completed their PhD or equivalent in the natural or computer sciences, mathematics, or any related discipline are welcome to apply for our full-time postdoctoral positions.

Assistant professors at ISTA are independent group leaders with an initial contract of six years. A positive evaluation at the end of this period leads to promotion to the tenured professor position. Tenured professor candidates are distinguished scientists in their respective research fields and typically have at least six years of experience in leading a research group.

Profile can be viewed at
physicsworldjobs.com

LOCATION
Klosterneuburg, Austria

NUMBER OF RESEARCHERS
150 research groups (approx. 1500 scientists) by 2036

POSITIONS RECENTLY RECRUITED FOR
We have recruited to a variety of positions, across numerous research fields and job levels

DESIRED DEGREE DISCIPLINES/CLASS
From interns to trainees, from students to graduates, from PhD to postdoc, from postdoc to faculty – all in a wide variety of specializations

HOW TO APPLY
Please find information on **ista.ac.at/jobs/careers-in-science** and **ista.ac.at/en/jobs/open-positions**

CLOSING DATE
All year round – special deadlines for various programmes as advertised on our website

CONTACT
Institute of Science and Technology Austria
Am Campus 1
3400 Klosterneuburg
Austria
Tel +43 2243 9000
E-mail academic.affairs@ista.ac.at
ista.ac.at

IOP Publishing is a wholly owned subsidiary of the Institute of Physics, a leading scientific society with a worldwide membership of physicists from all sectors. Complementing the Institute's mission of promoting physics and bringing physicists together for the benefit of all, IOP Publishing provides a range of journals, ebooks, magazines, conference proceedings and websites for the scientific community. Any profits generated by the publishing company are used by the Institute to support science and scientists in both the developed and developing world.

Why work for us

IOP Publishing provides a friendly, positive, open, relaxed but purposeful environment. People who come to work here tend to stay. This is because it feels like you come to work with your friends, not just colleagues. We like to think that we've got the kind of environment that encourages people to do well and to enjoy what they do. We believe in treating each other with respect, providing an opportunity for you to contribute to our future. IOP Publishing is a great place to work.

Our success is made possible by the talent, energy and commitment of our people to the company and what we do. This success is founded on having the right people in the right place, in an environment in which they can flourish.

What we are looking for

As an organization, we are the sum of our parts. While we employ specialists in a range of fields, all our employees share a number of qualities and and attributes: our people are professional and dedicated, talented and energetic. They work collaboratively to help us expand in a rapidly changing scientific landscape. The IOP Publishing culture is one of growth, learning and innovation, and we are looking for people who want to develop, innovate and succeed; people who see the exciting opportunities that digital publishing has to offer.

Join the community

Making science better, together: be part of a community working together to make science better. A society publisher with the perfect blend of not-for-profit purpose and commercial perspective. Here, we help each other be the best we can be – a team big enough to impact and small enough to care.

Profile can be viewed at
physicsworldjobs.com

LOCATIONS
UK, US, China, India and Japan

NUMBER OF EMPLOYEES
540

POSITIONS RECENTLY RECRUITED FOR
Associate editor, publishing services assistants, research integrity officer, platform engineer, product manager, campaign manager

HOW TO APPLY
For more information about our recruitment process, visit **ioppublishing.org/join-the-community**. For a list of current vacancies, visit **www.ioppublishingcareers.org/current-vacancies.html**

CLOSING DATE
All year round

CONTACT
IOP Publishing
No.2 The Distillery
Glassfields
Avon Street
Bristol BS2 0GR
UK
E-mail careers@ioppublishing.org
ioppublishing.org

The Max Planck School Matter to Life offers a highly interdisciplinary and international integrated MSc/PhD graduate programme in Germany. Our mission is to train outstanding students under the guidance of world-leading scientists in the emerging field of Matter to Life. Driven by the fundamental questions "What is life?" and "Can life-like processes, functions and objects be quantitatively simulated, predicted and created in the laboratory?", we invite outstanding students from around the world to join us in exploring these frontiers of science.

Why study with us

- Kickstart your career with an exceptional and highly interdisciplinary integrated graduate programme directly after your bachelor's.
- Experience close supervision by outstanding scientists in Matter to Life, within a unique network of leading German universities and non-university research organizations.
- Earn a joint degree from University of Göttingen and Heidelberg University.
- Be part of a highly international and diverse community, where all courses are taught in English.
- Receive full funding throughout the programme.

Training and development

During the master's phase, you will build a strong foundation in biophysics, complex systems, synthetic chemistry, synthetic biology and related disciplines to provide a truly interdisciplinary education and prepare you for a successful research career in the emerging field of Matter to Life. After completing the master's phase, you can progress to the PhD phase and conduct your research in the laboratory of any Matter to Life faculty member.

A defining feature of the programme is its faculty: leading experts from universities and research institutes across Germany whose work spans biophysics, biomaterials and active matter. As a student, you will learn directly from these exceptional scientists, contribute to cutting-edge research, and help develop the growing and unique field of Matter to Life.

Who we are looking for

We are looking for outstanding students genuinely interested in an interdisciplinary education spanning physics, chemistry and biology. Applicants should hold (or be completing) a bachelor's in a relevant discipline; those with a master's are also welcome to apply. All admitted students follow our integrated Master's and PhD curriculum in Matter to Life.

Profile can be viewed at
physicsworld.com/jobs

LOCATIONS

MSc (joint degree): Göttingen and Heidelberg
PhD: multiple locations distributed all over Germany

MAIN AREAS OF RESEARCH

Synthetic biology and chemistry, active matter, biomaterials and engineering, self-organization of living systems, mechanobiology, complex systems, biophysics, biocomputation

DESIRED DEGREE DISCIPLINES/CLASS

All science and engineering disciplines related to the interdisciplinary cross-section of physics, chemistry and biology and in between. Check out our application website to find out more

HOW TO APPLY

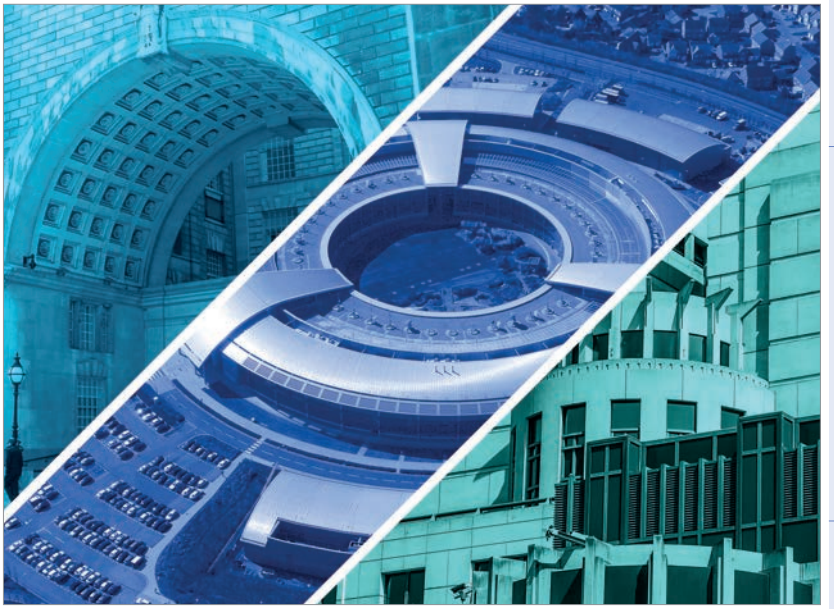
Online via the application portal of the Max Planck School Matter to Life

CLOSING DATE

1 December 2026

CONTACT

Max Planck School Matter to Life
Max Planck Institute for Medical Research
Jahnstraße 29
69120 Heidelberg
Baden Württemberg
Germany
E-mail mattertolife@maxplanckschools.de
mattertolife.maxplanckschools.org



We are MI5, MI6 and GCHQ. Together, we make up the UK's Intelligence Services. And together, we safeguard Britain's people, interests and businesses from threats at home, overseas and online, including cyber-attacks, espionage, terrorism and organized crime. We might be three agencies, but we're united under one mission: to protect the UK.

Why work for us

It's not every day that your skills can help protect national security, but that's exactly what you'll do if you join the UK's Intelligence Services. Here, your work has a different kind of impact, and it's one that affects everyone. We're committed to empowering you every step of the way. From professional training resources and dedicated training days, to a Civil Service pension with a substantial employer contribution, you'll have access to benefits that truly make a difference.

Training and development

No matter where you are in your career, you can count on us for plenty of support. Once you become part of our team, we'll make sure you receive full training on our systems. And as you continue to grow, we'll give you the opportunity to enhance your skills even more. We also have dedicated support networks to help you succeed. This means that we'll give you the encouragement and freedom to get the best out of yourself and the opportunities available to you.

Graduate schemes

Across MI5, MI6 and GCHQ, we have a range of opportunities available. From software development to data science, analysis to maths and cryptography, project management to infrastructure engineering. We've got a role for everyone. Whether you're looking to spend a summer getting a taste of life here, or you're ready to apply your knowledge to a unique graduate role – there's a broad mix of structured programmes available.

Who we are looking for

We're looking for curious, motivated individuals ready to make a real impact. You'll be encouraged to be yourself, share your ideas and grow every day. Innovation and curiosity helps us stay ahead of the challenges we face.

Profile can be viewed at
physicsworldjobs.com

LOCATIONS

London, Cheltenham, Manchester, Samlesbury, Bude, Scarborough, Digby, Northern Ireland, UK

MAIN AREAS OF RESEARCH

Each organization focuses on different core mission areas such as keeping the country safe from serious threats to harm the UK, its people and way of life (MI5), protecting the security and economic wellbeing of the UK from overseas threats such as regional instability, terrorism, and cyber-attacks (MI6) and using cutting-edge technology, ingenuity and partnerships to identify, analyse and disrupt threats to the UK (GCHQ)

POSITIONS RECENTLY RECRUITED FOR

Maths and cryptography roles, intelligence data analysts, cyber insights summer school programme, technology graduate development programme, project managers, project control officers

DESIRED DEGREE DISCIPLINES/CLASS

Some roles need a specific degree, but for most, the subject isn't important – as long as you have a 2.2 or above

PRE-REQUISITES

To be eligible to apply, you must be a British Citizen. If you hold dual nationality, of which one component is British, your application will still be considered. You can apply at 17 years of age. If successful, we'll coordinate a start date after your 18th birthday. You'll need to have been a UK resident for seven out of the last 10 years, with exceptions for specific circumstances (i.e. studying abroad/serving in the military). We'll require references for the time you lived abroad

HOW TO APPLY

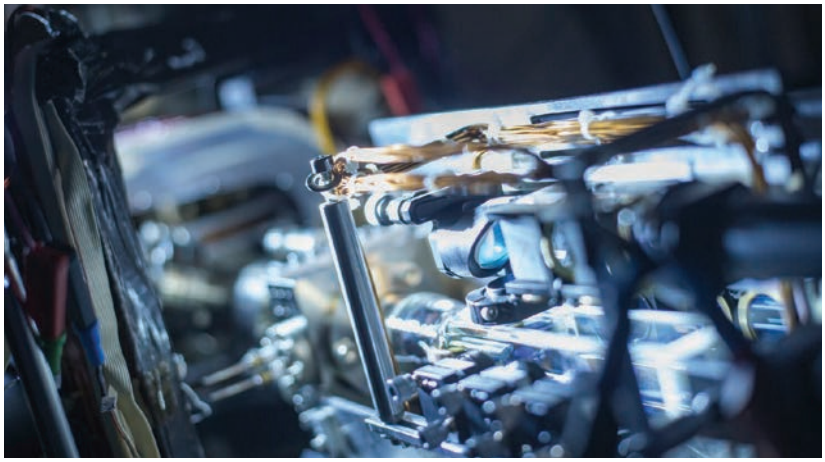
For more details, visit
www.mi5gov.uk/careers
www.sis.gov.uk/careers
www.gchq-careers.co.uk

CLOSING DATE

All-year round

University of Nottingham
UK | CHINA | MALAYSIA

UNIVERSITY OF NOTTINGHAM: SCHOOL OF PHYSICS & ASTRONOMY



Welcome to the University of Nottingham School of Physics & Astronomy, where our teaching philosophy is deeply intertwined with our cutting-edge research. We are ranked 7th among UK physics departments in the last REF assessment, second only to Cambridge over the last three assessments for research quality. We are home to the Nobel prize for the development of MRI body scanners, have won recent awards for groundbreaking work in quantum technologies and dark energy, and host research fellows from the most prestigious research funders.

Why study with us

Our one-year MSc programmes in Quantum Science and Technologies (QST) and Machine Learning in Science (MLiS) offer world-class teaching from leading experts in rapidly growing fields. You'll gain hands-on experience using cutting-edge university facilities and have the opportunity to engage with key industry partners. Our flexible learning pathways will equip you with the knowledge, skills and connections for a successful career in the rapidly evolving fields of quantum technology and artificial intelligence.

Training and development

Our MSc programmes equip you with in-demand skills for the future.

The MLiS MSc focuses on applying machine learning and AI to real scientific problems, combining computational tools with statistical and physical principles. You'll develop strategies to analyse scientific data and acquire a broad set of transferable skills enhancing your employability in the rapidly growing field of AI.

The QST MSc covers quantum sensing, information, and metrology – areas of quantum technology already impacting society through brain imaging, gravitational sensing, and quantum communication. You'll also explore advanced topics like coherent quantum devices, light and matter, machine learning and scientific programming, preparing you for the evolving quantum industry.

Graduate schemes

Students in both the QST MSc and MLiS MSc have the opportunity to undertake selective, paid part-time internships with external partners, gaining valuable industry experience. The QST programme further enhances career prospects through workshops and seminars with industrial experts. Our MSc courses serve as excellent preparation for careers in industry or research, with the QST MSc particularly suited for those pursuing research careers in quantum science.

What we are looking for

Applicants for our MSc programmes should have an undergraduate degree at 2.1 (or international equivalent) in one of the following areas: physics, mathematics, computer science, chemistry or engineering.

Profile can be viewed at **physicsworldjobs.com**

LOCATION

Nottingham, UK

DESIRED DEGREE DISCIPLINES/CLASS

Prospective MSc students should have an undergraduate degree at 2.1 (or international equivalent) in one of the following areas: physics, mathematics, computer science, chemistry, engineering

PRE-REQUISITES

Eligible to study in the UK

HOW TO APPLY

Apply online at **www.nottingham.ac.uk/pgstudy/how-to-apply/taught.aspx**

CONTACT

University of Nottingham
School of Physics & Astronomy
University Park
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UK
Tel +44 (0)1159 513082
E-mail physics-reception@nottingham.ac.uk
www.nottingham.ac.uk/physics

Swiss Nanoscience Institute
Center of Excellence supported by the University of Basel and the Canton of Aargau

SWISS NANOSCIENCE INSTITUTE: UNIVERSITY OF BASEL

The Swiss Nanoscience Institute (SNI) at the University of Basel funds nanoscience research as part of an interdisciplinary degree course and a PhD programme, and in projects with industry partners. All students are widely integrated into the activities that address cutting-edge scientific topics in nanoscience and nanotechnology, embedded in classical disciplines such as physics, chemistry, biology, medicine and engineering.

Why study with us

The SNI offers internationally recognized, comprehensive, and hands-on degree programmes in nanoscience. The bachelor's and master's programmes attract highly motivated students and provide an excellent interdisciplinary education with a broad background in all the natural sciences in a very supportive environment.

In the SNI PhD School, students from all over the world work on a diverse range of projects; for example quantum computing, spintronics, molecular electronics, graphene, quantum sensing, nanocontainers for medical applications, solar cells, single-cell proteomics, nanofluidic devices, and many more. An established selection process involving external and internal senior scientists ensures excellent PhD projects.

Undergraduate and graduate students become part of the SNI community, with regular opportunities for personal development and scientific exchange within the whole SNI network, including all research institutions in north-western Switzerland.

Training and development

The SNI offers a broad interdisciplinary education with additional tailormade courses to improve personal development and skills such as scientific writing, communication, and presentation techniques. Small working groups guarantee personal and individual supervision.

The PhD programme includes regular SNI conferences, such as the SNI Annual Event and a winter school. These introduce students to the interdisciplinary scientific community and offer ideal opportunities for scientific and personal exchange, including with partners from industry.

Who we are looking for

Excellent and motivated undergraduate and graduate students who are not interested only in their particular working area, but are also fascinated by other fields in the natural sciences.

- If you are interested in the nanostudy programme, please visit **www.nanoscience.ch/studium**
- Information on new positions in the SNI PhD School and the online application tool are available from September to December every year at **www.nanoscience.ch/phd**

Profile can be viewed at **physicsworldjobs.com**

LOCATION
Basel area, Switzerland

NUMBER OF SNI MEMBERS
120

DESIRED DEGREE DISCIPLINES/CLASS
For PhD School: master's degree in physics, chemistry, biology or related field. For study programme: high-school diploma

HOW TO APPLY
Apply online when new PhD positions are announced. New positions and the online application tool are available from September–December every year on **www.phd.nanoscience.ch**

CLOSING DATE
31 December 2026

CONTACT
Swiss Nanoscience Institute
University of Basel
Klingelbergstrasse 82
4056 Basel
Switzerland
Tel +41 61 207 3906
E-mail andreas.baumgartner@unibas.ch
www.nanoscience.ch

Trinity College Dublin is Ireland's leading university, renowned for excellence in teaching, research and innovation. Founded in 1592, it offers a vibrant, diverse academic community and a beautiful historic campus in the heart of Dublin. Trinity fosters creativity, critical thinking, and equips students to tackle 21st-century global challenges.

Why study with us

The MSc in Quantum Science and Technology offers a rigorous theoretical foundation in quantum information, computation, open quantum systems, hardware, quantum chemistry and materials. Students gain insight from expert faculty, an engaged academic community, and strong industry links. Project-based work develops problem-solving skills while building professional networks through events connecting students, alumni and employers, ensuring graduates are ready to contribute to cutting-edge research and innovation in the fast-growing quantum sector.

Training and development

This programme provides in-depth technical training and structured research development, from mastering core theory to writing code for quantum processors. Students experience real-world challenges through lectures from multinationals, SMEs, and start-ups. Trinity ranks 31st most international university (*Times Higher Education* 2024) and 91st globally for Graduate Employability (QS), offering an inspiring environment that equips graduates with knowledge, adaptability and professional skills for success in the evolving 21st-century workplace.

Graduate schemes

Graduates are prepared for research routes in academia or industry, supported by connections with research institutes, enterprise partners, and the growing quantum innovation ecosystem.
The programme builds analytical depth, programming capability, and advanced problem-solving skills, positioning students for roles in quantum computing, communications and materials. Many pursue PhD research hosted by universities or industry, contributing to next-generation quantum technologies and shaping the future of the global quantum sector.

What we are looking for

This course is for those fascinated by quantum physics and its potential, interested in a career in quantum science, in the quantum technology industry, or working in related areas such as data science, machine learning or programming. It suits aspiring entrepreneurs in the emerging quantum space and those considering further study or research. If you are eager to develop advanced theoretical skills, engage with industry, and contribute to quantum innovation, this programme is designed for you.

Profile can be viewed at
physicsworld.com/jobs

LOCATION
Dublin, Ireland

NUMBER OF RESEARCHERS
200+, including 28 academic staff, 60 postdoctoral fellows and 100+ graduate students

MAIN AREAS OF RESEARCH
Thermodynamics in the quantum regime, quantum information theory, quantum simulation, quantum measurement and control, light-matter interactions, and computational material design

POSITIONS RECENTLY RECRUITED FOR
Up to 25 MSc students per year

DESIRED DEGREE DISCIPLINES/CLASS
This programme is suitable for graduates who have achieved an upper second class honours degree or the international equivalent in either physics, maths or computer science

HOW TO APPLY
Online at **www.tcd.ie/courses/postgraduate/courses/quantum-science-and-technology-msc--pgraddip**

CLOSING DATE
30 June 2026

CONTACT
Trinity College Dublin
School of Physics
The University of Dublin
College Green
Dublin 2
Ireland
E-mail quantum@tcd.ie
www.tcd.ie/physics/quantumtech

University College Dublin (UCD) hosts more than 30,000 students based in six colleges, of which 6000 are international students and 1500 are PhD students. The university is situated on a large modern campus located about 4 km south of the centre of Dublin. The College of Science comprises seven Schools: Biology and Environmental Science, Biomolecular and Biomedical Science, Chemistry, Computer Science, Earth Sciences, Mathematics and Statistics, and Physics.

Why study with us

The UCD School of Physics has a strong reputation for excellence in research and teaching, attracting students and staff of the highest international quality. The mission of the School of Physics is to promote knowledge and cultural and economic advancement, through excellence in research and teaching in physics (and related fields). The School is highly research active in fundamental physics, quantum science, space-related activities and the physics for health and medicine. It is one of the leading schools of physics in Ireland. Objectives of the school include:

- To continue to provide first-class education at undergraduate and postgraduate levels, in which teaching is delivered by research-active academic staff to equip graduates for careers in physics and in a wide range of related disciplines.
- To conduct excellent research in the school by establishing a critical mass of top-quality research teams and through increased funding from external sources.
- To strengthen existing collaborations and develop new research links with international centres of excellence in physics and science in general.

The UCD School of Physics is committed to being an inclusive, collegial and diverse environment in which all staff and students, regardless of gender, civil or family status, sexual orientation, religion, age, disability, race or membership of the Traveller community, are respected and valued, and given the necessary support to overcome barriers and to achieve their full academic potential. University College Dublin and UCD School of Physics are committed to fairness, consistency and transparency in selection decisions.

Graduate schemes

We offer MSc taught programmes in space science and technology, applied mathematics and theoretical physics, computational physics, medical physics, nanobioscience, nanotechnology, and physics.

We are also recruiting for PhD or MSc (research). Scholarships currently open: Thomas Preston Scholarship (PhD only), SIRAT Scholarship (PhD and MSc by research).

Profile can be viewed at **physicsworldjobs.com**

LOCATION
Dublin, Ireland

NUMBER OF RESEARCHERS
34 academic, 16 research,
13 administration/technical/other,
60 PhD students

PRE-REQUISITES
Eligible to study in the EU

HOW TO APPLY
Taught MSc: **www.ucd.ie/apply**
PhD/MSc (research): **www.ucd.ie/physics/study**
Currently recruiting: **www.ucd.ie/physics/research/vacanciesopportunities**

CONTACT
UCD School of Physics
University College Dublin
L.M.I. Building
Beech Hill Road
Dublin 4, D04 P7W1
Ireland
Tel +353 1 716 2210
E-mail bairbre.fox@ucd.ie
www.ucd.ie/physics
www.ucd.ie/about-ucd

WALLEYE QUANTIC

Walleye Capital is a global multi-strategy investment firm designed to constantly innovate. We integrate deep fundamental research, advanced quantitative methods and artificial intelligence to generate alpha across markets. Our collaborative culture, focus on innovation and robust risk management support diverse strategies in equities, quant, volatility and tactical.

Quantic, Walleye's premier quantitative business, runs a range of systematic, multi-asset strategies powered by cutting-edge technology, sophisticated data infrastructure and proprietary algorithms that drive some of the firm's most complex investment initiatives.

Why work for us

Walleye is a firm where exceptional talent meets collaborative culture. Built on the belief that outstanding people drive outstanding results, the firm fosters an environment where every team member can make a meaningful impact. Our culture blends intellectual rigour with pragmatic execution, prioritizing doing things right while preserving the agility and innovation of an entrepreneurial environment. Our commitment to teamwork is paired with continuous self-reflection and growth, ensuring the platform evolves to support the long-term success of everyone involved.

Training and development

Walleye's approach immerses new team members with their groups from day one, providing hands-on exposure and real experience. This learn-by-doing model is supported by structured learning. Teach-ins on the firm's strategies and businesses provide a broad view of how the organization operates, and weekly AI meetings keep the team current on emerging technologies and their application in the investment space. Employees also have access to external learning platforms, enabling self-directed development aligned with individual interests and career goals.

What we are looking for

At Walleye, we seek individuals who are exceptional thinkers and collaborative builders – people who thrive where impact, creativity and integrity matter. We value those who approach problems from fresh angles, embrace complexity, question assumptions and continually learn from others. A strong quantitative mindset is essential, as is the ability to pair rigorous analysis with practical execution. Our teams are strengthened by diverse backgrounds and experiences, and we actively seek candidates who bring unique perspectives.

Profile can be viewed at
physicsworldjobs.com

LOCATIONS
Boston, Chicago, Miami, Minnesota, New York, US; London, UK; and Dubai, UAE

NUMBER OF EMPLOYEES
400

MAIN AREAS OF RESEARCH
Fundamental equities, quantitative, volatility

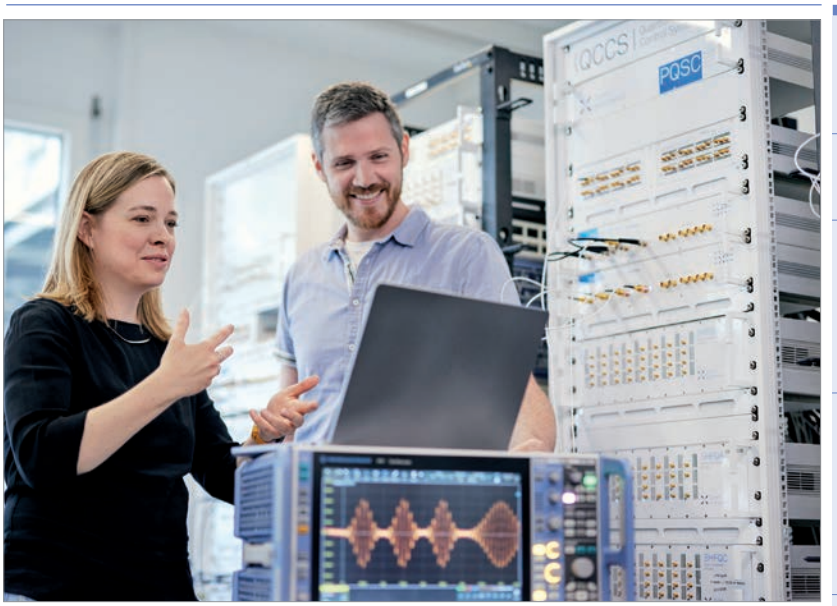
POSITIONS RECENTLY RECRUITED FOR
Quantic quantitative researcher, Quantic quantitative developer, volatility quantitative researcher, software engineering, artificial intelligence

HOW TO APPLY
View open roles and apply online
walleyecapital.com/careers

CLOSING DATE
All year round

CONTACT
Walleye Capital, LLC
315 Park Ave S, 18th Floor
New York
NY 10010
US
walleyecapital.com

Explore our open roles and apply now!



Zurich Instruments is a test and measurement company headquartered in Zurich, Switzerland, and is part of the Rohde & Schwarz family. We develop and sell measurement instruments worldwide, either directly or through carefully selected partners, and provide responsive and effective customer service. Our offering includes lock-in amplifiers, arbitrary waveform generators, impedance analyzers, phase-locked loops, digitizers, boxcar averagers, and quantum computing control systems.

Why work for us

You will work in a team of bright, creative and inspiring people. We all love technology, and work together with a positive and innovation-driven spirit. You will encounter a work environment with a lot of freedom to act, and space for creativity. We also believe that consistently good work performance requires a healthy work–life balance. This starts with a good working climate where we tackle daily challenges with persistence and a sense of humour.

Training and development

Our team members grow in their role, and are coached to successfully take more responsibility. Knowledge sharing and continuous learning across different functions is essential. We foster a culture of open and constructive feedback. Driven by our company values, everybody is encouraged to take leadership in order to achieve the best for our customers and for our company beyond functional and organizational boundaries.

What we are looking for

At Zurich Instruments we actively seek results-oriented self-starters who love to tackle challenges in a co-operative fashion. For our application scientist positions, they're people who want to transition from an academic path into a more commercial role, and for engineering positions they want to be part of a high-quality R&D team striving for the best-on-market measurement software and hardware solutions. You'll need to perceive daily variation as a positive stimulus for your own development and feel inspired working in a multicultural, hi-tech environment.

Profile can be viewed at **physicsworldjobs.com**

LOCATIONS
Zurich, Switzerland; Shanghai, China; Boston, MA, US; Germany; Korea; Japan

NUMBER OF RESEARCHERS
180

CORE OFFERINGS
Quantum computing control system
Lock-in amplifier
Impedance analyser
Arbitrary waveform generator

POSITIONS RECENTLY RECRUITED FOR
Application scientist (quantum), application scientist (optics), software engineer, FPGA and firmware engineer, hardware engineer, business developer (quantum)

DESIRED DEGREE DISCIPLINES/CLASS
BSc, MSc or PhD, or equivalent, in physics, electrical engineering, computational science or other technical fields, depending on the role

PRE-REQUISITES
US citizenship preferable for US-based roles

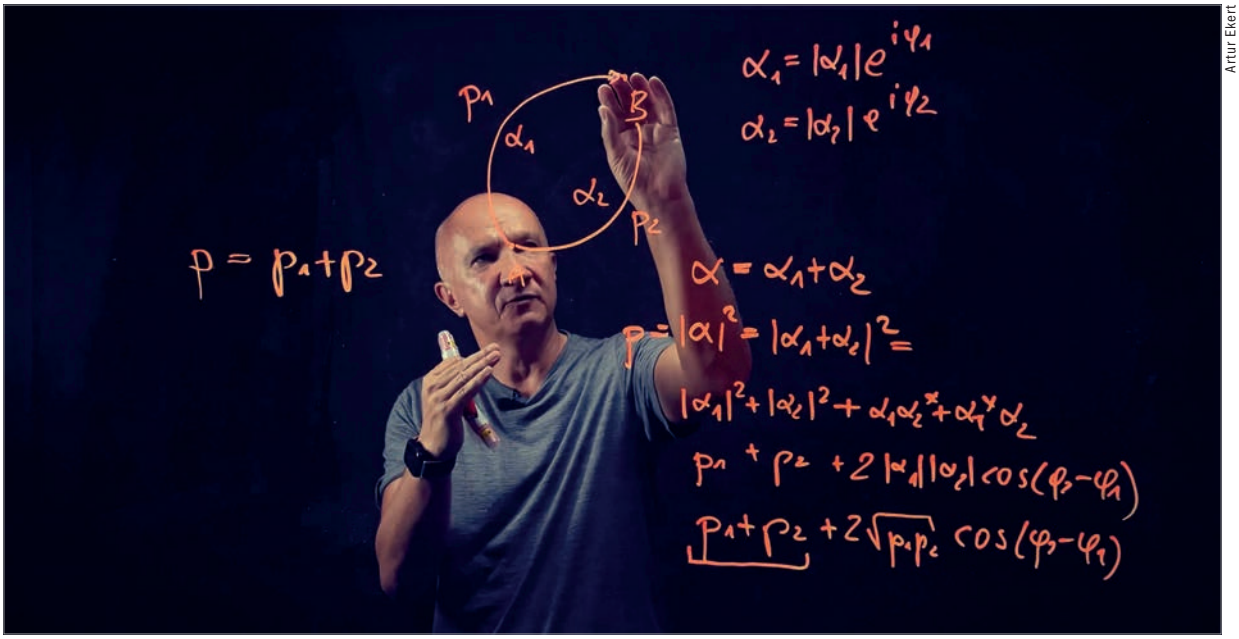
HOW TO APPLY
Apply online at **www.zhinst.com/company/careers**

CLOSING DATE
All year round

CONTACT
Zurich Instruments
Technoparkstrasse 1
Zurich 8005
Switzerland
Tel +41 044 515 04 10
E-mail info@zhinst.com
www.zhinst.com

Quantum cryptography

Artur Ekert is a professor of quantum physics and cryptography at the University of Oxford, UK, whose work on information processing in quantum mechanical systems has wide-ranging applications in cryptography and quantum computing. In 2024 he received the Royal Society's Milner Award for outstanding achievement in computer science by a European researcher



Artur Ekert

What skills do you use every day in your job?

Apart from the usual set of mathematical skills ranging from probability theory and linear algebra to aspects of cryptography, the most valuable skill is the ability to think in a critical and dissecting way. Also, one mustn't be afraid to go in different directions and connect dots. In my particular case, I was lucky enough that I knew the foundations of quantum physics and the problems that cryptographers were facing and I was able to connect the two. So I would say it's important to have a good understanding of topics outside your narrow field of interest. Nature doesn't know that we divided all phenomena into physics, chemistry and biology, but we still put ourselves in those silos and don't communicate with each other.

Nature doesn't know that we divided all phenomena into physics, chemistry and biology, but we still put ourselves in those silos and don't communicate with each other

What do you like best and least about your job?

Least is easy, all admin aspects of it. Best is meeting wonderful people. That means not only my senior colleagues – I was blessed with wonderful supervisors and mentors – but also the junior colleagues, students and postdocs that I work with. This job is a great excuse to meet interesting people.

What do you know today, that you wish you knew when you were starting out in your career?

That it's absolutely fine to follow your instincts and your interests without paying too much attention to practicalities. But of course that is a post-factum statement. Maybe you need to pay attention to certain practicalities to get to the comfortable position where you can make the statement I just expressed.

Mathematics and computation

Hannah Earley is the chief technical officer and co-founder of Vaire Computing, which is a start-up seeking to commercialize computer chips based on the principles of reversible computing – a topic Earley studied during her PhD in applied mathematics and theoretical physics at the University of Cambridge, UK. The central idea behind reversible computing is that reversible operations use much less energy, and thus generate much less waste heat, than those in conventional computers

What skills do you use every day in your job?

In an early-stage start-up environment, you have to wear lots of different hats. Right now, I'm planning for the next few years, but I'm also very deep into the engineering side of Vaire, which spans a lot of different areas.

The skill I use most is my ability to jump into a new field and get up to speed with it as quickly as possible, because I cannot claim to be an expert in all the different areas we work in. I cannot be an expert in integrated circuit design as well as developing electronic design automation tooling as well as building better resonators. But what I can do is try to learn about all these things at as deep a level as I can, very quickly, and then guide the people around me with higher-level decisions while also having a bit of fun and actually doing some engineering work.

What do you like best and least about your job?

We have so many great people at Vaire, and being able to talk with them and discuss all the most interesting aspects of their specialities is probably the part I like best. But I'm also enjoying the fact that in a few years, all this work will culminate in an actual product based on things I worked on when I was in academia. I love theory, and I love thinking about what could be possible in hundreds of years' time, but seeing an idea get closer and closer to reality is great.

The part I have more of a love-hate relationship with is just how intense this job is. I'm probably intrinsically a workaholic. I don't think I've ever had a good balance in terms of how much time I spend on work, whether now or when I was doing my PhD or even before. But when you are responsible for making your company succeed, that degree of intensity becomes unavoidable. It feels difficult to take breaks or to feel comfortable taking breaks, but I hope that as our company grows and gets more structured, that part will improve.

Intel Ignite

When I was a PhD student, it felt like there wasn't that big a gap between theory and implementation. But there is...

AUDIO

In a conversation with *Physics World*'s Margaret Harris, Hannah Earley talks about the physics, engineering and commercialization of reversible computing.

What do you know today, that you wish you knew when you were starting out in your career?

There are so many specifics of what it means to build a computer chip that I wish I'd known. I may even have suffered a little bit from the Dunning–Kruger effect [in which people with limited experience of a particular topic overestimate their knowledge] at the beginning, thinking, "I know what a transistor is like. How hard can it be to build a large-scale integrated circuit?"

It turns out it's very, very hard, and there's a lot of complexity around it. When I was a PhD student, it felt like there wasn't that big a gap between theory and implementation. But there is, and while to some extent it's not possible to know about something until you've done it, I wish I'd known a lot more about chip design a few years ago.

Metamaterials

With a PhD in physics from the University of California, San Diego, **Tom Driscoll** is the founder and chief technology officer of the Seattle-based firm Echodyne, which uses metamaterials to build radar technology for both commercial and defence applications. He was previously managing director of the Metamaterials Commercialization Center at the technology incubator Intellectual Ventures

What skills do you use every day in your job?

I'm thankful every day that my physics background helps me quickly understand information – even outside my areas of expertise – and fit it into the larger puzzle of what's valuable and/or critical for our company, business, products, team and technology. I also believe it's under-appreciated how difficult it is to communicate clearly – especially on technical topics or across large teams – and the challenge scales with the size of the team. Crafting clear communication is therefore something that I try to give extra time and attention to myself. I also encourage the wider team to follow that example and do it themselves as they develop our technology and products.

What do you like best and least about your job?

The best thing for me is that every day, every task and action, no matter how small, helps bit-by-bit to build a world that is safer and more secure against the backdrop of dramatic changes in autonomy. What's also great are the remarkable people I work with – on my team and across the company. They're dedicated, intelligent, and each exemplary in their own unique ways. My least favourite part of the job is PowerPoint, which to me is the least effective and most time-consuming means of communicating ever created. In the business world, however, you have to accept and accommodate your customers' preferences – and that means using PowerPoint.

What do you know today, that you wish you knew when you were starting out in your career?

I wish I'd known that anyone who believes a hardware start-up will only take three or four years to develop a product has to be kidding. But jokes aside, I believe that learning things is often more valuable than knowing things – and the past 11 years have been an amazing journey of learning. If I had a time machine would I go back and tweak what I did early on? Absolutely! But would I hand myself a cheat-sheet that let me skip all the learning? Absolutely not!

Echodyne

It's under-appreciated how difficult it is to communicate clearly

Quantum technology

Giulia Rubino is a lecturer and research fellow at the University of Bristol, UK, who explores the interface between quantum foundations and quantum technologies. As a member of the Quantum Engineering and Technology Lab and team leader of the Quantum Technologies ⇆ Foundations group, she uses integrated photonics to explore new architectures for quantum information processing, and studies quantum information theory and quantum thermodynamics

What skills do you use every day in your job?

Beyond the technical skills tied to specific aspects of my research, my work involves continuously engaging a balance of creativity, critical thinking and curiosity. Creativity alone isn't enough – in physics, ideas must ultimately stand up to scrutiny. Something is either right or it isn't, so the goal is to let your imagination run free, while keeping it anchored to scientific rigour.

This balance becomes especially important when it comes to defining your own research direction. Early in your career, you're usually handed a problem to work on. But, over time, you have to learn to ask your own questions, and formulating good ones is much harder than it sounds.

In the beginning, most of the ideas you come up with turn out either to be flawed or have already been explored. The alternative is to stay in safe territory and do incremental work, which certainly has its place, but it's difficult to build a research career on that alone.

What helps is staying curious. Finding a meaningful research question often means diving into unfamiliar literature, following sparks of interest, and carving out time to read and think critically. It also means being open to inspiration from other people's work, not just from research that overlaps with your own, but potentially from entirely different areas.

I've seen how easy it can be to fall into the trap of only valuing ideas that align with your own. To me, one of the most precious traits in research is the ability to keep your curiosity alive: to remain open to surprise, ready to recognize when you're wrong, be willing to learn, and to be excited by someone else's discovery, even when it has nothing to do with your own work.

Wavelength Studio/Christy Nunns

One of the most precious traits in research is the ability to keep your curiosity alive

What do you like best and least about your job?

What I like best is the freedom. I get to choose what my next research project will be about, and sometimes that process starts in the simplest of ways. I see an exciting talk at a conference, become fascinated by a new idea, and find myself reading everything I can about it. I'll come back, pitch it to a student, and if they're excited too, we explore it together.

When I start something new, I often feel like an imposter, venturing into foreign territory and trying to operate as if I know my way around, but as time goes on, things start to fall into place. Eventually, you reach the point where you create something new that others in the field may find interesting or inspiring in turn. That moment – when a once-distant topic becomes something you have actually contributed to – is deeply rewarding.

What I like least is answering e-mails. As a student, I couldn't understand why some professors took ages to reply. Now I do. Some days, my inbox just fills up endlessly, and responding thoughtfully to every message would take the whole day. It's a balancing act, deciding when to say yes and when to say no, and learning to say no in a considerate and fair way takes time and emotional energy. You want to be generous with your time, especially when someone genuinely needs help, but finding this balance can be exhausting. It's an important part of the job, but I wish it took up a bit less space.

What do you know today, that you wish you knew when you were starting out in your career?

That everyone feels like an imposter sometimes. When I started out as a student, I looked around and assumed everyone else was an expert, while I was just trying to find my way, painfully aware of how much I didn't know. Over time, you do gain confidence in certain areas, but research constantly pushes you in new directions. That means learning new things, starting from scratch, and feeling like an imposter all over again.

The first time I heard the term "imposter syndrome", it felt like a revelation. Just knowing that this feeling had a name, and that others experienced it too, was validating. Does this mean I feel less like an imposter now? Not really. But I've come to understand that it's part of the process. It means I'm still learning, still being challenged, still exploring new directions. And if that feeling never goes away entirely, maybe that's a good sign.

Journalism

Jason Palmer did a PhD in chemical physics at Imperial College London and a postdoc at the European Laboratory for Non-linear Spectroscopy (LENS) in Italy, before leaving research to become a science journalist. Having worked as a science writer for the BBC, *New Scientist* and the *Economist*, he now co-hosts the daily global news and analysis podcast *The Intelligence* at the *Economist*

What skills do you use every day in your job?

One thing I can say for sure that I got from working in academia is the ability to quickly read, summarize and internalize information from a bunch of sources. Journalism requires a lot of that. Being able to skim through papers – reading the abstract, reading the conclusion, picking the right bits from the middle and so on – that is a life skill.

In terms of other skills, I'm always considering who's consuming what I'm doing rather than just thinking about how I'd like to say something. You have to think about how it's going to be received – what's the person on the street going to hear? Is this clear enough? If I were hearing this for the first time, would I understand it? Putting yourself in someone else's shoes – be it the listener, reader or viewer – is a skill I employ every day.

What do you like best and least about your job?

The best thing is the variety. I ended up in this business and not in scientific research because of a desire for a greater breadth of experience. And boy, does this job have it. I get to talk to people around the world about what they're up to, what they see, what it's like, and how to understand it. And I think that makes me a much more informed person than I would be had I chosen to remain a scientist.

When I did research – and even when I was a science journalist – I thought "I don't need to think about what's going on in that part of the world so much because that's not my area of expertise." Now I have to, because I'm in this chair every day. I need to know about lots of stuff, and I like that feeling of being more informed.

I suppose what I like the least about my job is the relentlessness of it. It is a newsy time. It's the flip side of being well informed, you're forced to confront lots of bad things – the horrors that are going on in the world, the fact that in a lot of places the bad guys are winning.

Economist

AUDIO

Listen to *Physics World*'s Hamish Johnston in conversation with Jason Palmer who describes how he made the transition from the laboratory to the newsroom.

Nobody can know everything ... science is a learning process

What do you know today, that you wish you knew when you were starting out in your career?

When I started in science journalism, I wasn't a journalist – I was a scientist pretending to be one. So I was always trying to show off what I already knew as a sort of badge of legitimacy. I would call some professor on a topic that I wasn't an expert in yet just to have a chat to get up to speed, and I would spend a bunch of time showing off, rabbiting on about what papers I'd read and what I knew, just to feel like I belonged in the room or on that call. And it's a waste of time. You have to swallow your ego and embrace the idea that you may sound like you don't know stuff even if you do. You might sound dumber, but that's okay – you'll learn more and faster, and you'll probably annoy people less.

In journalism in particular, you don't want to preload the question with all of the things that you already know because then the person you're speaking to can fill in those blanks – and they're probably going to talk about things you didn't know you didn't know, and take your conversation in a different direction.

It's one of the interesting things about science in general. If you go into a situation with experts, and are open and comfortable about not knowing it all, you're showing that you understand that nobody can know everything and that science is a learning process.

Quantum materials

Sophie Morley, who has a PhD in physics from the University of Leeds in the UK, is a staff scientist at the Advanced Light Source (ALS) synchrotron facility – part of Lawrence Berkeley National Laboratory in California – where she helps visiting researchers to probe the fundamental properties of quantum materials

What skills do you use every day in your job?

I am one of two co-chairs, along with my colleague Hendrik Ohldag, of the Quantum Materials Research and Discovery Thrust Area at ALS. Among other things, our remit is to advise ALS management on long-term strategy regarding quantum science, We launch and manage beamline development projects to enhance the quantum research capability at ALS and, more broadly, establish collaborations with quantum scientists and engineers in academia and industry.

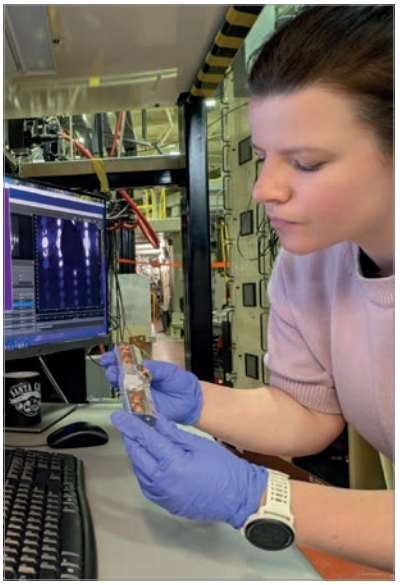
In terms of specifics, the thrust area addresses problems of condensed-matter physics related to spin and quantum properties – for example, in atomically engineered multilayers, 2D materials and topological insulators with unusual electronic structures. As a beamline scientist, active listening is the key to establishing productive research collaborations with our scientific end-users – helping them to figure out the core questions they're seeking to answer and, by extension, the appropriate experimental techniques to generate the data they need.

The task, always, is to translate external users' scientific goals into practical experiments that will run reliably on the ALS beamlines. High-level organizational skills, persistence and exhaustive preparation go a long way: it takes a lot of planning and dialogue to ensure scientific users get high-quality experimental results.

What do you like best and least about your job?

A core part of my remit is to foster the collective conversation between ALS staff scientists and the quantum community, demystifying synchrotron science and the capabilities of the ALS with prospective end-users. The outreach activity is exciting and challenging in equal measure – whether that's initiating dialogue with quantum experts at scientific conferences or making first contact using Teams or Zoom.

ALS



The outreach activity is exciting and challenging in equal measure – whether that's initiating dialogue with quantum experts at scientific conferences or making first contact using Teams or Zoom

Internally, we also track the latest advances in fundamental quantum science and applied R&D. In-house colloquia are mandatory, with guest speakers from the quantum community engaging directly with ALS staff teams to figure out how our portfolio of synchrotron-based techniques – whether spectroscopy, scattering or imaging – can be put to work by users from research or industry. This learning and development programme, in turn, underpins continuous improvement of the beamline support services we offer to all our quantum end-users.

As for downsides: it's never ideal when a piece of instrumentation suddenly "breaks" on a Friday afternoon. This sort of trouble-shooting is probably the part of the job I like least, though it doesn't happen often and, in any case, is a hit I'm happy to take given the flexibility inherent to my role.

What do you know today, that you wish you knew when you were starting out in your career?

It's still early days, but I guess the biggest lesson so far is to trust in my own specialist domain knowledge and expertise when it comes to engaging with the diverse research community working on quantum materials. My know-how in photon science – from coherent X-ray scattering and X-ray detector technology to in situ magnetic- and electric-field studies and automated measurement protocols – enables visiting researchers to get the most out of their beamtime at ALS.

Economics

Tom Woodroof did a PhD in applied nuclear physics at the University of Liverpool, UK, before leaving academia to find ways to build a more equitable and sustainable economy. He is co-founder of the company Mutual Credit Services

What skills do you use every day in your job?

I co-founded Mutual Credit Services in 2020 to help small businesses thrive independently of the banking sector. As a financial technology start-up, we're essentially trying to create a "commons" economy, where power lies in the hands of people, not big institutions, thereby making us more resilient to the climate crisis.

Those goals are probably as insanely ambitious as they sound, which is why my day-to-day work is a mix of complexity economics, monetary theory and economic anthropology. I spend a lot of time thinking hard about how these ideas fit together, before building new tech platforms, apps and services, which requires analytical and design thinking.

There are still many open questions about business, finance and economics that I'd like to do research on, and ultimately develop into new services. I'm constantly learning through trial projects and building a pipeline of ideas for future exploration.

Developing the business involves a lot of decision-making, project management and team building. In fact, I'm spending more and more of my time on commercialization – working out how to bring new services to market, nurturing partnerships and talking to potential early adopters. It's vital that I can explain novel financial ideas to small businesses in a way they can understand and have confidence in. So I'm always looking for simpler and more compelling ways to describe what we do.

What do you like best and least about your job?

What I like best is the variety and creativity. I'm a generalist by nature, and love using insights from a variety of disciplines. The practical application of these ideas to create a better economy feels profoundly meaningful, and something that I'd be unlikely to get in any other job. I also love the autonomy of running a business. With a small but hugely talented and enthusiastic team, we've so far managed to avoid the company becoming rigid and institutionalized. It's great to work with people on our team and beyond who are excited by what we're doing, and want to be involved.

The hardest thing is facing the omnicrisis of climate breakdown and likely societal collapse that makes this work necessary in the first place. As with all start-ups, the risk of failure is huge, no matter how good the ideas are, and it's frustrating to spend so much time on tasks that just keep things afloat, rather than move the mission forward. I work long hours and the job can be stressful.

Tom Woodroof

A mix of curiosity, self-education and carefully-chosen guidance can get you surprisingly far

What do you know today, that you wish you knew when you were starting out in your career?

I spent a lot of time during my PhD at Liverpool worrying that I'd get trapped in one narrow field, or drift into one of the many default career options. I wish I'd known how many opportunities there are to do original, meaningful and self-directed work – especially if you're open to unconventional paths, such as the one I've followed, and can find the right people to do it with.

It's also easy to assume that certain skills or fields are out of reach, whereas I've found again and again that a mix of curiosity, self-education and carefully-chosen guidance can get you surprisingly far. Many things that once seemed intimidating now feel totally manageable. That said, I've also learned that everything takes at least three times longer than expected – especially when you're building something new. Progress often looks like small compounding steps, rather than a handful of breakthroughs.

Quantum science education

Muhammad Hamza Waseem is a research scientist at Quantinuum, where he works on quantum natural language processing as well as quantum physics education and outreach. His other research interests include quantum foundations, applied category theory and mathematical linguistics

Waseem completed his DPhil in physics at the University of Oxford in the UK, where he worked on applied process-relational philosophy and employed string diagrams to study interpretations of quantum theory, constructor theory, wave-based logic, quantum computing and natural language processing. At Oxford, Waseem continues to teach mathematics and physics at Magdalen College, the Mathematical Institute, and the Department of Computer Science.

Waseem has played a key role in organizing the Lahore Science Mela, the largest annual science festival in Pakistan. He also co-founded Spectra, an online magazine dedicated to training popular-science writers in Pakistan. For his work popularizing science he received the 2021 Diana Award, was highly commended at the 2021 SEPnet Public Engagement Awards, and won an impact award in 2024 from Oxford's Mathematical, Physical and Life Sciences (MPLS) division.

Muhammad Hamza Waseem

What skills do you use every day in your job?

I'm a theoretical physicist, so if you're thinking about what I do every day, I use chalk and a blackboard, and maybe a pen and paper. However, for theoretical physics, I believe the most important skill is creativity, and the ability to dream and imagine.

What do you like best and least about your job?

That's a difficult one because I've only been in this job for a few weeks. What I like about my job is the academic freedom and the opportunity to work on both education and research. My role is divided 50/50, so 50% of the time I'm thinking about the structure of natural languages like English and Urdu, and how to use quantum computers for natural language processing. The other half is spent using our diagrammatic formalism called "quantum picturalism" to make quantum physics accessible to everyone in the world. So, I think that's the best part. On the other hand, when you have a lot of smart people together in the same room or building, there can be interpersonal issues. So, the worst part of my job is dealing with those conflicts.

I believe the most important skill is creativity, and the ability to dream and imagine

What do you know today, that you wish you knew when you were starting out in your career?

It's a cynical view, but I think scientists are not always very rational or fair in their dealings with other people and their work. If I could go back and give myself one piece of advice, it would be that sometimes even rational and smart people make naive mistakes. It's good to recognize that, at the end of the day, we are all human.

Get in touch

Want to be involved in the 2027 edition? Contact us today.

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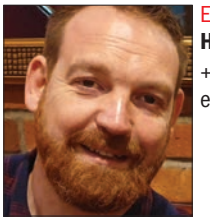

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