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WORK WITH CUTTING-EDGE TECHNOLOGY

From **space exploration** to **improving medical diagnosis** and treatments, **quantum science could change technology** as we know it.

At **Sydney Quantum Academy**, you'll become part of a **vibrant and welcoming student community** at the forefront of the **fast-growing quantum tech industry**.

Our partner universities — **UNSW Sydney, Macquarie University, the University of Sydney** and **UTS** — offer access to **world-class facilities and expertise**, and a wide range of quantum units and courses.

Our **programs and scholarships** provide critical **industry experience** and **networking opportunities** to ensure you're positioned for an **exciting career**.

Visit **sydneyquantum.org/quantum-careers** or email us at **info.sqa@sydney.edu.au**.

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NSW GOVERNMENT

Our Partners

MACQUARIE University

UNSW SYDNEY

THE UNIVERSITY OF SYDNEY

UTS

PUTTING THE Q IN THE NEXT INFORMATION REVOLUTION

What happens when you take classical information technology and apply the weird principles of quantum mechanics? You can be a part of finding out – and help revolutionise technology as we know it in the process!

PETER TURNER
CEO, SYDNEY QUANTUM ACADEMY

When I was an undergraduate, quantum computing was truly on the fringes of research – back then, few people had heard of the term quantum information science. When I finished my studies, it was almost impossible to imagine working on quantum stuff outside of a traditional academic university career. Less than 20 years later, things have really changed.

The job opportunities in quantum are as broad as the potential applications of the technology – from sensors through to communications and, of course, computing, both on the hardware and software sides. Basically anywhere (but not everywhere!) that information technology is used today, there could be potential quantum applications. The possibilities are enormous; so much so that it is not the current community of experts, but the next generation of scientists, engineers and entrepreneurs – your generation – that will really shape the future of the field.

WE NEED DIVERSE TALENT

All those diverse applications mean we need diversity of talent. You don't need to be a physicist or mathematician to join the quantum workforce. As this field grows, so will the career options – so whatever your passion, chances are you can find an overlap with quantum.

Australia has been at the forefront of quantum technology research since the beginning and Sydney is home to one of the highest concentrations of quantum science and technology experts in the world. Keen to make the most of the state's position as a quantum technology powerhouse, the NSW Government announced support for the establishment of the Sydney Quantum Academy (SQA) in 2019. The SQA is a partnership between four world-leading universities – Macquarie University, UNSW Sydney, University of Sydney and University of Technology Sydney. Our aim is to grow Australia's quantum economy. This will mean more high-quality careers for people with the right passion, skills and qualifications.

If you dream of a quantum career but the path isn't clear to you after reading these pages, reach out to us at SQA and we'll help you discover your quantum career potential!

Peter Turner
CEO, Sydney Quantum Academy

> **"AS THIS FIELD GROWS, SO WILL THE CAREER OPTIONS – SO WHATEVER YOUR PASSION, CHANCES ARE YOU CAN FIND AN OVERLAP WITH QUANTUM"**

CEO, SYDNEY QUANTUM ACADEMY

DIRECTOR, QUANTUM ENGINEERING CENTRE FOR DOCTORAL TRAINING, UNIVERSITY OF BRISTOL

ASSISTANT PROFESSOR, THE UNIVERSITY OF TOKYO

MSC AND PHD (PHYSICS), UNIVERSITY OF TORONTO

BACHELOR OF SCIENCE (PHYSICS AND MATHS), DALHOUSIE UNIVERSITY

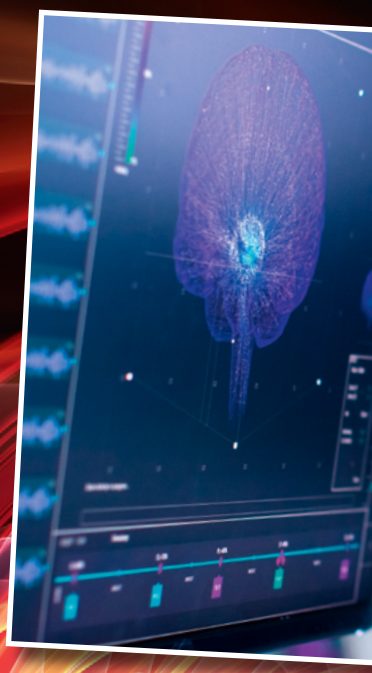
Meet our cover star

Irene Fernández de Fuentes (pictured on the cover) studied physics at uni and went on to become one of the first PhD students to join the Sydney Quantum Academy on a Supplementary Scholarship. She's now doing her PhD at UNSW Sydney, researching a novel design for quantum bits!

Read her full story at bit.ly/sqa-irene

SHUTTERSTOCK

QUANTUM + X = YOUR DREAM JOB!



We live in the Digital Age, a world made possible by computers and information technology. Now, we look set to herald a new 'Quantum Age', and the potential applications – and career opportunities! – are almost limitless

Quantum technologies harness the world of the very small. We're talking technologies based on the physics that occurs at the scale of atoms. Computers, the internet and lasers use quantum physics, but not to its full potential – recent discoveries have created a stack of new possibilities and opportunities are growing rapidly. The rise of quantum tech has been compared to the dawn of computing last century. Some technologies are here already and many more are being invented. There are endless ways to bring your passion to the world through quantum technologies. Here are just a few! – *Sarah Kellett*

#1 QUANTUM TECH + COMPUTERS = QUANTUM COMPUTING

YOUR PASSION: creating cutting-edge computers

CAREERS AND EARNING POTENTIAL:

- Technical project manager ($115k to $130k)
- Scientist, quantum ($90k to $120k)
- Software team leader ($120k to $160k)

THE LOWDOWN: Computer companies around the world are looking to quantum for the next big leap. You'll work in a team to create new software and hardware solutions that make the future possible.

EMPLOYERS: Diraq, IBM, Microsoft, Google Quantum AI, Silicon Quantum Computing, Max Kelsen, AWS.

#2 QUANTUM TECH + BUSINESS = ENTREPRENEUR

YOUR PASSION: developing technology and taking it into the real world

CAREERS AND EARNING POTENTIAL:

- Founder of a startup ($100 to $100M or more!)
- Commercial development manager ($90k to $130k)
- Innovation hub project officer ($100k to $125k)

THE LOWDOWN: You can help a startup company develop a new quantum device – or invent a device yourself and start your own. You'll talk to customers, improve your products and could create a global company. Or you can work in an innovation hub that supports tech startups. The sky is the limit!

EMPLOYERS: Create your own business, join a startup like Q-CTRL, Quantum Brilliance or Archer, or work in an innovation hub like The Quantum Terminal.

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#3 QUANTUM TECH + HEALTH = MEDTECH INNOVATOR

YOUR PASSION: improving health and wellbeing

CAREERS AND EARNING POTENTIAL:

- Project manager – quantum devices ($100k to $120k)
- Product designer ($100k to $140k)
- Medical device assessor ($85k to $100k)

THE LOWDOWN: Keep up with new advances and share ideas about how they can improve people's health. In the future, quantum sensors could detect diseases earlier – your work is to bring those technologies to doctors and hospitals.

EMPLOYERS: Government (Health) or med-tech startup

#4 QUANTUM TECH + SECURITY = CYBER EXPERT

YOUR PASSION: keeping Australia safe

CAREERS AND EARNING POTENTIAL:

- Software developer ($90k to $130k)
- Researcher, quantum cryptography ($90k to $120k)
- Senior consultant, quantum ($120k to $160k)

THE LOWDOWN: Work with banks and defence to develop ultra-secure quantum key distribution networks that can spot hackers who would otherwise go undetected. You could also help develop strategies supporting quantum technology adoption. You'll stay ahead of the trends and collaborate to use technology to keep Australia safe.

EMPLOYERS: QuintessenceLabs, Government (Defence), CSIRO.

5 COOL QUANTUM APPLICATIONS

Here are some more examples of fields where quantum technology has had, or could have, a major impact:

1 ULTRA-SECURE COMMUNICATIONS

The main application of quantum physics in the communications sector is for data protection and ultra-secure information processing and transmission. Hello, cyber security of tomorrow!

2 NEXT-GEN CHEMISTRY

Quantum computers could help to model or simulate complex natural phenomena – a huge advantage in developing new drugs and medical treatments.

3 SENSITIVE SENSORS

By applying quantum physics, we could vastly improve how we measure, detect and interact with the world around us (and beyond!) – think next-gen GPS, smarter autonomous vehicles and super-powerful telescopes.

4 TACKLING CLIMATE CHANGE

Quantum could play a role in developing climate change solutions, including delivering more efficient energy storage or next-generation batteries for the vehicles of the future, with little or no carbon footprint.

5 AI 2.0

What do you get when you combine super-powerful quantum computing algorithms with the exciting emerging field of machine learning and artificial intelligence (AI)? Well, our best and brightest researchers are busy figuring it out – and maybe you will join them one day!

SUPER POSITIONS

Meet three people with cool careers in quantum

#1

QUANTUM CODER

MARIKA KIEFEROVA IS DEVELOPING PROGRAMS FOR QUANTUM COMPUTERS THAT DON'T YET EXIST

As a high school student, Marika attended a lot of physics, maths and computer science camps.

"I loved the camp community," she says. "While I wasn't one of the brightest students, I decided to study physics, hoping I could still keep up if I worked hard enough."

Fast-forward to today and Marika has shown that she can more than keep up. Having completed her PhD at Macquarie University, she is now a leading quantum computing scientist who combines lecturing students with performing cutting-edge research at the University of Technology Sydney and Google Quantum AI.

"What matters to me is working on fun projects that push the boundary of what we know about the power and limitations of quantum computing," says Marika, who is focusing on quantum algorithms in her current work. "I try to understand how we would program and apply quantum computers once we have them."

Currently recruiting students for her group, Marika's advice to any budding quantum researcher is to learn as much maths as possible: "Mathematics is the language of quantum computing and there is always more to learn."

> "WHAT MATTERS TO ME IS WORKING ON PROJECTS THAT PUSH THE BOUNDARY OF WHAT WE KNOW ABOUT QUANTUM COMPUTING"

LAUREN TROMPP

BACHELOR AND MASTER OF SCIENCE (PHYSICS), COMENIUS UNIVERSITY, SLOVAKIA >> PHD (PHYSICS), UNIVERSITY OF WATERLOO + MACQUARIE UNIVERSITY >> QUANTUM CONSULTANT, ZAPATA COMPUTING

POSTDOCTORAL FELLOW, UNIVERSITY OF TECHNOLOGY SYDNEY >> LECTURER, UNIVERSITY OF TECHNOLOGY SYDNEY >> RESEARCH SCIENTIST, GOOGLE QUANTUM AI

#2 QUBIT CREATOR

LAUREN TROMPP

MAJA CASSIDY IS BUILDING THE (QU)BITS TO POWER NEXT-GEN QUANTUM COMPUTERS

If even a supercomputer can't tackle certain complex calculations, a quantum computer could – in theory. The problem is that even the most advanced quantum computers in the world right now suffer errors that scramble their output. The basic units of quantum data they use, called qubits, are a bit flaky.

Maja – a Sydney Quantum Academy expert and principal research manager for Microsoft Quantum in Sydney – is working on a remedy: making better qubits. She leads a team engineering qubits and integrating qubits with electronics and software.

"The process to imagine something, then plan it, build it and see it work is very rewarding," she says.

Maja enrolled in UNSW Sydney's Bachelor of Engineering (Electrical Engineering), because it involved lots of maths and was a 'platform' degree for a wide range of potential careers. But she soon developed a love for physics – and quantum devices in particular – during her Honours research project.

Maja did take on a PhD developing imaging sensors for cancer detection, but she couldn't resist the pull of quantum: "I missed the beauty and depth of understanding it offers," she says.

> "THE PROCESS TO IMAGINE SOMETHING, THEN PLAN IT, BUILD IT AND SEE IT WORK IS VERY REWARDING"

BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING), UNSW SYDNEY >> MASTER OF SCIENCE + PHD (APPLIED PHYSICS), HARVARD UNIVERSITY >> POSTDOCTORAL FELLOW, DELFT UNIVERSITY OF TECHNOLOGY

FOUNDING ADVISOR, IRIDIA >> RESEARCH FELLOW, UNIVERSITY OF SYDNEY >> PRINCIPAL RESEARCH MANAGER, MICROSOFT QUANTUM

#3 ERROR CORRECTOR

JUAN PABLO BONILLA ATAIDES SHOWS THAT FOLLOWING YOUR PASSION FOR PHYSICS FROM AN EARLY AGE CAN SET YOU ON AN EXCITING CAREER JOURNEY

At age 15, Pablo was working on a project at the University of Sydney. At 21, he published his first scientific paper. It was groundbreaking.

For the paper, Pablo fiddled with code that had been used to correct errors in quantum computing. Working with university researchers, he tweaked the code, doubling its ability to snuff out errors. It has since been used widely around the world.

Pablo has been snapped up by California-based startup PsiQuantum. There, he is working on quantum error correction for a quantum computer that will run on light-based technologies.

And he's looking forward to whatever comes next: "I'm not sure down which path this will take me but I'm excited to see where I end up!" – *Ben Skuse*

> "I'M NOT SURE DOWN WHICH PATH THIS WILL TAKE ME BUT I'M EXCITED TO SEE WHERE I END UP!"

BACHELOR OF SCIENCE / BACHELOR OF ADVANCED STUDIES (PHYSICS AND MATHS), UNIVERSITY OF SYDNEY >> SUMMER RESEARCH SCHOLAR, UNSW SYDNEY >> INTERN QUANTUM ARCHITECT, PSIQUANTUM

UNIVERSITY OF SYDNEY

Quantum quest

Inspired about a career in quantum science and technology? Here are some more resources and information to get you on your way

STUDY PATHWAYS

There are so many pathways into a quantum career. Here are some options for after high school, and beyond!

UNDERGRADUATE DEGREES

Macquarie University
- Bachelor of Science (Physics major)

UNSW Sydney
- Bachelor of Engineering (Honours) (Quantum Engineering)
- Bachelor of Advanced Science (Honours) (Advanced Physics major)
- Bachelor of Advanced Science (Honours)/ Bachelor of Engineering (Honours) (Advanced Physics major)

University of Sydney
- Bachelor of Liberal Arts and Science (Physics)
- Bachelor of Science (Physics major)
- Bachelor of Science/Bachelor of Advanced Studies (Physics major)

UTS
- Bachelor of Computing Science (Honours) (Quantum Information Science major)
- Bachelor of Advanced Science (Quantum Technology major) *(New in 2023!)*
- Bachelor of Science (Physics major) *(New!)*

SCORE A SCHOLARSHIP

If you're studying at one of SQA's partner universities you can apply for an SQA Undergraduate Research Scholarship and do a six-week project supervised by a leading quantum researcher.

POSTGRADUATE COURSES

- Master of Science in Quantum Technology, **Australian National University**
- Master of Research, **Macquarie University**
- Master of Quantum Technologies, **The University of Queensland**

SHORT COURSE

- Quantum Information Processing, **The University of Melbourne**

Discover more quantum jobs

According to CSIRO data, quantum science and technology have the potential to create 16,000 new jobs and generate $4 billion in annual revenue by 2040. Wondering what your future role might be? Here's a list of quantum sector jobs to get you inspired and excited about your future career!

DEVICE/COMPONENT ENGINEER
Circuit Designer
Product Sales/ Marketing
Technical Sales/Marketing
Data Scientist
Quantum Algorithm Developer
CONTROL SYSTEMS ENGINEER
Cryogenics Engineer/Scientist
Applications/Solutions Architect
Experimental Physicist
PHOTONICS/OPTICS ENGINEER/SCIENTIST
Test/Measurement Engineer
Software Programmer
COMPUTATIONAL CHEMIST
SYSTEM ARCHITECT/ DESIGNER
Theoretical Physicist
DEVOPS/DATABASE ENGINEER
ERROR CORRECTION SCIENTIST
System Assembly/Maintenance Technician

FILL YOUR FEED

Get quantum career inspo in your feeds on the daily

@SYDNEYQUANTUM
Sydney Quantum Academy mainly features quantum experts on its IG grid, so follow them for mentors and career role models.

MEET THE MEQUANICS
Available on Spotify, tune in to this Aussie podcast for regular updates on the latest developments in quantum technologies.

CLEAR AS QUANTUM
This podcast series from the Centre of Excellence for Engineered Quantum Systems features conversations with Australian quantum scientists.

@SYDNEYQUANTUM
Over on Twitter, Sydney Quantum Academy will keep you up to date with its events, announcements and all things quantum.

Q-CTRL
Check out the YT channel of Aussie software company Q-CTRL for cool insights into quantum tech.

Check out SQA

Sydney Quantum Academy offers programs for school students, undergrads and postgrads, and can also facilitate internships with industry partners. If you're considering further studies, there's also the SQA PhD Scholarship program. Browse the experts section on their website to find mentors and role models. If you're interested in a career in quantum, hit them up!

Visit sydneyquantum.org /quantum-careers

FLIP OVER FOR CAREERS WITH ENGINEERING!

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