

# Quantum Technologies Careers Fact Sheets





## **What careers are there in the quantum sector?**

## **Where could a career in quantum technology take me?**

## **How can I get there?**

This set of careers fact sheets is designed to answer all of these questions and many more!

Quantum technologies harness quantum physics to gain a functionality or performance which is otherwise unattainable – the functions of quantum technologies are derived from science that cannot be explained by classical physics, such as Newton's Laws of motion, thermodynamics, or Maxwell's equations of electromagnetism.

The field of quantum technologies is rapidly growing as the technologies advance towards commercialisation, and because of this, the career opportunities within the field are expanding exponentially! There is genuine enthusiasm for quantum technologies matched by heavy investment across the globe, as the UK National Quantum Technologies Programme and similar government initiatives across the world are striving to stimulate a quantum economy.

There are many different career pathways in quantum. Alongside obvious roles such as quantum researchers, quantum engineers and cryptographers, there is also a plethora of support roles, which are crucial to the field and to growing a quantum economy, for example: project managers, business development managers, software developers, communications specialists, patent officers and many more. All of these roles show that you don't need to have a physics background to work in quantum, there really is a role for everyone, no matter what their background is!



# Laboratory technician

As a laboratory technician you would be based in university or company laboratories and would provide technical support to researchers which would be crucial to the successful development and testing of quantum technologies.



## What does the role involve?

- Meeting with researchers to understand their requirements
- Interpreting system designs
- Building systems following bespoke designs and methods which enable technologies to meet certain specifications
- Testing of systems/hardware you have created
- Recording and analysing data
- Presenting results to colleagues
- Learning how to use new pieces of equipment
- Ensuring all equipment is maintained and serviceable
- Ensuring the laboratory follows strict health and safety procedures at all times



## Where would I work?

Laboratories within campuses or company facilities.



## What subjects should I do well in at school?

Physics, Electronics, Chemistry, Computer Science, Mathematics, Biology.



## What qualifications do I need?

Minimum Bachelor's degree in a relevant subject e.g. Physics, Electronics, Chemistry, Computer Science, Mathematics. Some technicians have post-graduate qualifications, however, this is not essential.



## What skills and attributes are required?

Good manual dexterity and hand-eye coordination, attention to detail, time management, ability to work individually and as part of a team, good communication skills, logic, innovative thinking, problem solving, determination, resilience, flexibility.



## What work experience would be helpful?

Experience carrying out research projects, hands-on experience working in a laboratory (could be gained during laboratory sessions of an undergraduate degree).



## What about career progression?

There is the opportunity to progress from the role of laboratory technician to senior laboratory technician or manager, overseeing multiple laboratories or projects. In some cases, it is possible to specialise within a particular subfield or technology area and become senior within that.

## CASE STUDY



## Sébastien Guilbaud

Originally from France, Dr Sébastien Guilbaud began his career in science by studying chemistry at undergraduate level before moving to study biophysics at postgraduate level. After deciding that an academic career was not for him, Sébastien chose to pursue a career in research support, specifically in the role of research laboratory technician, which ultimately allowed him to remain heavily involved in academic research, without carrying out the research directly himself. Find out more about Sébastien's journey at [tinyurl.com/careersinquantum](https://tinyurl.com/careersinquantum)



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# Mathematician

As a mathematician in quantum, you would most probably work within a university but could also work for a company. Your work will mostly be office based although it is possible that you could visit laboratories to meet with experimentalist colleagues.



## What does the role involve?

- Use of specialist software and programming languages to perform mathematical functions
- Trying innovative methods to find solutions to mathematical problems
- Using mathematical techniques to model or analyse the performance of new technologies
- Presenting findings in written papers and in meetings
- Giving presentations at conferences
- Keeping up to date with advances in the field
- If based in academia, you would probably be required to undertake teaching and supervise students, along with carrying out some admin tasks



## Where would I work?

Offices within campuses or company buildings.



## What subjects should I do well in at school?

Mathematics, possibly Further Mathematics and Physics.



## What qualifications do I need?

Minimum Bachelor's degree in mathematics, or a related field such as physics. Most mathematicians hold PhDs in mathematics or are working towards holding one.



## What skills and attributes are required?

Problem solving, data manipulation and analysis, evaluation skills, coding/computer programming, inquisitiveness, attention to detail, critical thinking, communication skills (written and verbal), teamwork, self-motivation, ability to work independently, creativity, flexibility.



## What work experience would be helpful?

Experience working on research projects would be helpful, this could be part of a degree e.g. in a dissertation. Experience working with different computer programming languages.



## What about career progression?

If you work in an academic setting, once you obtain a PhD you are likely to hold a number of postdoctoral positions working on different projects before obtaining a permanent role as a lecturer and potentially professor. In industry, there is the potential to move into more specialist roles within a company or move into managerial roles overseeing other mathematicians across a range of projects.

## CASE STUDY



## Roger Colbeck

Having studied Physics, Chemistry, Maths and Further Maths at A Level, followed by an undergraduate degree in Natural Sciences at the University of Cambridge, Professor Roger Colbeck embarked upon a PhD in mathematics, also at Cambridge, which was the start of his career in quantum. Roger held several postdoctoral positions before joining the University of York as a lecturer and then professor of mathematics, working on a variety of projects including on Quantum Cryptography and Quantum Random Number Generators. Find out more about Roger's journey at [tinyurl.com/careersinquantum](https://tinyurl.com/careersinquantum)



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# Research portfolio manager

As a research portfolio manager, you will be based at a research council, part of UK Research and Innovation (UKRI), and will play a crucial role in shaping the direction of research within the field.



## What does the role involve?

- Understanding the research landscape in detail
- Building relationships with stakeholders including academics, members of industry and government
- Overseeing the allocation of funding to appropriate research projects
- Answering questions related to funding of research in the field
- Assessing the progress of projects which have received funding
- Contributing to work on the strategic direction of the field, including new strategies and business cases for new investments
- Attending events, networking



## Where would I work?

Research council offices, sometimes remote working, some travel to visit funding recipients and attend events/meetings.



## What subjects should I do well in at school?

No particular requirements, however, achieving good grades in core subjects such as English, Mathematics and Science would be advantageous.



## What qualifications do I need?

Many research portfolio managers have PhDs in a related field; however, this is not vital. A Bachelor's degree and an excellent understanding of the field can be sufficient.



## What skills and attributes are required?

Good communication skills (oral and written), presentation skills, data analysis, evaluation skills, IT skills, attention to detail, time management, teamwork, tact and diplomacy.



## What work experience would be helpful?

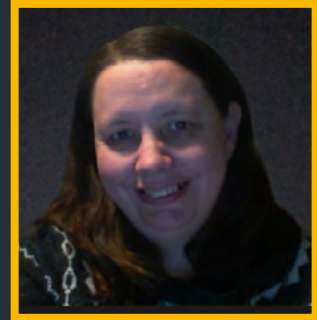
There is no set work experience or placement that is crucial for this role, however, developing an understanding of how research takes place within academia and industry and how research is funded would be beneficial. Likewise, obtaining a good understanding of the current state of the art within the field would be useful.



## What about career progression?

Progression in this role could be moving to a more senior position within the research council, it may initially be overseeing a team of portfolio managers who are each responsible for a different aspect of a field, however, you could progress further to hold more strategic roles within the organisation.

## CASE STUDY



## Amanda Howes

Having originally studied law at university and qualified as a tax advisor, Amanda Howes decided that wasn't for her and took a career break. She travelled the world and when she returned, she took the opportunity to work in an admin position at the Engineering and Physical Sciences Research Council (EPSRC) and has not looked back since. Amanda has held several roles at EPSRC and has worked as a research portfolio manager in quantum for a number of years. Find out more about Amanda's journey at [tinyurl.com/careersinquantum](https://tinyurl.com/careersinquantum)



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# Computer scientist

As a computer scientist in quantum, you may work in a university or in a private company. There are a plethora of roles that a computer scientist could undertake in quantum, from building quantum computers to working on the security of quantum communications technologies or writing code for new software.



## What does the role involve?

- Carrying out research on quantum technologies, including quantum computers or quantum cryptographic schemes
- Designing new quantum software and hardware systems
- Identifying and troubleshooting problems with software and hardware and their integration
- Testing and analysing the performance and security of quantum technologies
- Advising colleagues
- Presenting data to colleagues
- Writing reports and research papers



## Where would I work?

Company or university offices and laboratories. Some travel to visit collaborators could be required. Remote working may be possible.



## What subjects should I do well in at school?

Computer Science, Mathematics, Physics.



## What qualifications do I need?

Minimum Bachelor's degree, it would be most common for this to be in Computer Science, however, it could be in related fields such as Physics and Mathematics. It is common for computer scientists in quantum to hold a Masters degree or PhD but this is not essential if you have equivalent skills and experience.



## What skills and attributes are required?

Problem solving, critical thinking, reasoning, logic, attention to detail, data analysis, communication (oral and written), coding, teamwork, ability to work independently, resilience.



## What work experience would be helpful?

Experience carrying out research in computer science or working in a computer science lab would be advantageous (this could be through a degree or internship).



## What about career progression?

Along with the wide variety of roles available in this field, the career progression opportunities are vast too. If based in academia, it is possible to progress from a postdoctoral position to lecturer and subsequently professor. If based in industry, you could become a lead computer scientist, overseeing a team of people, or alternatively a technical director or even director of your own company.

## CASE STUDY



## Julio Hernandez-Castro

Having studied Mathematics and Computer Science at undergraduate level, followed by a PhD in Computer Science, Professor Julio Hernandez-Castro took up a career in industry, however, it was not for him. Julio decided to pursue a career in academia instead. Julio is now a Professor in Cyber Security at the University of Kent and works on many projects, including the Quantum Communications Hub, where he focuses on the certification of quantum random number generators. Find out more about Julio's journey at [tinyurl.com/careersinquantum](https://tinyurl.com/careersinquantum)



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# Business analyst

As a business analyst in quantum you will use your business skills and understanding of the quantum landscape to produce reports and information useful to companies and investors within the field. You might work within a specific quantum company or as part of a management consultancy firm advising others within the sector.



## What does the role involve?

- Keeping up to date with the latest advances within the field by reading the most recent research papers and news.
- Following deals made between businesses.
- Networking.
- Communicating with colleagues and key stakeholders within the field.
- Compiling and analysing data.
- Modelling based on the data you obtain.
- Writing reports.
- Presenting findings.



## Where would I work?

Company offices, remote working often possible, some travel will be required.



## What subjects should I do well in at school?

Business Studies, English, Mathematics, Science, Economics.



## What qualifications do I need?

Minimum Bachelor's degree - it is helpful if this is in a relevant field such as Physics, Computer Science, Finance, Business or Economics, but this is not essential. Postgraduate degrees are not crucial, however, some people undertake an MBA (Masters in Business Administration) or a PhD before entering a role like this.



## What skills and attributes are required?

Data analysis and evaluation, attention to detail, critical thinking, good IT skills, good communication (oral and written), problem solving, flexibility, teamwork, ability to work independently.



## What work experience would be helpful?

You could gain work experience at a business analysis company either via a work placement, internship or on a voluntary basis.



## What about career progression?

Progression in this role might include moving into a more senior position, overseeing a team of analysts with different responsibilities. You can also progress to working at director level within a company or opening your own business analysis company.

## CASE STUDY



**David Shaw**

Having studied physics at postgraduate level, Dr David Shaw began a career in management consulting and business analysis working for multiple firms across various sectors, before launching his own business analysis company in quantum, ***Fact Based Insight***, where he now works as lead business analyst. Find out more about David's journey at [tinyurl.com/careersinquantum](https://tinyurl.com/careersinquantum)



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# Policy officer

As a policy officer you will build networks, gather information and analyse data to gain a deep understanding of the field in order to be able to confidently advise government departments on various matters, including things such as policy, strategy and investment.



## What does the role involve?

- Keeping up to date with advances in the field
- Meeting and networking with a variety of people within the field e.g. academics and members of industry
- Attending events
- Gathering data
- Analysing data
- Writing reports
- Giving presentations
- Advising government officials
- Contributing to draft policy documents or strategies
- Developing proposals for new activities which support policy



## What subjects should I do well in at school?

English, Mathematics, Science as a minimum. Other useful subjects include: Economics; Sociology; Philosophy; Psychology; Religion, Society and Ethics.



## What qualifications do I need?

Strong GCSE qualifications in the core subjects including English, Mathematics and Science are essential. An undergraduate degree is usually required; however, this does not have to be in Science. Clearly a good understanding of Physics or quantum would be helpful, however, it is not vital. Many policy officers have degrees in Economics, Politics, Sociology or other Science disciplines not directly related to Physics e.g. Healthcare.



## Where would I work?

Government offices. Sometimes remote working. Travel (domestic and international) is common.



## What skills and attributes are required?

Good communications skills (verbal and written), presentation skills, networking, good organisational skills, interpersonal skills, ability to prioritise, be flexible, self-motivated, data analysis, ability to see the bigger picture, forward thinking.



## What work experience would be helpful?

Work experience in government offices through an internship or summer placement would be beneficial. Many local councils and the Civil Service run paid summer internships for undergraduate students.



## What about career progression?

There is the potential for policy officers to progress to senior positions such as senior policy officer or advisor and eventually to roles such as policy managers which oversee teams of policy officers working on different policies. You could also progress to becoming head of a particular policy area, being responsible for strategic decisions as well as managing several teams.

## CASE STUDY



### Kathryn Chen

Having originally studied Health Sciences and Public Health, Kathryn Chen decided to pursue a career in science policy. She is currently Head of Science, Innovation and Policy at the British Consulate-General in Toronto and has a specific remit of developing collaborations between the UK and Canada, in the field of quantum. Find out more about Kathryn's journey at [tinyurl.com/careersinquantum](https://tinyurl.com/careersinquantum)



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# Journalist

Quantum could be one of many topics that you report on as a journalist. Most of your stories will originate from a press release and it will be your responsibility to use that as the basis to form a story that will be of interest to your readers, whatever the type of media you write for.



## What does the role involve?

- Keeping up to date with developments in the field
- Building contacts within the field
- Attending press conferences
- Attending events
- Reading and digesting press releases
- Writing articles (for web or print) relating to press releases appropriate to your target audience
- Contacting public relations officers for further information or quotes related to press releases



## Where would I work?

You may spend some time based in your company's offices; however, work is often remote and can involve a lot of travel (both domestic and international). Many journalists are freelance and so always work remotely as they do not work for one particular news outlet.



## What qualifications do I need?

Careers in journalism are open to graduates of all disciplines, however, an undergraduate degree in journalism is sometimes preferred. Some outlets prefer people to have a degree relevant to the sector being reported on e.g. Physics for quantum, however, this is not essential and often people start as general journalists or technology reporters and gradually specialise once they have suitable experience within the field. You can enter the field without a degree but this is quite difficult.



## What subjects should I do well in at school?

English, Mathematics, Science.



## What skills and attributes are required?

Good communication skills (written and verbal), ability to communicate complex matters to a non-expert audience in an engaging way, attention to detail, organisation, prioritisation, flexibility, proactivity.



## What work experience would be helpful?

Undertaking an internship or work placement at a news outlet would be very beneficial. Writing for student newspapers could also be advantageous.



## What about career progression?

Journalists usually start out reporting on a variety of topics and then begin to specialise. Once specialised, journalists can progress to becoming senior reporters or correspondants in their particular area. Some journalists move into news management or editorial roles while others take their journalism expertise to PR & communications companies or become consultants.

## CASE STUDY



### Toby Moore

Having always wanted to be a journalist, Toby studied for a degree in History at the University of Cambridge before embarking on a 23-year long career in journalism, working for major national and international newspapers. Toby then pivoted and moved to working as a Public Relations and Communications Specialist before becoming Director of Communications at Appleby Comms. Toby now works as a Communications Consultant for the UK National Quantum Technologies Programme. Find out more about Toby's journey at [tinyurl.com/careersinquantum](https://tinyurl.com/careersinquantum)



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# Events coordinator

As an events coordinator in quantum, you could be responsible for organising conferences, exhibitions, trade shows or workshops. You will be responsible for the events from start to finish, including the planning, organisation, execution and evaluation. In a junior role, you may follow a brief set by a manager, but in more senior roles you could be working to design a brand-new event from concept to completion.



## What does the role involve?

- Researching the needs of the market and the needs of the people within a sector
- Researching suitable venues and suppliers to support the event
- Researching, recruiting and liaising with potential speakers or hosts
- Working with communications teams to promote the events
- Managing budgets
- Being the main point of contact before, during and after the events
- Helping to set up and take events down
- Carrying out risk assessments and ensuring legal requirements regarding health and safety are met
- Evaluating the events



## Where would I work?

In company offices where you would be based some of the time, but your events could take place up and down the country or even in different destinations around the world.



## What work experience would be helpful?

Any experience in organising events would be beneficial, either on a voluntary basis or as part of a work placement, it could also be something you undertake for e.g. university societies. Marketing, sales and business development experience would also come handy.



## What subjects should I do well in at school?

There are no specific subjects directly related to events management, however, good grades in the core subjects of English, Mathematics and Science are important.



## What qualifications do I need?

No specific qualifications are required for this role, however, it is possible to obtain professional qualifications in events management.



## What skills and attributes are required?

Organisation, attention to detail, time management, good communication skills (written and verbal), problem solving, flexibility, financial management, ability to work independently and as part of a team.



## What about career progression?

You could progress from being an events coordinator to an events manager, overseeing a team of people with responsibility for multiple events concurrently or setting strategy for a single large-scale event. You can also progress by taking on larger or higher-profile events. Some people eventually set up their own events management company or work as a consultant, using their experiences and expertise to guide others.

## CASE STUDY



### Amit Das

Having studied Government and Law at undergraduate level and subsequently for a Masters in South Asian Politics and Economy, Amit Das decided a career in political science was not for him and chose to pursue a career in conference organisation. Initially, Amit worked for a company but then took the leap to launch his own company, Alpha Events, which organises the famous Quantum.Tech events series. Find out more about Amit's journey at [tinyurl.com/careersinquantum](https://tinyurl.com/careersinquantum)



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## FURTHER READING

If you would like to find out more about any of the people featured in the case studies in this pack, or about others working in quantum, visit [tinyurl.com/careersinquantum](https://tinyurl.com/careersinquantum) to read interviews of people in a wide range of roles from a variety of backgrounds.

