

WHAT DOES A FUSIONer DO?

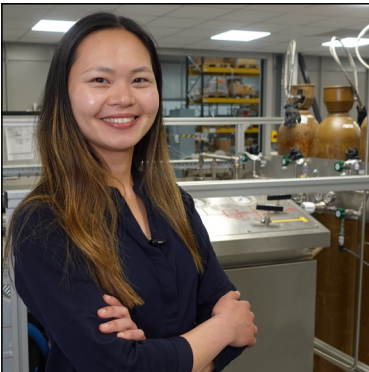


Rosie Barker

Experimental Physicist, First Light Fusion Ltd.

CAREFUL
METHODICAL
DEDICATED

“If you enjoy physics - go for it! Read lots and immerse yourself”



Dr Vivian Lee

Fusion Development Engineer, Tokamak Energy Ltd.

PROBLEM-SOLVER
ENTHUSIASTIC
TEAM-PLAYER

“Remember to embrace failure along the way!”



Fae Thompson

Technical Writer, UK Atomic Energy Authority.

CREATIVE
DETAIL-ORIENTED
THINKING AHEAD

“You can learn a lot on the job! You don't need to be a technical expert.”

WHAT DOES A FUSIONer DO?



Nathaniel Baker-Wolff

Experimental Physicist, Renaissance Fusion.

TEAM-PLAYER
METHODICAL
DETERMINED

“Sometimes you even get lucky, and the universe offers you a glimpse of how it actually works.”



Faiz Rahman

Control Systems Software Engineer,
UK Atomic Energy Authority

PASSIONATE
RESOURCEFUL
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“I get to be a part of something much greater than myself”



Amy Ireson

Supply Chain Officer, UK Atomic Energy Authority

LEADER
PREPARED
PEOPLE-ORIENTED

“Essentially, my job is bringing people together.”



Credit: First Light Fusion/Monty Rakusen

Rosie Barker

Experimental Physicist, First Light Fusion Ltd.

CAREFUL
ENTHUSIASTIC
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✦ I'm responsible for...

I design and carry out experiments, then analyse the data from them - that's how we test our predictions. Our machines can accelerate projectiles to 12 km/s, which then impact our targets containing fusion fuel. We measure the conditions of the projectile, inside the target and inside the fuel, and cross check our measurements with predictions from our computer code.

✦ My typical day...

There is no typical day as an experimental physicist! Some days it's planning - that means reading research papers, or coding. Some days I'm in the lab building targets, setting up laser beamlines and optical relays, and working out exactly how to capture the experimental data at the right time - the event lasts less than 10 nanoseconds so we have to time our experiments perfectly! Afterwards I analyse the data, make graphs, and try to understand it all. Then I'll write it all up into a report to share with my colleagues.

✦ The best part of my job...

The best part of my job is knowing that I am working towards a clean, green way of powering the world. I am constantly learning new things every day - I'll never be bored when there is more physics to learn! There are also always new tools and methods that we can use.

✦ My advice to others...

If you enjoy physics, go for it! Read lots and immerse yourself in the area you want to work in. Don't be afraid to ask questions, and take any

opportunities you are offered. Most of all, believe in yourself and your ability.

✦ I want to be remembered for...

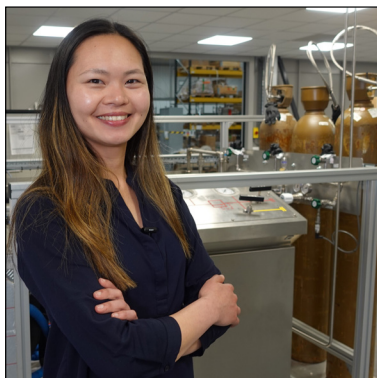
Making STEM a more diverse and inclusive place where everyone can work, no matter who they are. Fusion is such a challenging problem to tackle, we need every single person we can get to help us. The more diverse our workforce, the better and more robust our solutions to problems will be.

✦ My Plan B...

When I was younger, I always wanted to be a writer or a science journalist. I love communicating what fusion is and why it's so important. In reality, if I wasn't a physicist, I'd probably be a software engineer as I do love writing code, but I would definitely miss the physics if that was my job.

✦ How did I get here?

Up until the age of about 13 English was always my favourite subject. I loved (and still love) reading any books that I can find. At some point as a teenager I realised I really enjoyed physics too. Ironically, I didn't enjoy maths until my A levels started - that was when maths really became a subject I loved. I got top grades in my GCSEs and A-levels and went on to do a BA degree in physics. I left uni determined that I didn't want to be a physicist and so I went into a graduate scheme to train to be a software developer. I realised after 6 months how much I loved and missed physics and that's why I went on to do a MSc degree in fusion energy. I knew by then that I wanted a career in fusion.



Dr Vivian Lee

Fusion Development Engineer, Tokamak Energy Ltd.

PROBLEM-SOLVER

TEAM-PLAYER

ENTHUSIASTIC

PRACTICAL

✧ I'm responsible for...

testing the materials and components needed to build fusion power plants. I work on the machine components closest to the plasma. A typical day starts by checking in with my team, discussing what we're working on and deciding if there's anything we can do to support each other. My role has a good balance of hands-on lab work, where we make prototypes for testing and validation, collaboration meetings with other teams, and computer-based tasks.

✧ The best part of my job...

The extremes of temperatures! To maintain the conditions for fusion, the tokamak must withstand plasma temperatures hotter than the sun and cryogenic (very cold) temperatures for the superconducting magnets. These two extremes of temperature are less than one metre apart. It is a privilege to be working so closely on the energy challenge, within a brilliant and highly motivated community, to realise clean energy for us and generations ahead.

✧ My advice to others...

A strong commitment to learning and continuous development is at the heart of being an engineer but remember to embrace failure along the way! To minority communities: the drive and support for equality, diversity, and inclusion (EDI) has never been more alive than in recent years. Let that be an encouragement to all to fearlessly pursue a fulfilling career in engineering.

✧ I want to be remembered for...

Dedication to learning and support to others on their development journeys. And my cat mug – the same one I have used my whole working life!

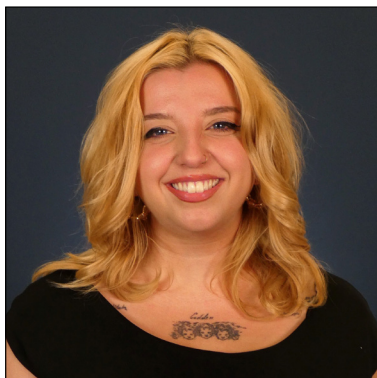
✧ What else should we know

Fusion energy is a multidisciplinary challenge. Other than scientists, engineers, and technicians, we also need project managers, safety managers, commercial officers, integration, site planning, communications and so on to coordinate our efforts in achieving breakthroughs in fusion. Many of us can play their part.

✧ How did I get here?

I had a mixed enjoyment of school. I came from a school with traditional teaching methods, which I did not find promoted critical thinking skills. There were however opportunities to explore many branches of science and sports, and languages were taught in-depth and I graduated fluent in three languages. I went to the same uni for both my BEng degree in aviation engineering and my PhD in mechanical engineering. They had several wind tunnels for aerodynamic testing and a flight simulator for my first degree, and an opportunity to do a placement year. I stayed for the PhD due to the strong network with industry and teaching training programme.





Fae Thompson

Technical Writer, UK Atomic Energy Authority

DETAIL-ORIENTED
CREATIVE
THINKING AHEAD
LEARN-BY-DOING

✧ I'm responsible for...

I bridge the gap between experts, who have deep technical knowledge, and the audience or user. This saves time in the document writing process. I can write, edit and review documentation. This includes formatting and template design, improving usability, and consistency across the organisation. The types of documents I work on range from science and engineering to business development and finance. I've created and contributed to leaflets, posters, presentations, and how-to tutorial videos. What people expect from me is attention to detail, innovation and creativity, to come up with different ways of translating technical language into accessible language, and an ability to meet deadlines with a polished piece of work to show for it.

✧ My typical day...

I start by catching up on emails, messages, and project updates. Things evolve rapidly in science and engineering, so it's crucial I stay up to date. Since I have deadlines to meet, I have to ensure my priorities are laid out in advance. I always have meetings booked in to keep up to date with my colleagues, e.g. the technical experts. At the moment, I'm making document templates, writing a leaflet to explain the function of a technical writer, I'm adapting text to fit the style guide, proof-reading a cyber security document, and creating a document on a component for the Joint European Torus fusion device. Typically, my week will end up quite varied, meaning I can spend a few hours on one document, then take a break to work on another, which is really useful for being able to look back on my work with fresh eyes.

✧ The best parts of my job...

I work with lots of different people across the organisation. Something I write can be the template for years to come, I'm able to see the progress and results in real time, and I get to be creative!

✧ My advice to others...

You are able to learn a lot on the job! You don't need to be a technical expert, or even trained in science and engineering or business development, in order to do technical writing. There are short courses you can take, and finding a coach will always be useful. Technical writing is a skill that's really in demand, so there are many resources that will help you boost your confidence. I promise it's not as daunting as it sounds!

✧ How did I get here?

I took my GCSEs and left school after one year of sixth form. I got average grades that I was really proud of. I first took a hotel reception job, and then an entry level office job, whilst biding my time and thinking about the future. I was unsure about applying for an apprenticeship with the UKAEA but I made it in. As an apprentice I gained a Level 3 qualification in business administration, and got a job at the end of it. During my time with the UKAEA, I've worked across a couple of different teams and been on a few short courses. They have valued my transferable skills and have opened the door for lots of options in different roles.



Nathaniel Baker-Wolff

Experimental Physicist, Renaissance Fusion

TEAM-PLAYER
PROBLEM-SOLVER
DETERMINED
METHODICAL

✦ I'm responsible for...

I lead an experimental physics group at Renaissance Fusion in France. That means coordinating the design, assembly, commissioning, and operation of industrial scale fusion reactor prototypes. At Renaissance Fusion, we'll use liquid metal to extract heat from the fusion process. And because metals conduct, we can use electric and magnetic fields to control the flow of the liquid metal.

✦ My typical day...

It depends. The design stage is mostly about brainstorming and back-of-the-envelope calculations to determine specifications and design parts. The assembly and commissioning phases involve finding and speaking to suppliers, but most importantly spending a lot of time in the lab assembling parts, debugging the experimental rig, doing small prototyping, setting up probes and data-loggers. When we reach the operation phase, the goal is to acquire as much data as possible, process it and hopefully come up with a story that allows our brains to grasp what we observe with our experiments. Of course, the machines that we build are the result of a team effort. As a group leader, one of my daily tasks is to ensure that the workload

is evenly spread out among team members, and that all their contributions eventually fit together to make the experiment successful.

✦ The most challenging part of my job...

Keeping the team determined and optimistic amidst the inevitable setbacks such as: repairing something that breaks, trying out different approaches before finding the right way to do something, running the experiment over and over again before understanding what's going on.

✦ I love my job because...

Experimental physics is exhilarating because it allows you to literally probe and interact with the universe through your apparatus. Sometimes you even get lucky, and the universe offers you a glimpse of how it actually works.

✦ My advice to others...

Your career path will most likely be dictated by chance rather than careful planning. My advice would be to embrace the uncertainty, take every opportunity you get to go out and meet other people. You just never know what might come out of it.





Faiz Rahman

Control Systems Software Engineer, UK Atomic Energy Authority

PASSIONATE
RESOURCEFUL
DETERMINED
LEARN-BY-DOING

✦ I'm responsible for...

a number of different robotic systems, ranging from small robots up to a large 18 tonne snake-like robot.

✦ My typical day...

It depends on the project I'm working on. It could be testing electrical circuits, getting hardware to work together, or programming at my desk. I could be getting a robot with a human-like hand to pick up rubber ducks or getting a large robot to manoeuvre itself around obstacles.

✦ The best part of my job...

Is the range of different types of work I could be exposed to, working alongside people who come from all walks of life. I get to be a part of something much greater than myself, and I know that my work, while I won't see the full fruit of its efforts now, will be of use to future generations.

✦ The most challenging part of my job...

Working on new systems that have never been done anywhere else before, and also working on old undocumented systems that still work. Both are difficult, you won't always get good support for it, but it's also incredibly exciting.

✦ I love my job because...

I love robots. Being able to channel my joy for robotics in a public-sector based outlet that is both exciting and useful is just fuel for my own motivation.

✦ My advice to others...

We live in a world where someone like me, who had no formal robotics training was able to learn a lot very easily just from the internet. Make use of what is now so easily accessible and get making. It doesn't have to be amazing - just do the things that you enjoy or always wanted to do. Hobbyist robotics is so big nowadays, there's a tutorial for almost everything that you could ever want to do!

✦ How did I get here?

I grew up in Malaysia, where maths was my favourite subject - although the teaching styles are incredibly different to the UK. I came to the UK to study an MEng degree in mechanical engineering. I enjoyed using the open facilities such as heavy machinery in the workshops to manufacture my rigs, hacker spaces to design circuits, and 3D print and laser cut my designs, as well as access to the biggest robotics lab in the country.





Amy Ireson

Supply Chain Officer, UK Atomic Energy Authority

LEADER
PREPARED
RELIABLE
PEOPLE-ORIENTED

✦ I'm responsible for...

managing a team within the procurement department at the UKAEA. Our purpose involves working with a whole range of suppliers who provide goods and services relating to fusion. We're always looking to improve what we do and ensure that everyone we work with makes ethical decisions and adds social value. Essentially, my job is bringing people together.

✦ My typical day...

I am very fortunate in that my job provides the best of both worlds. Half involves report writing, working with data, and putting my analytical hat on; the other is based on being creative and innovative and thinking outside the box to find solutions or improve a process. I never feel like I'm stuck in a rut. If a spreadsheet is making my head hurt, I can work instead on developing a new resource or a task for a future event which uses a completely different area of my brain and helps me come back to the original task with a fresh perspective.

I love my job because...

✦ The mission of the organisation is one that's extremely important to me. To develop a sustainable energy source to support future generations and our planet is a huge feat, but it's one that I get to play a part in. When fusion finally becomes commercially viable, I hope I can tell my children one day about the role I played in it!

✦ My advice to others...

Don't be afraid to get things wrong. Sometimes you may have a good idea, sometimes you might not – but what is the worst that could happen? Making mistakes is also part of learning and growth – don't let being afraid of getting something wrong prevent you from getting something right. Get in the room! If an opportunity arises, take it! Even if it's a trivial task, being in the room with different people and different levels of authority is a great way to grow your presence, your experience and your confidence.

✦ I want to be remembered for...

By the end of my career, I would like to be remembered as being a good leader, a reliable colleague, and for aiding collaborative approaches across the organisation. I would also like to be remembered by individuals that I have managed and mentored, as having a positive impact on them in their growth and in seeing them flourish.

✦ How did I get here?

I completed GCSEs, followed by a combination of A-levels and a L3 BTEC. I found unlike some of my friends, I found I couldn't wing it – but I ended up really enjoying learning once I put in the effort and realised I could do the things that were initially hard. Perseverance was key for me, which has been a very useful life skill since. I then went to university to study a BSc psychology degree. The data analysis skills I learned from my degree were what brought me to UKAEA, and since then I have undertaken a Level 4 Diploma related to my role.