Exploring & Understanding Science

fascination

careers and outreach special

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Cover image: Particle Physics Masterclass students during a computer practical exercise.

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News from the Science and Technology Facilities Council
Hello, and welcome to this special edition of Fascination. It will look slightly different to our regular readers, as it has been written by students specifically for students - we’ve introduced ourselves below.

We hope that this issue, which focusses on just how exciting a career in science can be, will inspire you during the crucial time of selecting course subjects and deciding on a career path, which for most people happens far before you feel ready to!

The important thing to remember is: don’t be put off by what science is like in the classroom - believe us when we say that it is not as boring and as dry as reading a textbook in the real world. But don’t take our word for it; read on and find out first hand from people who work in science.

The point is, even if you don’t see yourself in a laboratory, doing research (but then, until you’ve tried it, you don’t know if it’s for you!), there are plenty of other options open to you as a STEM (Science, Technology, Engineering and Maths) graduate.

**NAME:** Emily Pritchard  
**DEGREE:** Molecular & Cellular Biology @ University of Bath

**What have you learned during your time at STFC?**

Working at STFC has really opened my eyes to the huge range of jobs available in the science industry. It is not all men in white coats – in fact I think you would struggle to find someone who only fitted that description – there is always so much behind the scenes you don’t see.

**NAME:** Maddy Henney  
**DEGREE:** Medical Biochemistry @ University of Huddersfield

**Why is science so important?**

Science is important because it creates so many new opportunities, from jobs to gadgets; one bright idea can lead to a variety of different applications. I personally think that science is important because it rewards curiosity, allowing people to research until they have answers that they are looking for.

**NAME:** Jenny Atter  
**DEGREE:** Chemistry @ University of Bath

**A top tip picked up from experiences?**

Work experience at any point in your education is an excellent way of finding out what you would like to do (or not!) as a career before committing to it - it also looks great on your CV and gives you something to talk about and experiences to draw on at job interviews.

**NAME:** Andrew Pennington  
**DEGREE:** Business Studies @ Liverpool John Moores University

**How can non- STEM degrees help in the science sector?**

My placement with STFC has enlightened me to how business skills are applicable in other subject areas, like science. For example STFC has an Innovations department which helps scientists market their applications to potential academia and industrial users.

**NAME:** Harriet Dingle  
**DEGREE:** Biochemistry @ Southampton University

**What inspired you to study science?**

I think I was inspired to do STEM subjects and go on to study biochemistry by my grandfather. A scientist himself, he instilled in me a love of small things and an unquenchable curiosity for how these tiny, chemical molecules worked together so efficiently and effectively to make a living, breathing human being. My speciality, neurogenetics, and particularly the genetic basis of neurodegenerative disease, is all about that – how collections of minute changes in our DNA dramatically affect our health, our memory and our susceptibility to diseases like Alzheimer’s or Parkinson’s.
Science, Technology, Engineering and Mathematics (STEM) subjects are interesting and challenging subjects that can open doors to many different jobs or areas of further study. They’re essential for many careers (doctor, engineer, research scientist and so on), but they also come in handy for lots of other careers such as an accountant, banker, laboratory technician…the list goes on. This is because of ‘transferable skills’. Employers know that people with degrees in STEM areas have capabilities useful beyond the science sector - problem solving, critical thinking, analytical skills and organisation to name a few.

Immediately after graduation, students that studied physics on average start on a wage between 14% and 18% more than the average graduate. ¹

Degree holders earned an average of £12,000 a year more than non-graduates over the past decade. ²

Statistics show that if you study engineering, physics or chemistry as your first degree, you’re almost 90% likely to be in either full-time employment or further study three years later. The average across all graduates is just above 80%. ⁴

Latest figures show that in 2011-12, the numbers of students opting to start STEM degrees was up 5.7% compared with 2009-10. ³

According to the recent Engineering UK 2012 report the UK is going to need two million more workers with skills in science, engineering and technology over the next five to 10 years. ⁵

¹ Institute of Physics - The Careers Path of Physics Graduates – A Longitudinal Study 2006-2010, IOP (2012)
² Office of National Statistic - Graduate Earnings Over the Last Decade, 2011
³ Higher Education Statistics Agency - Latest 2011/12 student and qualifier statistics
⁴ Higher Education Statistics Agency - Destinations of Leavers from Higher Education Longitudinal Survey
⁵ The Independent - The UK is crying out for technology and science graduates
This is a question that doesn’t have one simple answer. There are so many paths that science could take you down, and they are all very different. We’ve tried to give you some idea of the range of options even just within STFC by asking a few of the people who work here how they got to where they are today and what inspired them to choose science as a career.

Hayley Smith
Job: Accelerator Physicist, ISIS Neutron source, Oxfordshire
Background:
• A level: Maths, Chemistry, Physics
• MPhys in Physics with Astrophysics, University of York
Inspired by: I was incredibly lucky to witness a live space shuttle launch, and even from twelve miles away the sight and sounds were phenomenal, sparking my interest in all things space and astronomy. Ever since, a bit of me has wanted to be an astronaut! I joined ISIS on STFC’s graduate scheme. ISIS accelerates protons to 84% the speed of light before smashing them into a target, producing neutrons. Scientists use these to investigate materials, helping to solve some of the world’s biggest challenges. I find it amazing that it takes such huge machines to deal with such tiny particles!

Tania Johnston
Job: Education Officer, UK Astronomy Technology Centre, Edinburugh
Background:
• Scottish Highers: Chemistry, English, Maths, Art & Design, German;
  Advanced Higher Chemistry
• MChem Chemistry including Professional Training, University of Southampton
Inspired by: I kept my options very open at school, but enjoyed chemistry. I found it challenging, which I really liked, so I decided to study it at University. I enjoyed my degree, but mostly what I liked was learning about different areas of chemistry and other sciences, and I still do today, which is probably why I love my job. I learn so much working at the UK ATC and I really enjoying telling other people about the amazing science and technology developed here.

A degree in science, or any STEM subject, sets you on a road that could lead anywhere - the opportunities are limitless.
Ceri Brenner

**Job:** Laser specialist for STFC’s Harwell Imaging Partnership, Laser plasma physicist and communications officer for STFC’s Central Laser Facility (CLF), RAL

**Background:**
- A-level: Maths, Physics, Economics
- BA Physics, University of Oxford
- PhD in Physics, University of Strathclyde

**Inspired by:** I was never sure at school what job I wanted to do but I’ve always wanted a career that makes a real difference to the world. A STEM career means my work will make a difference to our knowledge of the world and, may contribute to the development of new technology and improve our future. I love the variation; I do experiments with super-intense lasers and plasmas that are as hot as the centre of the sun, I work on the borderline of research and innovation and I spend every day telling people about science and our work at CLF.

Vishal Francis

**Job:** Project Engineer – Technology, RAL

**Background:**
- A Level: Maths, Physics
- Mechanical Engineering, Oxford Brookes University, became fellow of the IMechE September 2012

**Inspired by:** I was always interested in understanding how and why things work, then trying to improve them. My parents and LEGO were great motivators. Engineering allows the application of new and old technology, combining into something new. With STEM subjects you can apply your knowledge to all aspects of life and work, therefore they are very adaptable to a multitude of roles and positions.

Lisette Sibbons

**Job:** Postgraduate researcher in astrophysics, University of Hertfordshire

**Background:**
- A level: Physics, Maths, History
- Astrophysics and Mathematics, University of Keele
- PhD in Astrophysics at the University of Hertfordshire

**Inspired by:** Science lets us discover and understand how the world around us works and why things happen. I chose to study astrophysics as I find stars both beautiful and curious. While the study of the stars is age old, the field of astrophysics is a relatively new science and I find it amazing that in the last 300-400 years we now developed the technology and techniques to enable us to observe and understand the physics of exoplanets, stars, galaxies and the wider universe and I wanted to be a part of that process of discovery.

Nico Kronberg

**Job:** PhD researcher in theoretical particle physics, University of Edinburgh

**Background:**
- A-level-equivalent (Germany): Physics, Maths, English
- Physics, University of Heidelberg, Germany

**Inspired by:** My main area of interest is cosmology: I study the very early Universe, fractions of a second after the Big Bang. My own fascination has always been with the big, fundamental questions, about how the Universe and its smallest buildings blocks behave, and about how that led to the cosmos we observe today. The exciting bit about physics is learning how to elegantly describe most of the known processes in the Universe using theories expressed in terms of mathematics, and then building experiments to test it and see if we really have figured out how things work.
Calling all girls!

Physics. The very name can set alarm bells ringing in a lot of teenagers’ heads. But why?

Neither biology nor chemistry triggers the same response. Both A-Level courses have a roughly 50/50 gender split, but physics has only 20% girls studying the science at further education. New research from the Institute of Physics (IOP) shows that nearly half of all state schools in England are not sending any girls on to study physics at A-Level.

It’s not lack of interest; girls who attend single sex schools are two and a half times more likely to progress onto physics A-Level. This implies that it’s the attitudes towards physics within certain schools that are prejudicing girls.

Physics has always been a male-dominated subject, stemming from the fact that many years ago women were advised not to study science; it was a very select area of research. Some of this prejudice seems to have made its way through the centuries and is still causing a problem today; not very many years ago, women had to work extremely hard to be seen as equal to men within a physics environment, and it took a lot of effort for them to progress in their field. This is less of an issue now, with equal rights giving women an easier time in a physics career, but the damage has been done, and physics could end up suffering because of it.

To prevent this, there are campaigns running all over the country, all with the aim of promoting physics to girls. There are lots of ways you can get involved, and see what physics is REALLY like. Girls are just as capable as boys, so why should we let them have all the fun? The bottom line is, girls should be proud of their ability to be part of the ever changing and ever growing sector that is now a central part of today’s society. There are a multitude of different paths within science, and even within physics the possibilities are endless.

Just think. The amount of computing power used during the entire Apollo program - not just the flights, but through all the planning and execution of the 11 year program that involved sending 11 men to the Moon (including Neil Armstrong) over 17 trips - all that computing power today is generated by one Google search. If computing has progressed that much over 50 years, where will we be in another 50?

STEM subjects are for everyone - male or female - and anyone who sees science as the fascinating subject it is deserves the chance to learn more.

Don’t you want to be a part of that? To find out how to get more involved, visit:
www.girl-geeks.co.uk/ambassadors.html
www.stemnet.org.uk/
www.physics.org/
www.stimulatingphysics.org/
Opportunities at STFC

Here at STFC we offer a huge range of opportunities to gain invaluable experience in a real-world environment. From early school age right through to beyond graduation there is something for everyone, meaning you can get involved whatever education path you decide to take!

Work Experience
WHO: 14 - 19 Year Olds
LENGTH: 1–2 Weeks
WHERE: RAL, DL
The work experience scheme is one of your first opportunities to see what day-to-day life is like in some of the UK’s leading science facilities. From space science to lasers, particle physics to engineering the scheme is hugely popular due to the range of experiences STFC can offer. If successful in applying, STFC aim to place you with a supervisor that matches your interests for 1–2 weeks of work that can really open your eyes to a career in the science industry. So whether you fancy working with our supercomputers or even in our press and media department this really is an opportunity not to be missed!
Contact: ralworkexp@stfc.ac.uk or dlworkexp@stfc.ac.uk

Advanced Apprenticeship Scheme
WHO: Secondary School Leavers
LENGTH: 4 Years
WHERE: RAL, DL, UK ATC
If University is not for you, our Advanced Apprentice Scheme offers another route into a highly coveted career in the science and engineering industry. A highly regarded and rewarding scheme that offers a competitive salary, the apprenticeship allows you to work at the leading edge of science and engineering. Whether undertaking a mechanical, electrical or electronic apprenticeship, the broad base of training and skills you will receive across various areas of the organisation will enable you to experience first-hand the breadth of careers in this industry. STFC looks for individuals who have or will have achieved four GCSE passes at Grade C or above, including english, science and maths and are self-motivated, hard-working and enthusiastic about learning.
Contact: lisa.faircloth@stfc.ac.uk

Vacation Student
WHO: Undergraduates
LENGTH: 4–12 Weeks
WHERE: RAL, DL, SO, UK ATC
Make your summer really count with STFC’s Vacation Student scheme where you can work in a field relevant to your current area of study. This scheme runs at all four of our UK sites so we can offer a huge variety of projects in various locations. This also includes our head offices in Swindon where you can get a feel of ‘behind the scenes’ in a big science organisation in areas such as press, events or impact. Previous students have stated how beneficial this scheme has been to their careers and they have developed great working relationships that continue beyond the end of the placement.
Contact: STFCVacationStudent2013@stfc.ac.uk

We also offer further schemes for during and after your degree. Our Year in Industry scheme is aimed at those heading to University and can give you real hands on experience relevant to your chosen study area. As part of a sandwich degree course you could spend a year with STFC with a full salary, working in science, engineering or more office based roles such as communications or events. There is also a two year graduate scheme for graduates with a Bachelor’s or Master’s degree in engineering, physics and computing sciences which is consistently ranked highly in the Guardian UK 300 most popular graduate employers.

Keep a look out for these fantastic opportunities as you progress through your education! See the STFC Website for more details! www.stfc.ac.uk/357.aspx

Key
RAL – Rutherford Appleton Laboratory, Oxfordshire
DL – Daresbury Laboratory, Cheshire
UK ATC – UK Astronomy Technology Centre, Edinburgh
SO – Swindon Offices, Headquarters of the Research Councils
Do you want to get involved in science? Here at STFC we have a range of different opportunities for young people to experience ‘real life’ science. As well as a variety of events run at our sites, we also have over 100 STEM ambassadors within STFC that can come to your school and talk about their career, give an insight into their area of science, or help set up a science club at your school.

Get Involved NOW!

Education Access Days
The Rutherford Appleton Laboratory (RAL) in Oxfordshire and the Daresbury Laboratory (DL) in Cheshire, host a series of Education Access Days for schools. These days are a great way of experiencing the different areas of science that STFC is involved in and they are completely free. No two of these events are the same but typically they involve a tour of one of the facilities, hands on activities and a talk about one of the areas of science that we have on site. Each event is aimed at certain year groups, so they are tailored to make them as interesting and relevant as possible.

Public Lectures
There are a series of free lectures that take place monthly at RAL and DL. These ‘Talking Science Lectures’ can be on anything science-related, from physics at the Olympic Games to the un-natural history of dragons. Some of the previous lectures are available to watch on our website. These events are very popular, so keep an eye on the website to make sure you get a place. UK ATC also run a series of talks with a small admission fee, to enable them to run.

Particle Physics Masterclass
The annual Particle Physics Masterclass allows A-level students to learn all about particle physics. There are tours of our accelerators and talks from real particle physicists from CERN, as well as the chance to put physics theories into practice with computer simulation activities. This is a national event that happens at particle physics research facilities across the country and over 800 students attended the sessions at RAL and DL during February and March 2013.

Other events
We also have lots of other events throughout the year; we have a range of different Access Days at the laboratories, from family days open to public of all ages, to more scientific talks and tours for those aged 16 and up. There are also a number of Chemistry and Physics at Work days at DL, to give you an idea of how these subjects are used in people’s day to day lives. At RAL, there is a county science fair, where local Oxfordshire year 7 students come to site to learn about science in an interactive way. Dark Sky Discovery is a UK-wide initiative aiming to engage people from all over the country with stargazing and astronomy. These events take place at STFC sites across the UK including RAL, DL, and the UK ATC in Edinburgh, as well as many other Dark Sky Sites.

How to book
All these events are very popular so please book in advance; for upcoming dates and information on how to book please visit our website.

For further information please contact:
RAL Talking Science: rltalkingscience@stfc.ac.uk or call 01235 445959
DL Talking Science: dltalkingscience@stfc.ac.uk or call 01925 603040
RAL Education Access Days or Particle Physics Masterclass: Chris Duff - RAL Education and Public Engagement Officer christopher.duff@stfc.ac.uk or please call 01235 445789
DL Education Access Days or Particle Physics Masterclass: Wendy Cotterill-DL Public Engagement wendy.cotterill@stfc.ac.uk

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