PLACEMENTS AND EMPLOYER ENGAGEMENT

For physics undergraduates, postgraduate research students and employers

SEP(net

South East Physics Network **Employability**

ABOUT SEPnet

SEPnet (The South East Physics Network) is a consortium of nine partner university physics departments (Hertfordshire, Kent, Portsmouth, Queen Mary, Royal Holloway, Southampton, Surrey, Sussex and The Open University) working together to advance and sustain physics as a strategically important subject for the UK economy and its science base in the South East of England.

SEPnet works with industry to address skills needs and creates opportunities for industry and SEPnet partners to work more closely together.

There has never been a better time to study physics. STEM graduates, especially those in physics, are in great demand in many sectors including defence, energy, engineering, finance, IT and many more.

SEPnet:
· offers employers access to the best and brightest students
· works with industry to ensure physics graduates and postgraduates are qualified to meet industry needs
· provides a first point of contact for organisations to link with physics academics for business and research collaboration.

SEPnet's Employer Engagement Programme includes:
· 8-week industry placements for physics undergraduates
· Industry placements/consultancy challenges for physics PhD students
· Industry site visits and tours
· Employer talks and workshops
· Work shadowing and industry mentoring opportunities
· Industry and researcher networking events.

WHY PLACEMENTS ARE IMPORTANT

There is strong evidence that placements are extremely valuable to students for improving academic performance and employability. Placements can provide the opportunity to:

- Gain knowledge specific to your subject

- Develop transferable (employability) skills required for the world of work eg communication, problem-solving, team-working, commercial awareness, project management

- Learn about an industry or sector and make better informed decisions about career choices

- Make useful contacts

- Provide evidence of skills and experience on your CV

- Get a reference

- Gather useful examples to use in competency-based job applications or interviews.

Employers, especially SMEs (small and medium-sized enterprises), seek graduates with the employability skills to hit the ground running.

Work experience can help develop the skills you need to succeed in a competitive job market. Employers are increasingly using work experience as an integral part of their recruitment strategy. A recent survey of employers shows nearly half of students on placements were offered graduate jobs in the same company (AGR).

This booklet includes tips from employers on applying for placements and jobs and provides placement case studies giving first-hand accounts of the benefits to students and employers.

"Work experience can help students make contacts and build up a portfolio of evidence to support their applications. It can also help students figure out which occupations and industries they do not want to work in."   HECSU

"I gained insight into branches of science directly and tangentially related to my degree, as well as a greater sense of the career opportunities that are out there." - Second year student, The Open University

"Her dedication and critical thinking has resulted in the collection of a high quality data set. Her findings will influence changes we are making to the way measurement uncertainty is evaluated at the highest level. We would not have been able to undertake this work without the SEPnet scheme." NPL

HOW TO MAKE A SUCCESSFUL APPLICATION - TIPS FROM EMPLOYERS

Whether you source your own placement, apply to a company scheme or through programmes such as SEPnet's, you should get support from your Careers Service as well as following the tips below:

CVs and covering letters

- Apply early to make your application stand out; it shows you are keen and well-organised!
- Make sure your covering letter is addressed correctly and tailored to the role
- CVs should be neat, checked for spellings and not too long
- Covering letters and CVs should be in the same font throughout
- Make sure your CV shows how your studies are relevant to the role
- Show evidence of relevant academic and professional skills in your CV – e.g. computing, presentation skills etc
- Your covering letter should state why you are interested in the project and include relevant academic modules and projects
- Show evidence of your skills with examples
- Draw on relevant outside interests/experience - "*the impressive candidates had CVs which showed a good balance between academic success and getting their hands dirty with real-world modelling problems, or data science-type techniques/projects outside of their university work.*" (SME)

Interviews

- Research the topic of the project and the organisation before the interview
- If you mention anything in your CV or covering letter, be prepared to talk about it at interview
- Be prepared for technical questions on relevant material
- Be willing to have a go at questions even if you don't know the answer
- Revise basic physics
- Show enthusiasm for the placement project/your subject
- Gain some interview practice. The successful candidates "*answered questions clearly and well and demonstrated skills with well-explained examples.*" (SME)

SUMMER PLACEMENT CASE STUDIES

Student: Valeria George, University of Hertfordshire
Placement: E2E Services Limited
Role: Software Developer

Describe a typical day?

On a day-to-day basis I have been working on a link budget tool project for a client. This software tool is used to help mitigate any loss of power between a transmitter and a satellite receiver. Using reports provided by the ITU ("International Telecommunications Union") I have been able to update existing Java code using the most recent data and technical standards.

The project has enabled me to gain a broader understanding of how to code in Java. I have also had the opportunity to learn Python by assisting colleagues with their projects.

How do you think this placement has benefited you for the future?

The placement has put into perspective how useful it is to know computer languages in the science industry. Despite having only learnt MATLAB at university, I am now more determined to develop my knowledge of other languages, including Java and Python, which have been the key languages used throughout my internship.

What are your next steps?

The next steps for me are to complete my final year and work hard towards achieving a first class degree. My internship has really sparked an interest in software engineering so pursuing a career in this sector is something I am definitely considering after graduation.

Employer perspective:

Valeria integrated well within the software team and she made a valuable contribution to a key project within E2E services. Also, being part of the SEPnet scheme has raised E2E's profile as recruiter of high achieving physics graduates which will benefit the company as it grows and develops.

Student: Jacob Maresca, University of Sussex
Placement: Facility for Airborne Atmospheric Measurements
Role: Turbulence probe designer

Describe a typical day

A typical day might involve developing software using LabVIEW to communicate with hardware and testing to check that it behaves as expected. I also spent a significant amount of time building a working prototype of a 5-hole turbulence probe which required me using practical skills as well as theoretical ones. The turbulence probe can be used to measure differential pressures in perpendicular planes, allowing the calculation of 3D wind velocities.

Why did you decide to do a placement?

I wanted to further explore ideas for what to do after I have finished studying, specifically in a field that uses the skills I am learning. My placement challenged me to learn a new programming language and to apply my knowledge to new problems. For example, I had to develop a method and piece of software for calibrating the hardware I was working with.

Would you recommend doing a placement?

Absolutely, my placement was really enjoyable and I learned a huge amount. I had the opportunity to work with a wide range of people over the course of my placement, gaining the benefit of their experience. This also allowed me to develop good communications and team-working skills. It is an excellent opportunity to make connections outside of university.

How do you think doing a placement has benefited you for the future?

I have learned new skills and developed existing ones. I have gained workplace experience and a better idea of the types of jobs that are out there.

What are your next steps?

I intend pursuing a PhD in physics (weak gravitational lensing).

"I have learned new skills and developed existing ones. I have gained work-place experience and a better idea of the types of jobs that are out there."

Student: Grace Maxted, University of Kent
Placement: Tesla Engineering Ltd
Role: Engineering Intern

Describe a typical day

A lot of the time I spend helping out with the testing and winding of coils which make up a proton therapy magnet. There are also times where I end up on a winding line to wind coils destined for the European Synchrotron Facility or overwrapping said coil (my least favourite job!). A fair bit of paperwork is involved most days along with some data entry to help with keeping production running smoothly. My project sometimes takes a bit of a back-seat, with everything that's business critical coming before it.

Hopefully at the end, I'll be able to tell them whether all the testing procedures are necessary along with giving them a procedure for locating and defining any faults in their coils. So far it's looking pretty good!

How do you think this placement has benefited you for the future?

I've got a lot of experience now both with industry and in engineering, and I've also got a more balanced view of working life. In all honesty the money is a big help and will take the pressure off me next year so that's a good short term benefit. I feel that I've got a head start in knowing where I want to go with my future, and although that's not necessarily into industry or into a more engineering-like branch of physics, I think this placement has helped me learn more about my own preferences and to become more confident in my own abilities.

I've also learnt a lot, from practical skills like not hitting my thumb as much with a hammer(!) to a new programming language and a deeper understanding of some of my previous modules.

What are you next steps?

Finish my undergraduate Masters degree, get some experience working in medical physics, preferably in a hospital environment, hopefully become a medical physicist working in the NHS!

"I've got a lot of experience now both with industry and in engineering, and I've also got a more balanced view of working life."

Student: Peter Stewart, Queen Mary University of London
Placement: Sysco Productions
Role: Reducing the Cognitive Overhead using Pre-visualisation for Museum Spaces

Describe a typical day
Work was conducted from home for 4 days of the week and consisted of completing the tasks set during weekly Monday team meetings. My tasks were mainly focused on writing and testing code for the project and creating the functionality for the program we would go on to use in our final presentation.

How do you think this placement has benefited you for the future?
I've gained a valuable insight into how the commercial world differs from working in the public sector. It has provided the groundwork for a potentially major new industry which would give me unique expertise if the industry were to grow and provide career opportunities.

What has been your biggest achievement and biggest challenge during your placement?
Creating usable assets that can be imported and exported for use in the Unity software and demonstrating these assets to industry specialists who will be looking to take these to market.

Biggest Challenge – writing code from scratch in a new coding language for software that in some instances had very little or no documentation.

What are your next steps?
Keeping in touch with the project leaders to see the further development of the work we've done as it progresses from a pre-alpha stage to a stage that's ready to be shown and sold to clients across the globe.

Employer perspective
Peter is bright and engaging. He has a certain persistence and determination that is a rare asset when working in new and emerging R&D. He consistently went beyond his assigned briefs to deliver more than what was expected of him and the confidence and ease with which he is able to communicate his ideas is very impressive.

He would be a fantastic member of any team and he is very welcome back with us if he ever would like to engage in another project.

Student: Helen Davidge, The Open University
Placement: The Royal Marsden Hospital
Role: Reconstruction of radiation intensity measurements from time-based data

Why did you decide to do a placement?
The role was similar to the type of work I did during my PhD. The main parts included reading up on the radio therapy unit and writing computer code. This placement also gave me the opportunity to improve my Python programming skills, necessary for the Pivigo S2DS (Science to Data Science) summer boot camp).

Can you briefly describe the role?
The coding was split into creating a simple database to store current and previous experimental data and performing initial data reduction on the current experimental work and converting this into a data reduction pipeline.

I read some useful science papers and write-ups of previous SEPnet graduate students' work. For the computer coding I used Python. One of my tasks, which was very different to my PhD work, was one evening a week I assisted with experiments on a radio therapy unit.

How do you think this placement has benefited you for the future?
I have enjoyed the structure of the work and valued the teamwork aspects of the role. Also, doing the London commute from my house for eight weeks and working a nine-to-five job, as well as line managing the undergraduate SEPnet intern has been useful experience.

The experience has helped me identify that I am interested in programming. I have further developed my computer skills by gaining an intermediate level of coding in Python and learning the basics of the programming language R, as well as Linux.

What are your next steps?
I am planning to attend the Pivigo S2DS summer boot camp programme where I will get more experience of data science. Knowing the commute is do-able and enjoying all that the capital has to offer, I will be looking to work in London.

Employer perspective:
Helen brought skills in terms of problem-solving and programming - working as part of a team and independently. Her attention to detail and perseverance in tackling new facets of the problem were exemplary. Getting a positive outcome from which to move on is an achievement.

Student: Tariq Hilmi, University of Surrey
Placement: MRC Harwell, Mammalian Genetics Unit
Role: Computer vision and the behaviour of animals

Describe a typical day

I would arrive and continue work on the project in the IT lab. This was usually tied in with my supervisors and other researchers who updated me on what they were doing so I could tailor my graphical user interface functionality to best suit their needs, along with how to adjust my computer vision program to detect the right kind of behaviour.

What skills and knowledge have you learnt during the placement?

Extensive use of coding in Python has greatly strengthened my computing skills and given me great experience in modules such as Pandas, OpenCV and PyQt, including compiling my codes into stand-alone programs.

Furthermore, I have learned a great deal of biology, either from talks I attended or through coding I did myself, and how it links to research undertaken at the institute. Simply working with people from such a different scientific background has also proven beneficial in terms of conveying information to others.

How do you think doing a placement has benefited you for the future?

Along with preparing me for what I might be doing after graduation, the placement has helped me to identify my strengths and weaknesses while at work which I can continue to work on to better prepare me for my future career.

What advice would you give to an undergraduate student who might be interested in seeking a placement?

There is no denying the brilliant opportunity placements provide while at university and I absolutely recommend doing one if you have any doubts. You should also remember how much advice and help you can get at university too; either with interview skills, improving your CV or just the general application process.

"The very opportunity to work for and apply what you have learned at university at any institution has given me invaluable work experience."

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Student: Lucy Ladyman, Royal Holloway University of London
Placement: National Physics Laboratory
Role: Research into quantum effects in superconducting magnets

Describe a typical day

My role at NPL was researching quantum effects in superconducting devices with the cryogenic signal processing group. On a typical day, I spent half my time in the laboratory and the other half in the office. In the lab my supervisor would talk me through what experiments we would be doing that day. I used knowledge gained from my degree in conducting experiments and evaluating the outcome, suggesting possibilities for further experimentation. In the office I conducted further analysis of the measurements. I used some software that was new to me, such as MATLAB, but my previous coding experience allowed me to pick it up quickly.

Towards the end of the placement I worked on my poster. I also had the opportunity to attend some group meetings along with my supervisor, where researchers in the quantum detection group present their latest results.

How do you think this placement has benefited you for the future?

It's great for employers to see I have practical experience in a professional capacity, especially in a national research facility.

Applying for a placement has given me a trial run of applying for jobs and PhDs this year.

What are your next steps?

After my placement I started my MSc final project at NPL, being supervised by a member of the group with which I did my placement. I plan on applying for a PhD or an industry position in this field of research after this year.

Employer perspective:
Having a student on this project has been very useful as they are able to spend 100% of their time on the work.

Lucy learnt how to work with low-temperature systems and nano-devices as well as carry out the electrical measurements and perform the required analysis on the resulting data.

A large number of samples were able to be measured over the course of the project which will allow us to take the next step with our research.

Student: Sheona Day, University of Southampton
Placement: Gill R&D
Role: Student Research Physicist

Describe a typical day
The day starts with a short team meeting covering our aims for the day and if there are any technical issues that we might need help with. The rest of the day is spent on my project within the research innovation group.

Some days could involve literature reviews, modelling and running simulations or report writing while other days were more hands on including design and construction work or testing of the product.

How do you think this internship has benefited you for the future?
My SEPnet placement got extended to a 6-month industrial placement as part of my university masters degree. Therefore not only was the placement a great opportunity to experience working in a research and development company but it also provided me with a great topic for my masters thesis.

I developed my coding and modelling skills and also gained a deeper understanding of the physics involved in my project while at Gill.

What are your next steps?
After my industrial placement I will complete the rest of my 4th year of my MPhys before hopefully finding a career in a similar research and development environment. Both my SEPnet and industrial placement have encouraged me to pursue a future in physics research.

Employer perspective
Sheona was assigned to a number of different projects and has risen to the challenges of each; performing experiments, recording and analysing the results and providing weekly reports. Regular reviews of these reports with Sheona have allowed us to mutually agree the best direction of each project.

The work performed by Sheona is directly linked to new capabilities within the organisation and to the innovation and development of a new product.

"The placement was a great opportunity to experience working in a research and development company."

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Student: Sylvain Wear, University of Portsmouth
Placement: UK Atomic Energy Authority
Role: Camera Technician

Describe a typical day

At 7:30 I would arrive at Culham Science Centre and usually deal with whichever task I was doing the day before until my supervisor arrived. My experiments revolved around the testing of 3 cameras. The WiDY and Hitachi were tested with a black body hot source (to simulate radiation inside a fusion reactor) and filters that filtered out any light that wasn't Infrared. These experiments look at how the digital levels of the camera are affected by the temperature of the hot-source, the filters used and the exposure time of the camera.

The objectives of these experiments were to find out what temperatures caused the CCD to reach saturation but also to find the transmittance of each filter.

Normally I would prefer eating my packed lunch in my office so I could get some extra work done before I clocked out. The hot-source takes about 2 hours to cool down to a safe temperature so I would switch it off at around 14:00. My work day ended at 16:30.

How do you think doing a placement has benefited you for the future?

I believe this placement has prepared me for a work environment in the field of professional scientific research and has taught me a lot in advance of the nuclear physics unit for my third year at university.

Living in Didcot was also my first time living away from my parents so I learned to look after myself as an independent adult.

What are your next steps?

Working at Culham Science Centre has made me reconsider my goals for the future. I never even thought about what I wanted to do after I finished my BSc but now I may consider continuing my studies to PhD level. Hopefully UK Atomic Energy Authority may take me on a second time for me to do a research project for them.

"I believe this placement has prepared me for a work environment in the field of professional scientific research".
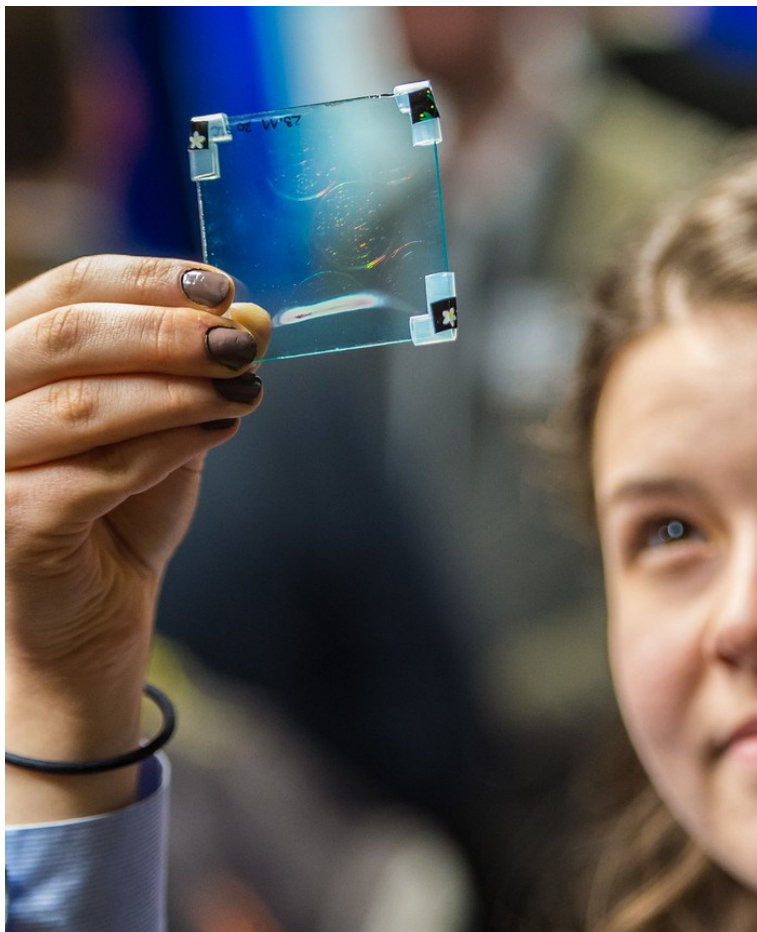
Some of the many employers who have offered SEPnet placements:

Accelogress, Adaptix, AlgoLabs, Alliantist, AWE, BAE Systems, Black Swan, ColourHolographic, Dobell, e2E, eOsphere, ESP Central, European Technology for Business, FDM Group, Fourth State Medicine, Gill Research & Development, Hilger Crystals, KTN-UK, Kurt J Lesker, Leonardo MW, Magnetic Shields, Magnox, Met Office, MeVitae, MRC Harwell, National Physical Laboratory, Noise, Observatory Science Centre, Oxto Energy, Photonics Technologies, Plum Data, Rank Group, Rezatec, Royal Marsden NHS Trust, RSSB, S&AO, Senseye, Snapout, Science Solutions for Education, Stanbridge, Rutherford Appleton Laboratory, RAL ISIS Facility, Symetrica Security, Sysco Productions, TalUpp, Tesla Engineering, Thales, UK Atomic Energy Authority, Wood Plc, Ultra Electronics CIS.

For more information about the SEPnet summer placement scheme and employer engagement, email: employerengagement@sepnet.ac.uk

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University of **Kent**

The Open University

UNIVERSITY OF **PORTSMOUTH**

ROYAL HOLLOWAY UNIVERSITY OF LONDON

UNIVERSITY OF **SURREY**

UNIVERSITY OF **Southampton**

US UNIVERSITY OF SUSSEX

University of Hertfordshire **UH**

Queen Mary University of London