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GRADnet

Professional Development for Physicists

Your training programme 2018-19

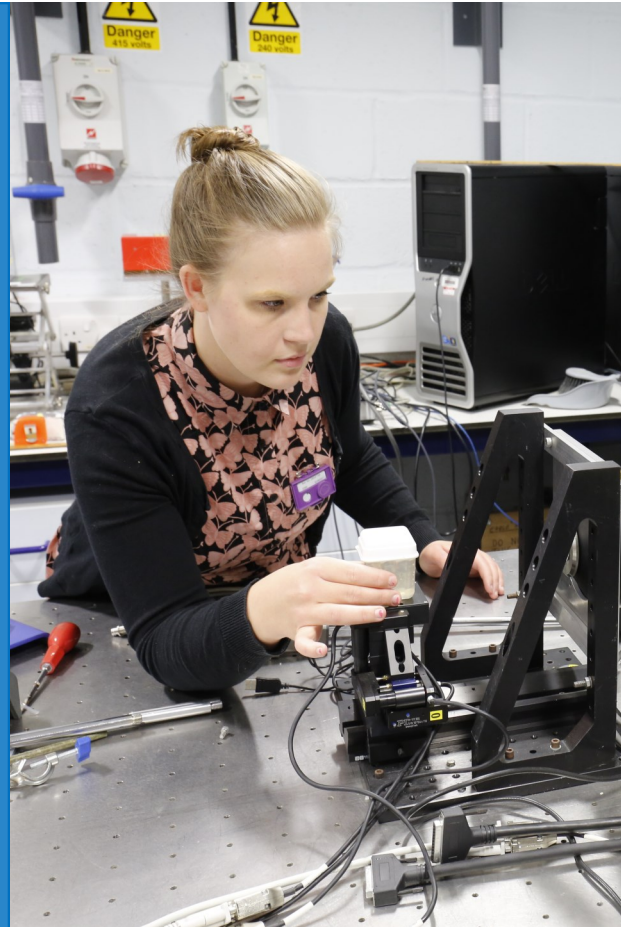
GRAD*net*
South East Physics Network

What is GRADnet?

GRADnet is the collaborative graduate school of nine South East England physics departments (SEPnet). It has been set up by the departments to offer you a wide range of advanced physics training from leading experts in their field. Moreover, it provides professional skills training made relevant to physicists with emphasis on those skills needed by physicists. Much of the training is offered in residential workshop format to ease delivery and timetabling alongside your other activities and to enable you to network with other researchers from other universities with similar interests.

The training you require will depend very much on the topic of your research and on the skills you have already. That training will come from a diverse range of sources including your department, your university, and your supervisor's collaborative networks. It will be accessed as seminars and lectures, workshops, schools, and a range of other activities. This brochure sets out the GRADnet programme for 2018-19. You should meet with your supervisor and decide which activities are relevant to you and those that you must take this year. You will then be able to register and attend them.

Why does SEPnet provide graduate-level training? Advanced physics training and development of professional skills are integral parts of any PhD research programme. The skills developed enable you to advance your research, but they are also the skills needed by future employers: both academic and industrial. Funding bodies and universities set minimum levels of training that you will be expected to undertake.



PHYSICS TRAINING DIARY 2018-19

Course	When	Where	Page
Introduction to Data Intensive Science	12-13 September 2018	Old Thorns Country Manor, Liphook	4
Moving Forward for Second Years	17 October 2018	Park Crescent (ISH) London	5
GRADnet Induction for First Years	24 October 2018	Park Crescent (ISH) London	6
IOP/SEPnet Careers Panel Event	31 October 2018	Hallam Conference Centre, London	7
The Interface between Observation and Theory in Astrophysics	17-18 January 2019	University of Hertfordshire	8
GRADnet Winter School	18-20 February 2019	Cumberland Lodge, Windsor, Berkshire	9
Student-led Conferences	3-4 April 2019	University of Southampton	10
Advanced Materials	8-9 April 2019	Royal Holloway, University of London	11
GRADnet Summer School	1-4 July 2019	National Physical Laboratory, Teddington	12
IX NExT (Particle Physics) PhD School	8-11 July 2019	Cosener's House, Abingdon, Oxfordshire	13
<i>Conferences 2020 Call for Ideas</i>	March 2019	Online	

“Professional development and employability are increasingly important considerations for potential postgraduates.” (Independent enquiry by the Higher Education Commission)

INTRODUCTION TO DATA INTENSIVE SCIENCE

Who: All DISCnet CDT students. Any GRADnet PhD student with an interest in data intensive science techniques.

What: A 2-day workshop that will introduce the CDT and data intensive science, comprising lectures, tutorials and examples of the benefits of data intensive science techniques as applied to current research projects.

When: 12-13 September 2018

Where: Old Thorns Country Manor, Liphook, Hampshire

Numbers: 30-35 delegates



The Data Intensive Science Centre in SEPnet (DISCnet) is a new STFC-funded Centre for Doctoral Training (CDT), with 22 core PhD students over two initial cohorts.

Introduction and induction into the DISCnet Centre for Doctoral Training: What is DISCnet? What kind of training is offered? What industry placements are available? This session gives an overview of the centre and provides information on how you can get involved.

Lunch and networking reception on the first day. This is a great networking opportunity. DISCnet students, GRADnet students, supervisory teams, and the DISCnet coordinators will get to know each other in an informal setting.

Examples in data intensive science: How does data science give you the edge in your PhD? Current PhD students from several SEPnet universities will demonstrate how data intensive science techniques have helped shape their PhD research. Topics range from astronomical surveys, to numerical simulations and particle physics accelerator data.

Tools for data intensive science in particle physics and astronomy: This session will introduce you to important packages and tools that are in use in the various research fields. We will provide help installing software and guide you through the first steps.

Requirements: A laptop computer is essential for this workshop.

“Data intensive science has a huge, and rapidly growing, potential. It is exciting to collaborate with GRADnet to deliver a mix of interdisciplinary, data intensive science skills, domain-specific knowledge, and professional/personal development skills to our postgraduate researchers.” (DISCnet CDT Lead)

MOVING FORWARD FOR SECOND YEARS

Who: 2nd Year Physics PhD students. All SEPnet departments strongly recommend all 2nd year students to attend.

What: An opportunity to network with fellow researchers from across the network and to participate in two out of four short workshops designed to enhance your research skills and / or career prospects.

- **How to write a successful Fellowship Application:** This workshop is aimed at those students who are considering an academic career. Most often this starts with a period of post doctoral study during which the researcher is supported by a Fellowship. The workshop focusses on what is required to prepare a successful research council or similar fellowship application.
- **Practical innovation:** Thinking about how to commercialise your research, or an idea, and turn it into an exploitable product or service? Perhaps you are interested in a career in business or knowing how businesses are created. Would you like to start thinking like an entrepreneur, or as someone that wants to change the world through innovation?
- **Research data management:** Research data management is increasingly important in all fields of research. Presented by research council and university experts, this workshop asks what is required for good data management and examines some of the common problems and issues that researchers face.
- **Understanding software for research:** This workshop introduces computing concepts necessary to support your research. You can find out more about the types of national computing facilities available and the programming languages used to produce quality research. The workshop offers a general understanding of computing with an introduction to parallel computing along with practical tools and techniques that will help you write and maintain better code more efficiently.

When: 17 October 2018

Where: One Park Crescent International Students House, Great Portland Street, London.

Numbers: Circa 80 delegates are expected to attend.

INDUCTION WORKSHOPS FOR FIRST YEARS

Who: 1st Year Physics PhD students. All SEPnet Departments expect all new students to attend.

What: A one day introduction to GRADnet to learn more about opportunities, to meet fellow researchers from across the network and to participate in two out of four short workshops designed to get you started in key areas of activity.

- **Getting your research published.** This workshop will explain the steps necessary to take the results of your research through to a published paper. Led by “insiders” from IOP Publishing, it will explain what makes a good paper and why some authors succeed while others do not.
- **Python.** Python is a powerful, high-level scripting language that is widely used in scientific research for a huge range of data analysis and visualisation applications. In this workshop you will learn how to use Python, starting from basic scripts to explore syntax and data types, working up to more complicated 'real world' examples.
- **Research data management:** Research data management is increasingly important in all fields of research. Presented by research council and university experts, this workshop asks what is required for good data management and examines some of the common problems and issues that researchers face.
- **Science communications skills:** Want to explore ways of sharing your research with many different audiences? It is now more important than ever to be able to communicate with non-specialist groups. Whether it's a public talk in a pub, writing in your department blog, doing some stand-up comedy, writing a popular science article or simply standing on a box in a street corner, this session will get you started. Outside research the ability to communicate technical details clearly to all sorts of partners will be an asset on any CV. The skills you learn on the day can be put in practice through the many science communication opportunities offered in your department and across the region.

When: 24 October 2018

Where: One Park Crescent, International Students House, Great Portland Street, London.

Numbers: This event is *mandatory* at all SEPnet partner Departments for new PGRs. Circa 100 students are expected to attend.

IOP/SEPNET CAREERS PANEL EVENT

Who: All Physics PhD students and post doctoral researchers.

What: A careers and networking event aimed at PGRs and post doctoral researchers.

When: 31 October 2018

16:00-20:30

Where: Hallam Conference Centre, London W1.

Numbers: 80-100 delegates

The Institute of Physics and SEPnet are organising a joint career networking event for postgraduate researchers. This event will give an insight into the broad range of career paths open to PhD graduates.

This event aims to help, inspire and motivate you to explore the careers options open to you in a welcoming and friendly environment. You will hear from a range of panellists, including PhD graduates in physics-related fields who have gone on to pursue interesting, successful careers in diverse areas – both in and outside academia.

Before the panel session, Elaine Hickmott, EH Enterprises will run a short workshop called 'Connections and Conversations for Career Success - A practical networking masterclass'.

You will then have time to question our panellists in groups and to network informally with them and other students over refreshments.

What past attendees said about the last career networking event:

Fascinating evening: passionate physicists, open and willing to share, great breadth of experience!

I got ideas about what I can do with my physics degree in different sectors.

The variety of panellists was great.



IOP/SEPnet Careers Panel Event 2017: "It's so good to see so many careers as physicists beyond academia." (SEPnet PGR)

THE INTERFACE BETWEEN OBSERVATION AND THEORY IN ASTROPHYSICS

Who: Postgraduate and postdoctoral researchers in astronomy, astrophysics and closely allied fields.

What: A 2-day school led by senior researchers in SEPnet comprising lectures and workshops.

When: 17-18 January 2019

Where: University of Hertfordshire, Hatfield

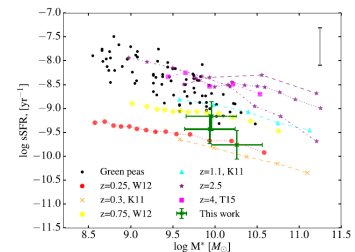
Numbers: Circa 40 delegates

The Advanced Physics School on the interface between observation and theory in astrophysics will address how to interpret astronomical observations in the new data-rich era. The sessions will cover theory and modelling relating to a number of current research areas in stellar, galactic and extragalactic astrophysics, including using simulations and applying statistical tools to link theory and observational data. In particular, the School will address the rapidly developing area of machine learning and its application at the interface between observation and theory in astrophysics.

The School will work its way up through spatial scales from planetary (in the context of exoplanet modelling), black hole, galactic (star formation), extragalactic (with a particular focus on stellar population synthesis models and also AGN), and on to galaxy formation

models in cosmological contexts (and the role of cosmological simulations).

With experts from across SEPnet presenting sessions in their areas of expertise, it is intended that the School will benefit students over a wide cross-section of astrophysics. Students will learn not only about the specifics of approaches they may utilise in their current research, but also learn about modelling and simulation techniques being applied in other fields of astrophysics that they may want or need to utilise in their future careers.



Cosmology and Gravitation School 2016: “A good mix of talks - technical and involved, and talks which gave more of a broad overview on research in the field.” (SEPnet PGR)

GRADNET WINTER SCHOOL

Who: All postgraduate researchers who want to develop their leadership and team-building skills.

What: This 3-day residential school will focus on the skills required for effective leadership and team-working. Different leadership styles will be presented and discussed. Each student attendee will be given the opportunity to have their preferred team-working style evaluated using the Belbin model.

When: 18-20 February 2019

Where: Cumberland Lodge, The Great Park, Windsor, Berkshire.

Numbers: Circa 25-30 delegates

Core activity: Columbia's Final Mission

This multi-media case tracks the Columbia Space Shuttle mission from launch as NASA engineers and leaders sought to understand the nature and threat associated with an anomaly that occurred on launch. Over the course of the mission, managers and engineers at NASA analysed the damage, assessed the risks, and decided what to do. Members of the NASA team had different perspectives, opinions and views about the damage, its effects and therefore the actions that would need to be taken. Leadership, organisational culture, communication, personality characteristics, formal systems and job positions are amongst many complex issues that affected the course of the decision-making process. In the event, at the end of the mission, the shuttle disintegrated as it re-entered the Earth's atmosphere, killing the seven astronauts. Participants will analyse the case using materials supplied by NASA under the

guidance of a consultant. As the mission unfolds, they will work in teams, each team taking the role of one of the key NASA managers or engineers. A team experiences only those events and has access only to information that that person had at the time of the mission. This adds a rich dimension to the case experience as participants recognise how perceptions of the same event can vary. With a combination of team working and plenary discussion, key principles and applications of leadership, management and communication unfold as the workshop progresses.



GRADnet Winter School 2018: "I really enjoyed the programme. It was varied and interesting. I liked the mix of presentation and workshop and having networking discussion panels with employers was useful. (SEPnet PGR)

STUDENT-LED RESEARCH CONFERENCES

Who: Postgraduate and postdoctoral researchers from the SEPnet region with research interests in this year's conference topics. A limited number of places are available to early stage researchers beyond the region.

What: Two parallel research conferences proposed and organised by students wanting to advance their research and extend their collaborations. The conferences include talks by invited speakers and students as well as poster and recreational sessions.

When: 3-5 April 2019

Where: University of Southampton.

Numbers: Circa 40-50 delegates

Looking ahead: There will be a call for 2020 conference topics in March 2019.

From Zero to Infinity: The history of the Universe in redshift

This conference aims to bring together students from all areas of astronomy research. From the study of inflation at Portsmouth to planetary science at the Open University, the GRADnet astronomy groups' research probes many epochs of the Universe. Students will gain knowledge of a wide range of research techniques applied to phenomena at various redshifts, and see where such techniques may cross over and enhance their own research. Organisers: Elizabeth Swann, Steve Cunnington, Max Foxley-Marrable, Natalie Hogg, Sam Youles, University of Portsmouth.

The Future of Particle Physics in the Post-Higgs Landscape

Since the discovery of the Higgs boson, there have been no further discoveries at colliders

that hint at new physics. This conference will bring together students from experimental and theoretical topics in particle physics to discuss the progression of the field in light of current results. There will be review talks by distinguished academics on the history of the Standard Model and its successes and advice on how to interpret various current and future experimental results. There will be a particular focus on the interplay between theory and experiment and the promotion of interdisciplinary collaboration. Organisers: James Richings, Azaria Coupe, Sam Rowley, University of Southampton.



Student-led Conference 2018: "Excellent sessions, talks were well-given and placed and invited speakers were interesting and understood audiences. "Great conference, student led conferences are an ideal opportunity for all PhD students and speed networking was a particular highlight." (SEPnet PGRs)

ADVANCED MATERIALS

Who: 1st and 2nd Year Physics post-graduate researchers working on theoretical and experimental advanced materials wanting to learn what each other can do.

What: A 2-day residential workshop that describes the background science of advanced materials and experimental and theoretical techniques to study them.

When: 8-9 April 2019

Where: Royal Holloway, University of London

Numbers: Circa 25-30 delegates

This residential school provides an overview of research on advanced materials. It comprises lectures, tutorials, hands-on computing practice and, working in small groups, students will write a proposal for central facilities resource. Assuming only a knowledge of undergraduate level physics, it should be beneficial to students working on both theoretical and/or experimental projects.

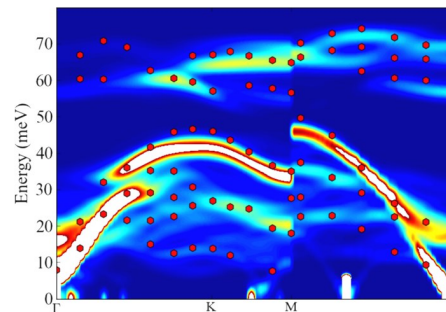
Strong correlations: The session will cover the theoretical concepts necessary to understand strongly correlated systems.

Numerical modelling: This session will introduce Monte Carlo, molecular dynamics, and first-principles quantum mechanical simulation.

Optical spectroscopies: This session will cover the basics of optical

spectroscopy, spectrometers and spectrographs using photoluminescence, Raman spectroscopy and absorption spectroscopy.

X-ray and neutron scattering: This session will cover neutron and synchrotron sources, instrumentation, basic scattering theory, structure determination, magnetic structures and excitations, lattice dynamics and diffusion.



Strong Correlations Workshop 2018: “The best parts of the programme were the variation from easy to hard; experimental connection; some actual research talks; socialising and soft skills. Really nice to mix PGRs, postdocs and lecturers in an informal and small-scale setting. Inspiring!” ((SEPnet PGR)

GRADNET SUMMER SCHOOL

Who: Physics, and physics-related, post-graduate researchers.

What: A 4-day residential school that explores the wide range of opportunities open to PhD physicists.

When: 1-4 July 2019

Where: National Physical Laboratory, Teddington, Middlesex.

Numbers: Circa 50–60 delegates



This intensive school comprises a broad menu of workshops and challenges led by different employers designed to offer students an insight into opportunities beyond their PhD.

A wide range of employers join the school to offer workshops designed to show what life in a given industry sector type is like and what kind of work is involved.

Students choose to take four of these over two days.

A consultancy challenge is run another day. High-tech companies come with real science problems and invite students, working in teams, to create solutions using the skills they have learnt in their PhD.

The whole event is threaded through with short sessions led by expert speakers looking at some of the issues that confront those working in science: Outreach, Impact, IPR, Ethics and the like.

Employers participating in recent summer schools include: AgFE Ltd, Airbus Defence and Space; AkzoNobel; Deloitte; AWE; Centre for Applied Science and Technology (Gov't forensics); Centre for Integrated Photonics (Huawei); Culham Centre for Fusion Energy; Dstl; Fourth State Medicine; IBM; Kindred Group Plc; Magnox; the Met Office; MR Solutions; NVIDIA, QinetiQ; Royal Surrey County Hospital, Observatory Science Centre; Oxford Instruments; RBA Acoustics; Rolls Royce; Surrey Satellite Technology Ltd; and WP Thompson.

“I attended the 2018 Summer School as I really benefited from attending the Summer School in 2017. It gave me more confidence when delivering presentations as well as practical demonstration of the skills I have developed as a Physics PGR that I had forgotten or didn't even realise were unique and very lucrative to various employers.” (SEPnet PGR)

IXth NExT PhD WORKSHOP

Who: SEPnet PhD students interested in particle physics experiments and theory, alongside NExT PDRAs, PhDs and other national participants.

What: A 4-day residential workshop that consists of a series of extensive review talks/lectures, research presentations by participants, a student-led talk session.

When: 8-11 July 2019

Where: Cosener's House, Abingdon, Oxfordshire

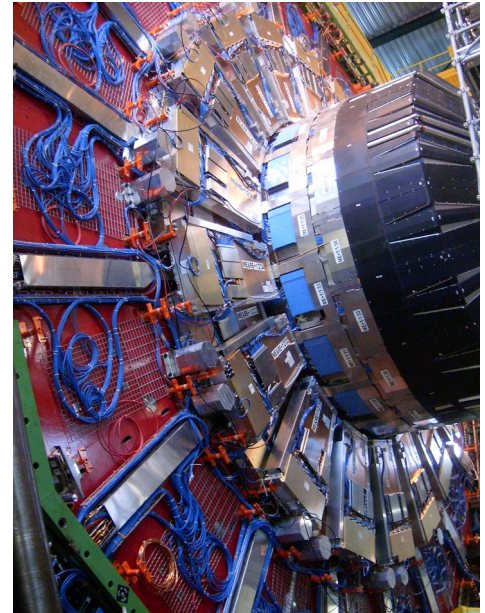
Numbers: Circa 30-40 delegates

Website: <https://indico.cern.ch/e/nextphd2019>

The workshop provides advanced training for students and stimulates work from all participants as it acts as an incubator of collaborative research across SEPnet.

There will be plenty of time for informal conversations and a formal workshop dinner. This event will be centred around the latest results from Run 2 of the Large Hadron Collider at CERN as well as other ground and space facilities. The workshop will also feature SEPnet delivered sessions on Diversity, Careers, Employability and Outreach.

The meeting is supported by GRADnet and STFC. Full funding is provided for 20 PhD students from SEPnet institutions and a similar number of PhD students from external STFC groups from both the theory and experiment communities.



“I greatly enjoyed the NExT Workshop 2018. It gave me great opportunities to network with students and academics within NExT institutions and good insights into career prospects inside and outside of physics. I would highly recommend the workshop to any PhD student in particle physics.” (SEPnet PGR)

OTHER OPPORTUNITIES

- **Mentoring**
Students frequently benefit from the support and guidance of a mentor: someone who went through the system just a few years before them. GRADnet maintains a pool of physicists ready to act as mentors and is able to put students in touch with them for anything from “quick advice” to a longer term relationship. For further information email employerengagement@sepnet.ac.uk.
- **Placements for researchers**
Physics research students can benefit from our employer engagement programme which includes short placements. Popular options include a short spell undertaking industry projects with an organisation where they can develop their employability skills and where their PhD research may have real impact. Students can carry out a placement at any time, for example, after submitting their thesis and while waiting for their viva - just as they start to think about what to do next. Watch for email announcements.
- **Organise your own conference**
Many students welcome the chance to share their research at a conference that is just right for them and their colleagues. GRADnet provides practical support and training as well as funding to help you make your dream conference a reality. Details of the 2019 conferences are on page 10. We anticipate making a call in March 2019 for conferences in 2020.
- **Online learning resources**
There are a set of modules created by PhD students in response to the prompt “I wish I had known that..” to assist PGRs with their training. See: <http://www.sepnet.ac.uk/gradnet-online-learning>.

“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)

YOUR PERSONAL TRAINING DIARY

All students should meet with their supervisors during their first few weeks to plan their training requirements for the year. You may keep a record of that discussion here.

WHAT	WHEN & WHERE	NOTES
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For further information about postgraduate research projects, physics and professional skills courses, graduate schools and workshops and employer networking events, contact: gradnetadmin@sepnet.ac.uk. Telephone: 01483 682270 or visit www.sepnet.ac.uk.

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