

# IOP Institute of Physics

## HIGHER EDUCATION GROUP

NEWSLETTER March 2020

### UPCOMING EVENTS

#### POSTPONED:

**Developments in Physics  
Teaching and Learning in  
Higher Education During the  
Last 100 Years**

~~26 May 2020~~  
University of Glasgow, Glasgow

**STEM Education Innovation  
by the lake 2020**

~~2-7 April 2020~~  
Cumbria University, Ambleside

**HEG Community Meeting**

~~19 May 2020~~  
University of Birmingham

Save the date & follow news for:

**VICE PHEC**

20 & 21 August, Kent

#vicephec2020

### FROM THE CHAIR

Everything comes in threes! And so, it is my pleasure to see this third edition of our Higher Education Group newsletter coming to life.

After our previous newsletter was sent out, we've received confirmation of our budget allocation for 2020 from the Institute of Physics. It was positive as all the events we've planned for 2020 have been funded! This year there will again be several opportunities for everyone to join in exciting discussions about physics in the higher education world. In April we're organising a truly unique event over several days – look out for the STEM Education Innovation by the Lake workshop! We've secured enough funding to make this workshop really good value for money (in government's speak)! In May we will be having one of our community meetings in Birmingham – if you are in the area it's a good opportunity to do a bit of networking and have a friendly chat with like-minded colleagues. And, also in May, a joint meeting with the History of Physics group which should be of interest to many members of our community. It'll be in Glasgow, and we've been told it will be sunny! These are just a few of the events coming up this year.

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### Yay funding!

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Stay tuned for more to come. This issue also contains interesting accounts of meetings relevant to our activities, some of them organised or co-organised by the Higher Education Group. We hope you find this newsletter informative and useful. As always, if you have any comment, let us know. Enjoy!  
*Nicolas Labrosse*

*The ongoing events related to Covid-19 are forcing us to review some of the plans outlined above. Please check the event webpages for up-to-date information.*

### VICE PHEC 2020

Variety in Chemistry Education / Physics Higher Education Conference (VICEPHEC) is a national conference that brings together educators in chemistry and physics to discuss and share developments, ideas and good practice in learning and teaching at tertiary level.

This year we are pleased that VICEPHEC will be hosted by the School of Physical Sciences at the University of Kent, on August 20th and 21st 2020.

The conference is open to academics, researchers, teachers and postgraduate students as well as those with an interest in chemistry and/or physics higher education (such as A-level teachers interested in supporting students' transition into university).

University of  
**Kent**

School of  
Physical Sciences

The site <http://vicephec.org/2020/> will be continually updated with information regarding our programme including our keynote speakers, how to register for the conference, and information about submitting abstracts for the different sessions during the conference. You can also find more information about us, VICEPHEC, and how to get here, but if you have any questions or want more details please do not hesitate to email us at [2020@vicephec.org](mailto:2020@vicephec.org), or follow us on twitter [@vicephec](https://twitter.com/vicephec) for updates.

The IoP Higher Education Group will be holding a Satellite meeting, before the main VICE/PHEC conference. The satellite meeting and the AGM of the IoP Higher Education group will be held on Wednesday August 19th directly before VICE/PHEC. The AGM will last no more than 45 minutes and all Group members are encouraged to attend. If group members have items they would like to raise please contact the IoP HE group secretary ([helen.heath@bristol.ac.uk](mailto:helen.heath@bristol.ac.uk)).

## **DEVELOPMENTS IN PHYSICS TEACHING AND LEARNING IN HIGHER EDUCATION DURING THE LAST 100 YEARS [POSTPONED UNTIL FURTHER NOTICE]** ~~26 May 2020, University of Glasgow, Glasgow, UK~~

The way that students learn, and the way we teach, has changed a lot during the last 100 years partly due to evolutions in physics itself, partly due to changes in technology and partly due to better understanding of what is effective. Students' learning, and the concept of "active learning", have many dimensions which have changed over time. The purpose of physics education (both for students and teachers) is often neglected as a crucial factor as is the need for an internal focus in the student's mind.

This meeting, jointly organised by the IOP Higher Education and History of Physics groups, will be an excellent opportunity to discuss the developments in Physics teaching in Higher Education over the last 100 years, what we can learn from this perspective, and how learning and teaching physics at University may evolve in the future.

**This event is open to all with an interest and you can now register. Attendance is free; however, pre-registration is required.** <https://www.iopconferences.org/iop/frontend/reg/thome.csp?pageID=950553&eventID=1492>

## **STEM EDUCATION INNOVATION BY THE LAKE 2020 [POSTPONED UNTIL 29 SEP – 4 OCT]** ~~2-7 April 2020, Cumbria University, Ambleside~~

The last ten years have seen an explosion of new insights from the science of how people learn, with radical implications for university learning and teaching. The research has highlighted how different educational elements are best combined to help students become independent thinkers in the domains of science, technology, engineering, and mathematics (STEM).

This intensive training, by scientists for scientists, will bring together beginners and advanced instructors, as well as emerging education researchers, across a wide range of STEM subjects. It will offer an integrated vision of science education for the 21st century by the combination of the following sessions:

The Active Futures in STEM Education sessions will provide an introduction to the latest research on how students learn science. It will take a hands-on approach, applying evidence-based ideas to the instructional activities created by the participants, and giving help and feedback on practical implementation.

The Professional development for Emerging Education Researchers (PEER) sessions will teach how to conduct education research effectively. Participants will learn how to identify, design and develop education research projects, collaborate ethically, and evaluate the effectiveness of instruction. <http://stem2020.iopconfs.org/Home>

## SUCCESS FOR FIRST IOP NETWORK MEETING FOR PHD SUPERVISORS



*Fruitful discussions at the PhD supervisor network meeting*

The inaugural IOP PhD supervisor network meeting was on the 21st November at IOP headquarters. The meeting was a great success, with a range of very interesting talks that each drove a rich and thoughtful discussion about PhD supervision more generally, as well as the specific issues faced by Physics PhD supervisors.

Helen Gleeson, the THE PhD supervisor of the year 2018 gave an personal narrative of her experiences in mentoring PhD students, highlighting the work she has done, both on an individual level and at institutional level at both Manchester and Leeds, to elevate the PhD student experience.

Doug Cleaver introduced the UKCGE research supervisor recognition programme, detailing how the programme has been devised to help established academics reflect on their own PhD supervision, and help progress current supervision to focus on a more structured, regulated and time-limited approach.

Kiri Humphries shared her experiences in laying out a programme of training for PhD students at Leicester, providing an administrator's perspective on the difficulties in helping students reflect on their learning outcomes.

Chris Arridge provided a detailed overview of the current crisis in PhD student wellbeing, raising the frightening statistics showing the level of stress and anxiety within our students. He discussed strategies for providing a supportive and positive environment to help give students control over their environment, helping to reduce these negative stresses.

Tom Stallard provided a personal account of how his work at Leicester has helped develop support structures and networks for both his personal students, as well as within the wider cohort.

Finally, there was a detailed discussion of the leading issues facing Physics supervisors. *Dr Tom Stallard*

## SATELLITE MEETING REPORT- HOW CAN WE HELP PHYSICS STUDENTS FLOURISH?

Before the excitement of VICE/PHEC 2019 the IoP Higher Education Group met for a satellite meeting asking, "How can we help physics students flourish?". Fabienne Vailes from Bristol University, whose research looks at the reasons for students languishing or flourishing, was unable to be with us but provided a set of videos to start the discussion. We considered what was meant by well-being. Fabienne emphasised that for flourishing students we need flourishing staff and encouraged us to think about what recharges our batteries to enable us to support students. In a final exercise we discussed what we could influence at various levels. Fabienne's twitter handle is @flourishinghe.

### WE NEED YOU!

Do you have an interesting higher education project? Attracted some funding? Have examples of good practice to share? We need you to tell us! We would love to include your stories in the next edition of the newsletter later this year.

Submissions of around 400 words with images are encouraged. Please contact Emily Brunsten ([emily.brunsten@york.ac.uk](mailto:emily.brunsten@york.ac.uk)).

Following on from Fabienne's presentation there were three talks on specific initiatives. Gaynor Gardener from the IoP presented IoP initiatives to support students including student ambassadors and programmes of events to engage students. The IoP's aim is to build a thriving community of young physicists – an aim I hope we would all support. Alex Crombie then discussed new initiatives at Sheffield Hallam to help students hit the ground running. This included a pre-enrolment activity measuring g locally, with discussions on what the students had done on arrival. Getting students doing course related content early. Alison Voice from the University of Leeds presented the BEST survey in "Belonging and Engaging- factors for success in Physics". This is a Longitudinal survey looking at how students are feeling as they transition into Higher Education. For example, comparing how well-prepared students think they are with how well they find they are coping. The

survey gathers enough information to track students through their career.

The meeting included some interesting discussions and sharing of ideas and good practice in a difficult area. Most of the materials from the presentations are available on the Higher Education Group, event resources web page. *Helen Heath*

## WORKSHOP REPORT: SPACE TEACHING PRACTICE

Spacecraft engineering and space science attract highly motivated students who seek employment in the rapidly evolving space sector, and academics aim to deliver engaging and authentic learning experiences that develop the skills and knowledge needed by graduates. The Space Universities Network (SUN) and the IOP Higher Education Group organised a joint one-day workshop on 8 July 2019 to share good practice in the teaching of space engineering and space science at university level. The event was held at IOP Headquarters and was organised by the SUN Workshop Working Group led by Ian Raper (UCL) and Mark Jones (Open University) for HEG.



The day was organised such that there could be in-depth discussions about three case studies of innovative teaching (described briefly below). In addition, all participants had the opportunity to give a “2-minute” pitch about any teaching initiative that they had been involved in (7 of the 23 attendees did so). There was also a briefing by Jason Marroothynaden from the European Space Agency (ESA) about the ESA\_Lab@ programme.

The case studies were as follows. Nigel Bannister (Leicester University) described how he uses NASA’s GMAT software for a third-year undergraduate module on astrodynamics. After a brief introduction to the software, students engage with a set of mission scenarios that develop their understanding of the underlying physical principles and give them confidence to tackle increasingly complex problems. Students present their assessed work using GMAT itself and this allows for an interactive discussion of their results.

Pau Cuartielles (Cranfield University) described the experience of postgraduate students participating in the “Drop your thesis” programme run by ESA Academy. This is for a short duration (few seconds) microgravity experiment that is run using a vacuum drop tower facility in Bremen. Projects cover a timeline of about 1 year, and experiment proposals have a adoption rate of around 50%. ESA covers the costs to access facilities and expenses for students’ travel and accommodation. Experiments are designed, proposed and run by students (with supervisor’s guidance).

Mark Jones (Open University) described the use of Mars rover simulation for distance learning students on a master’s level programme in space science. This exercise aims to develop team-working skills that are relevant to working in the space sector. The simulation uses a physical Mars yard with data from real sources (archival data from NASA’s Curiosity rover). Virtual teams plan and run their mission in a resource-limited and time-pressured situation that mirrors real Mars rover operations. Students report that they enjoy the authenticity of the task and that it is successful in developing their team-working skills.

### UPDATES!

Make sure your details are up to date in the IOP member database! This helps us understand the HEG and how we can be useful to you. It only takes a minute to review your details at the link below.

<https://applications.iop.org/MembershipLogin.aspx#gref>

The workshop provided allocated time for small group discussions about the case studies. The attendees could consider the case studies in detail and reflect on application to their own teaching. Feedback (from 14 of the 23 participants) indicated that the meeting met its key aim in that all respondents either strongly agreed (64%), or agreed (36%) that it was useful

or helpful in informing their teaching practice. Videos of the presentations made at the workshop are available from the SUN website at <https://www.spaceuniversitiesnetwork.ac.uk/news-events/events/space-teaching-practice-workshop-2019>

The Space Universities Network is open to all academics involved in teaching space-related topics at university level and welcomes new members. For more information, see the website [www.spaceuniversitiesnetwork.ac.uk/join-us](http://www.spaceuniversitiesnetwork.ac.uk/join-us).

*Mark Jones*

## **BERA 2019 – UNIVERSITY OF MANCHESTER 10-12TH SEP**

This conference had an international attendance with many from Australia and Singapore attending and presenting, as well as representations from many of the UK education establishments and universities. The main theme of the conference is education at all levels from primary to higher education. Important for me was the division- Science Interest Group. It was a great opportunity to present my paper to such a focus group and to learn from the other presenters too. I received positive feedback on my research and some suggestions came through in the question session. With my data collection ended this month the conference was also timely to pick up expert advice on analysis methods used by others and also new references to follow up on.

There were a number of physics related presentations which are summarised below as I believe they would be of interest to the IOP. Other talks related to STEM, Science Capital and data analysis from existing data bases.

### **Do women-only spaces in physics still matter? Judith Hillier; University of Oxford, UK**

The Department run a conference in Oxford University for female physics undergraduates from other universities – This is a 4 days residential event. The presenter gave the following statistics:

50% of female physics undergraduates are on track for gaining a 1st then 30% are on track for 2:1 so this is evidence of that women in physics are an academic elite. 50% physics undergraduates do not have physics backgrounds in the family

Issued with a questionnaire pre and post conference showed that measures of self-concept and self- efficacy had improved. Over the time of conference there is a 20% increase in Physics Identity and Confidence to succeed up to 60% from 40%. They addressed the question: Why does it matter that the conference is a women-only space? It was concluded that it provided a safe space for gendered experiences to be related and the women could learn how to navigate the space

Also reported was the Women in Physics work by Janice Miller Friedmann – Oxford Uni dept of Education. A paper is imminent in the Journal of Research and Science Teaching entitled Cultivating the Physicist Identity it describes the traits of women who are successful in physics.

## **MEET THE COMMITTEE**



I am Nicolas Labrosse and I chair the Higher Education Group of the Institute of Physics and my goal is to develop it to become one of the most important IOP Group. I also joined the IOP Degree Accreditation Committee (as well as its team of assessors), and I do various other bits for IOP to promote Physics and Higher Education in general. I am currently a Senior Fellow of the University of Glasgow's Recognising Excellence in Teaching scheme, and Fellow of the Higher Education Academy. I am also a Fellow of the Institute of Physics, and Fellow of the Royal Astronomical Society. My current educational research focuses on student transitions and student engagement. I am passionate about learning and teaching in higher education, supporting our students, and working with them to build an environment enabling all of us to flourish as individuals.



Successful women had attitudes towards challenges which were unique – like men if they had 30% of requirements for a career position they applied – rejection letters didn't matter – their attitude was about acceptance

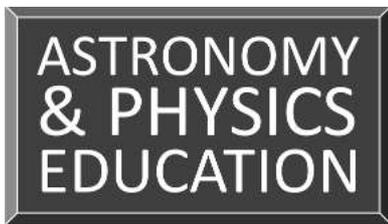
They become the physicist stereotype

- They were happy to be antisocial and they felt physics was what they were born to do.
- If they were mothers and spouse then their husbands stayed at home
- After childbirth they wanted back to work
- They felt they needed to do that to distance themselves from family life and child rearing

### **Exploring gesture to assess pre-school children's science understanding: Sara Price at al. UCL Institute of Education, UK**

Gestures to assess pre-school children's science understanding – part of the move2learn project funded by the Wellcome Trust and ESRC. Related to the design of museum and science centre exhibits and facilitating and enhancing learning. This summarised body-based forms of learning and how learning can be communicated through gestures when the vocabulary has not been acquired to express knowledge. The research explained how the gestures embodied understanding. This research could be usefully applied to applications such as early years learning science and digital tech. Digital Tech now brings body movements into learning – this is like visual consolidation – it is making the invisible, visible. *Elizabeth Crilly*

### **ASTRONOMY & PHYSICS EDUCATION AT THE UNIVERSITY OF GLASGOW**



I am delighted to share the news that the School of Physics & Astronomy at the University of Glasgow has formed an Astronomy & Physics Education (APE) Group. The purpose of the group is to foster a culture where the scholarship of teaching and learning is as valued, and valuable, as all other areas within the School.

APE group members share a desire to create the best possible learning experience for our students. The group aims to provide a structure of support for all its members, and anyone else with an interest in striving to get the best out of their learning and teaching. APE will support its members to disseminate good practice and to share innovations, with a view to delivering an enhanced, more consistent learning experience.

We would be very happy to hear from colleagues who would like to collaborate with us on projects to support students in their learning and to share best teaching practice.

If you would like to find out more about our activities, please visit [www.gla.ac.uk/schools/physics/research/groups/ape/](http://www.gla.ac.uk/schools/physics/research/groups/ape/) *Nicolas Labrosse*

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### **IOP HIGHER EDUCATION GROUP**

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Website: <http://www.iop.org/activity/groups/subject/hed/index.html> (please note this site is under deconstruction)

The contents of this newsletter do not necessarily represent the views or policies of the Institute of Physics, except where explicitly stated.

For content submissions (news, upcoming events, research stories...) please email Emily Brunsten ([emily.brunsten@york.ac.uk](mailto:emily.brunsten@york.ac.uk)).