

Regional Physics CPD Event: Working in partnership with University of Bath December 2020

The IOP in partnership with the University of Bath brings you two twilights plus a full day of online physics CPD on Wednesday 2nd, Thursday 3rd and Saturday 5th December.

Programme

Wednesday 2nd December			
	Channel A	Channel B	Channel C
5-6pm	Light & Colour (KS 3-4)		
6-7pm		LEGO Physics (KS 3-5)	
7-8pm			Using Virtual Physics Laboratory (KS 4-5)
Thursday 3rd December			
	Channel A	Channel B	Channel C
6-7pm	Radioactivity without the (re)sources (KS 4)		
7-8pm		Shining a Light on Waves (KS 3-4(5))	
Saturday 5th December			
	Channel A		
9.00 - 9.05am	Welcome		
9.05 - 9.50am	Keynote: Professor William Wadsworth - Trapping light in a hole (Deciding when you should try something anyway, even after you have proved that it is impossible)		
9.50 - 10.05am	Lab Tour: Come on a tour through the University of Bath's fibre optic research laboratory to see how raw materials are processed into flexible optical fibres.		

10.05 - 10.15am	Remain in session to speak with Bath University staff and students / Comfort Break		
	Channel A	Channel B	Channel C
10.15 - 11.15am	Teaching electricity - remotely & not (KS 3-4)	Science Capital in your classroom (KS 3-4)	Tackling KS3 Physics Misconceptions with non-subject specialists and new colleagues (KS 3)
11.15 - 11.30am	Remain in session to speak with Bath University staff and students / Comfort Break		
11.30am - 12.30pm	Using everyday physics contexts in teaching (KS 3-4)	Tackling Gender Stereotyping and Unconscious Bias in Physics (KS 3-5)	Key Ideas in Physics (KS 4)
12.30 - 12.45pm	Remain in session to speak with Bath University staff and students / Comfort Break		
12.45-1.45pm	The Herschels: a Case Study in the History of Science (KS 3-5)	Implementing BEST Evidence Physics (KS 3-5)	SUVAT - the Equations of Motion. An introduction for non-specialists (KS 4)
1.45 - 2.15pm	Remain in session to speak with Bath University staff and students / Lunch Break		
Re-broadcast of weekday twilights			
2.15 - 3.15pm	Light & Colour (KS 3-4) Repeat	LEGO Physics (KS 3-5) Repeat	Using Virtual Physics Laboratory (KS 4-5) Repeat
3.15 - 3.30pm	Comfort Break		
3.30 - 4.30pm	Radioactivity without the (re)sources (KS 4) Repeat	Shining a Light on Waves (KS 3-4(5)) Repeat	

Please read all about the sessions below before booking online.

Book your place at <http://bit.ly/IOPandBathPhysicsCPDEventDec2020>

If you have any problems booking or questions about the day, email education-south@iop.org

Session Descriptions

Wednesday 2nd December

5.00 – 6.00pm Light & Colour (KS 3-4) Dorian Pascoe

This workshop explores ideas about light and colour, including demonstrations, practical activities and simulations to help students understand ideas about the visible spectrum of light, additive mixing of colour, colour subtraction by filters, diffuse reflection and more.

6.00 – 7.00pm LEGO Physics (KS 3-5) Lewis Matheson

LEGO can be used to model the world around us - from the particle model in Year 7 to the standard model in Year 13. This workshop looks at ways that LEGO can be used in your teaching to build student understanding.

7.00 – 8.00pm Using Virtual Physics Laboratory (KS 4-5) Simon Ransome-Williams

The Virtual Physical Laboratory (VPLab) is a suite of over 300 simulations and more, developed by John Nunn of the National Physical Laboratory. This workshop is an introduction to VPLab, and how teachers can use it with KS4 and 5. All attendees gain a free download of VPLab.

Thursday 3rd December

6.00 – 7.00pm Radioactivity without the (re)sources (KS 4) Joe Rowing

Radioactivity is like magic – Stuff transforming from one substance into another! This session will cover some of the theory and practical demonstration work that is appropriate for GCSE. However, it is not always possible to use radioactive sources in a lesson, so part of the session will focus on practical activities that can be done without the use of them.

The workshop is suitable for any teachers of physics including non-specialists and recently qualified.

7.00 – 8.00pm Shining a Light on Waves (KS 3-4 (and a bit of 5)) Kath Myers

This workshop aims to help teachers navigate practical work for GCSE waves and to add some attention grabbing ‘hooks’ to their repertoires. This session is predominantly aimed at GCSE with some groundwork of basics and some stretch and challenge.

Saturday 5th December 2020

9.05 – 9.50am Keynote: Trapping light in a hole

Professor William Wadsworth

(Deciding when you should try something anyway, even after you have proved that it is impossible)

Physics is often very good at proof of the existence or non-existence of things, or that certain processes are possible or impossible. This can be very helpful for me as an applied physicist to avoid wasting time making things that are not just difficult but impossible. For example I often want a lot of white light from a lightbulb focussed on a small area. However there is a fundamental upper limit that comes from the theory of black-body radiation. It is very easy to reach, and there is no point striving to get beyond it.

In this talk I shall prove that it is impossible to trap light in a hole, and so it is impossible to make a hollow optical fibre. If we could make them, hollow optical fibres are just what we want for factories, for medical diagnosis and for planetary science missions, but if they are impossible there is no point dreaming about their uses. I shall show how we can change the question about what we are really looking for, so that physics says that it is actually just very difficult rather than impossible. This has resulted in a totally new type of optical fibre which we have developed in Bath.

9.50 – 10.05am Lab tour

Come on a tour through the University of Bath's fibre optic research laboratory. See how raw materials are processed into flexible optical fibres through our drawing towers. Discover how we create different types of optical fibres, by incorporating microstructures that guide light along their lengths, in ways that go beyond the conventional fibres used in telecommunications.

10.15 – 11.15am (Channel A)

Teaching electricity - remotely & not (KS3-4) Dorian Pascoe

Ideas for teaching electricity remotely, including:

- Exciting demonstrations that can be used in the laboratory or over a video link, with tips for how to film them effectively for live streaming and/or recording.
- Simple safe practical tasks that students can carry out in the lab, or at home using everyday objects.
- How to use simulations to effectively illustrate tricky concepts, and also for students to carry out structured investigative learning, including how to get around low frame rates when screen sharing through video conferencing software.

10.15 – 11.15am (Channel B)

Science Capital in your classroom (KS3-4) Laura Wharton

This workshop aims to address any questions you may have about the Science Capital teaching approach and to give some insight into how to use it in your teaching and delivery of practicals.

10.15 – 11.15am (Channel C)

Tackling KS3 Physics Misconceptions with non-subject specialists and new colleagues (KS3) Jeremy Thomas and Clare Forder

IOP Coach, Jeremy Thomas, and school partner, Clare Forder, will discuss key misconceptions encountered on KS3 Physics with ideas for addressing them from both a physics specialist and a non-specialist, Head of Department's point of view.

11.30am – 12.30pm (Channel A)

Using everyday physics contexts in teaching (KS3-4) Nicky Thomas

Physics is relevant to so many everyday activities, but these are strange times for physics teachers! This workshop shares ways to use everyday activities in your teaching so that pupils can use their own observations from home, and independently try simple practicals and other activities, to help them relate their classroom learning safely to everyday experiences.

11.30am – 12.30pm (Channel B)

Tackling Gender Stereotyping and Unconscious Bias in Physics (KS3-5) Olivia Keenan

This session focuses on key issues of gender stereotyping in schools and how you can overcome them in your school.

In the last few years research by the Institute of Physics has shown that the lack of young women taking physics at A-Level is part of a wider problem: gender stereotyping in schools. The report *Closing Doors* concluded that schools which had low numbers of girls doing physics also had a small number of boys and young men taking subjects which were stereotypically seen as 'girl subjects' by the pupils. Following this the IOP ran the *Opening Doors* project which generated a best practice guide for schools looking to tackle gender stereotyping. From the point of view of SEPnet partners, the lack of diversity in physics is a problem they want to tackle as potential undergraduate physics students are being put-off from studying the subject. Projects aiming to increase the diversity of students taking A-Level physics are then seen as growing the pool of potential physics undergraduates.

During the CPD session you will:

1. Understand how gender stereotyping affects subject choice at GSCE, A level and in STEM careers.
2. Discuss STEM career opportunities based on personality types and look at diverse case studies.
3. Explore ways to mitigate gender stereotyping in your school and communicate these issues with students, other teachers and parents.

This CPD session will enable you to:

1. Kick-start a discussion in your schools on how gender stereotyping is affecting different subjects and therefore influencing subject choice.
2. Become a gender champion in your school.
3. Communicate with students, parents, other teachers about why tackling gender stereotyping is important.

11.30am – 12.30pm (Channel C)

Key Ideas in Physics (KS 4) Theresa Conlon

This workshop looks at the Key ideas in Physics as described in the National Curriculum for KS4 in order to see how they are embedded within the GCSE Physics Specifications of the exam boards. These common themes are often overlooked, so this is an opportunity to be reminded of them. Simple equipment that can be incorporated within lessons will be shown, and there will be suggestions of how the key ideas can be used as the basis for retrieval / revision lessons.

12.45 – 1.45pm (Channel A)

The Herschel's; a Case Study in the History of Science (KS 3-5) Mark Whalley

We will look at the work of William and Caroline Herschel, including their discoveries in astronomy and William's discovery of infra-red radiation. We will also look at how their lives and work were shaped by society, culture, commerce and politics. The issues raised by contextualising their lives will be relevant across the history of science.

12.45 – 1.45pm (Channel B)

Implementing BEST Evidence Physics (KS 3-5) Shane Clark

The University of York Science Education Group has produced a suit of diagnostic tools (BEST Evidence Science) and approaches to support classroom teachers to probe student understanding of physics as well as to provide a range of strategies to challenge and rectify misconceptions and misunderstanding. This workshop will look at how this 'tool kit' of resources can be used in the classroom and help shape your curriculum. We do not have all the answers so there will be opportunities to share your own experiences and practices in making these resources more effective.

12.45 – 1.45pm (Channel C)

SUVAT - the Equations of Motion. An introduction for non-specialists (KS4) Joanna Kent

An introduction to the equations of motion and the acronym SUVAT. We will look at where the equations come from, and how to use them.

University break time chats:

Students, researchers and outreach staff from the University of Bath would be keen to chat with you in between sessions. University staff and students will be available in the breaks throughout the morning. If you would like to know more about student life at Bath meet our students in channel A, to find out more about research at the University join academics in channel B, and if you would like to hear about the outreach opportunities we offer, and share any ideas you have, chat with outreach staff in channel C.

On Saturday afternoon there will be a re-broadcast of the sessions that were run on Wednesday and Thursday, please check the timetable on the first page

Join the [Teaching Physics in The South Group](#) on TalkPhysics to find out about events, network and access resources from the CPD sessions.

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