

Regional Physics CPD day at Bath University 2021

9 - 9.15am	Registration, refreshments and welcome				
9.20 - 10.20am	1A Inclusive Physics Teaching with Marvin and Milo	1B The lives and work of William and Caroline Herschel	1C Electricity 1 (SKPT)	1D LEGO Physics	1E Coding Workshop - Weighing supermassive black holes (double length workshop)
10.25 - 11.25am	2A How are physics skills and knowledge used in the work place?	2B Radiation and Particles	2C Some alternative approaches to specific heat capacity	2D Developing excitement and curiosity	2E Coding Workshop - continued
11.25 - 11.40am	Break				
11.40am - 12.40pm	3A Spaced learning – neuroscience applied to education	3B Using Vizier to do real astrophysics research in the classroom)	3C Physics on a Shoestring	3D The Magic of EM Waves	3E Newton's Laws
12.40 - 1.40pm	Lunch and observatory tour (3 tours of 20 minutes each)				
1.40 - 2.40pm	4A New Teachers' Forum	4B Light and Colour	4C What's on my electricity trolley	4D Enhancing the teaching of kinematics with Tracker software	4E Physics and Weather
2.45 - 3.45pm	Keynote - Predicting the future of our evolving Universe with variable stars - Dr Vicky Scowcroft, University of Bath				

Workshop descriptions: Session One (9.20 – 10.20am)

1A Inclusive Physics Teaching with Marvin and Milo (KS3), led by Suzanne Woolhouse, IOP Teacher Support Coach

A hands-on workshop exploring a range of everyday physics experiments with Marvin and Milo. We'll also be thinking about curriculum, contexts and careers for each activity.

1B The lives and work of William and Caroline Herschel (KS3, KS4 and KS5), led by Mark Whalley, IOP Teacher Support Coach

We will look at the remarkable astronomical careers of William and Caroline Herschel, famous residents of Bath, and will consider some broader themes around the use of history of science in teaching.

1C Electricity 1 (SKPT) (KS3 and KS4), led by Jess Hamer, IOP Teacher Support Coach

Because we can't see it directly, this topic tends to be one of the trickier ones for students to understand. We will share useful models, demonstrations and practicals that will aid understanding and achievement.

1D LEGO Physics (KS3, KS4 and KS5), led by Lewis Matheson, IOP Teacher Support Coach

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. <https://www.physicsonline.com/lego>

1E Coding Workshop - Weighing supermassive black holes (KS4), led by Dr Carolin Villiforth and Mathilda Avirett-Mackenzie, University of Bath

Modern astrophysics could not exist without coding. We use it to analyse data, visualise our results and simulate the Universe. In this workshop, you will measure the mass of a supermassive black hole and study the properties of black holes in the Universe using Python, a popular programming language. You will see how coding is used in modern astrophysics. No previous knowledge of coding or Python is required. This workshop is for students and teachers with all levels of background knowledge!

No installation on your computer is required, you will be able to participate in the workshop through your browser. You are welcome to check out coding workbook ahead of the conference here <https://mybinder.org/v2/gh/cvillforth/CodeBlack/HEAD>. **Note this workshop is double length (2hrs) so select 2E for your next session if choosing.**

Session Two (10.25 – 11.25am)

2A How are physics skills and knowledge used in the work place? (KS3, KS4 and KS5) Led by Miranda Addey, IOP Regional Manager (South West)

Come and find out about local businesses that employ physicists to use the physics learned in the classroom in their everyday jobs. Get insight into different careers physicists go into, and ask all the questions you have on local industry and jobs for physicists. There will be the chance to hear from 3-4 physicists working in the local area, including an apprentice.

2B Radiation and Particles (KS3, KS4 and possibly KS5 too), led by Dorian Pascoe, IOP Teacher Support Coach

This workshop explores ideas about nuclear radiation and atomic physics – and even looks at some simple particle physics! The session includes demonstrations, practical activities and simulations to help students understand ideas about the atomic structure, ions, isotopes, radioactive decay processes, nuclear decay equations, and more. A laptop or tablet may be useful (though not essential) for some parts of this session.

2C Some alternative approaches to specific heat capacity (largely focused on KS4 but relevant to KS3 and KS4), led by Robert Birke, IOP Teacher Support Coach

This workshop, primarily for science technicians who support physics teachers, will offer a ‘hands-on’ element. It will demonstrate and explore some alternative approaches and apparatus for carrying out specific heat capacity practicals which are common to all GCSE physics specifications.

Time permitting we may, in addition, briefly look at approaches to latent heat investigations.

2D Developing excitement and curiosity (All key stages, though using KS3 as a starting point), led by Theresa Conlon, IOP Teacher Support Coach

The Science National Curriculum has ‘develop a sense of excitement and curiosity’ as one of its purposes. The workshop will suggest ways of engagement and encouraging curiosity using a selection of mostly physics items, and will look at common purpose across the disciplines, particularly at KS3 where physics (and chemistry and biology) is taught by non-specialists.

2E Coding workshop continued - see description above in session one. To attend you need to select 1E + 2E when making your workshop choices.

Session Three (11.40am – 12.40pm)

3A Spaced learning – neuroscience applied to education (KS3, KS4 and KS5), led by Alessio Bernardelli, IOP Teacher Support Coach

In this seminar we will consider the latest findings from neuroscience applied to learning and teaching to maximise the efficiency of encoding and retention of novel information in students' development and mastery of physics topics.

3B Using Vizier to do real astrophysics research in the classroom (be suitable for those teaching A-level Physics, GCSE Astronomy and anyone with an interest in Astronomy and Astrophysics), led by Mark Whalley, IOP Teacher Support Coach

Vizier is a database used by astrophysics as a source of data. It gives astrophysicists free access to an enormous amount of data, from the solar system out to the edge of the Universe. This database is freely accessible and can be used by anyone. In this session we'll look at a couple of catalogues, we'll see how to extract data and how to do some simple work with it. **Bring a laptop if you want to play as we go through the session.**

3C Physics on a Shoestring (KS3 and KS4), led by Jo Kent, IOP Teacher Support Coach

In this session I will demonstrate some easy and cheap activities to demonstrate physics concepts across the KS3 and KS4 physics curriculum. It will have an interactive element involving using your own imagination to devise activities using everyday items.

3D The Magic of EM Waves (late KS3 and KS4), led by David Farley, IOP Teacher Support Coach

This session explores the nature of electromagnetic waves, how they are produced and how they are detected. There will be discussion with demonstrations about the uses of various parts of the spectrum. The diverse nature of EM wave applications can lead to students seeing each part of the spectrum as separate entities. The session will try to draw out the common areas of physics that apply to each application, so students begin to make conceptual links between the various sections of the spectrum.

3E Newton's Laws (KS3 and KS4), led by Trevor Plant, IOP Teacher Support Coach

Why do so many students (and some teachers) get Newton's laws wrong, and how can we avoid these common mistakes?

Session Four (1.40 – 2.40pm)

4A New Teachers' Forum (KS3, KS4 and KS5), led by David Richardson, IOP Teacher Support Coach

This session is a chance to talk physics, teaching and the ups and downs of starting out as a physics teacher. There will be lots of opportunity to talk and share, as well as look at some intriguing physics ideas. Come ready to chat and meet others starting out on their career in physics teaching.

4B Light and Colour (KS3 and KS4), led by Dorian Pascoe, IOP Teacher Support Coach

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.

4C What's on my electricity trolley (KS3 and KS4), led by Robert Birke, IOP Teacher and Technician Support Coach

This workshop, primarily for science technicians who support physics teachers, will look at and suggest components required for an 'electricity trolley' capable of delivering classroom practical work up to the standard GCSE required practical activities common to the various examination boards. There will be discussion of circuit boards vs discrete components and multimeters vs ammeters & voltmeters. If time permits, we will also briefly look at additional KS5 equipment needs.

4D Enhancing the teaching of kinematics with Tracker software (KS4 and KS5), led by David Farley, IOP Teacher Support Coach

Tracker is free to download software that opens up a whole new world of experiments and demonstrations. This session will look at ways in which the software can be used to help involve students in their learning. There will be demonstrations, from basic displacement and velocity time graphs through to conservation of momentum and circular motion. The aim of the session is not to teach you how to use the software, but rather to show what is possible and maybe leave you keen to develop your own applications.

4E Physics and Weather (KS3 and KS4), led by Ruth Wiltsher and Alison Alexander, IOP Teacher Support Coaches

This workshop explores the main phenomena of weather to identify the physics concepts involved. The presentation includes ideas for simple experiments, a wealth of ideas behind weather and weather forecasting and some ideas for local links, applications and careers.

Keynote (2.45 – 3.45pm includes 15 mins for questions): Predicting the future of our evolving Universe with variable stars, Dr Vicky Scowcroft, University of Bath

How will the Universe end? Humans have been asking this question since we first looked up at the stars. In this talk, we will discuss why this isn't actually as depressing as it sounds but is one of the most exciting mysteries in science today. We will take a whirlwind tour of the history of the Universe. Starting at the big bang, we will explore how the Universe evolved into what we see today. We will look at how astronomers use observations and theories to learn about the Universe's history and how they can predict how it will evolve in the future. Variable stars are a crucial piece of this puzzle. These unique objects come in many flavours, some changing regularly and predictably, with others changing erratically, sometimes lying dormant for years at a time. The changes in a variable star occur on human timescales, making them one of the few astronomical objects whose evolution we can observe in real-time. Most importantly, variable stars can be used to measure distances to objects within our own Galaxy and far beyond. We will look at how variable stars can help solve the mystery of how the Universe has evolved and what will happen in the future. We will discuss Hubble's discovery that the Universe is expanding, how we know this expansion is speeding up, and what this tells us about the ultimate fate of our Universe.

Observatory tours will be bookable on the day at registration

This event has been organised in partnership with the Institute of Physics and University of Bath. Any queries, please contact teacherCPD@iop.org

Who is this suitable for?

For all Teachers including ECTs, NQTs and Trainees teaching age range 11–14 (KS3), 14-16 (KS4) and 16-18 (KS5) physics.

We hope the event will be 'in-person' at University of Bath, but some sessions may be virtual due to Covid restrictions.

Book online at <https://www.talkphysics.org/events/regional-physics-cpd-day-at-bath-university-2021/>

IOP Institute of Physics

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IOP Institute of Physics Registered charity number 293851 Scottish charity number SC040092