

Stimulating Physics Conference at Charterhouse School – Saturday 8th July 2017



Supporting the Teaching and Learning of Physics

| Time | Session | | | | | | |
|---------------------------------|---|--|---|---|---|---|------------------------|
| 09.15 – 09.55 | Registration and refreshments and exhibitor stands | | | | | | Modern Languages Foyer |
| 09.55 – 10.00 | Welcome and Introductions – Steve Hearn, Charterhouse | | | | | | Lecture Theatre |
| 10.00 – 11.00 | Keynote – Anu Ojha OBE, Director of Education and Space Communications at the National Space Centre and Director of the National Space Academy ' <i>Human spaceflight – the challenges, risks and opportunities</i> ' | | | | | | Lecture Theatre |
| 11.05 – 12.05 WORKSHOP ONE | Workshop 1a <i>Extreme Physics</i> Neil Atkin KS3 - 5 | Workshop 1b <i>Physics on a Shoestring</i> Jo Kent KS3 - 5 | Workshop 1c <i>Induction and Transformers</i> Rob Rutherford KS4 - 5 | Workshop 1d + 2d (double length) <i>Cloud Chambers make & take</i> Darrell Hamilton KS4 | Workshop 1e <i>Getting students to remember all those equations</i> Colin Piper KS3 - 5 | Workshop 1f <i>Using isaacphysics.org to Support GCSE and A-Level Learning</i> Heather Peck & Rob Firth KS4 - 5 | |
| 12.05 – 12.25 | Refreshments and exhibitor stands | | | | | | Modern Languages Foyer |
| 12.30 – 13.30 WORKSHOP TWO | Workshop 2a <i>Space Science on Earth? Physics in a Box</i> Alessio Bernardelli KS3 | Workshop 2b <i>Maths for Physics GCSE</i> Lawrence Cattermole KS4 | Workshop 2c <i>Induction and Transformers (repeat)</i> Rob Rutherford KS4 - 5 | Workshop 1d + 2d (continued) <i>Cloud Chambers make & take</i> Darrell Hamilton KS4 | Workshop 2e <i>Physics Practicals for the new GCSE 9-1 Combined Science</i> Liz Nourshargh KS4 | Workshop 2f <i>Unconscious Bias in the Physics Classroom</i> Claire Aspinall KS3 -5 | |
| 13.30 – 14.15 | Lunch and exhibitor stands | | | | | | Modern Languages Foyer |
| 14.15 – 15.15 WORKSHOP THREE | Workshop 3a <i>Extreme Physics (repeat)</i> Neil Atkin KS3 - 5 | Workshop 3b <i>Using Flipped Learning in Physics Teaching</i> Lewis Matheson KS3 - 5 | Workshop 3c <i>F=BIℓ</i> Trevor Plant KS4 | Workshop 3d <i>Shocked and Stunned</i> Gary Williams KS3 -4 | Workshop 3e <i>Physics Practicals for the new GCSE 9-1 Combined Science (repeat)</i> Liz Nourshargh KS4 | Workshop 3f <i>Year 8/9 Physics Ambassadors</i> Claire Aspinall KS3- 4 | |
| 15.20– 16.20 WORKSHOP FOUR | Workshop 4a <i>The Physics of Flight</i> Debi Hayes & the iFLY team KS3-5 | Workshop 4b <i>Physics on a Shoestring (repeat)</i> Jo Kent KS3 - 5 | Workshop 4c <i>F=BIℓ (repeat)</i> Trevor Plant KS4 | Workshop 4d <i>Shocked and Stunned (repeat)</i> Gary Williams KS3 -4 | Workshop 4e <i>Energy – choosing start and end points</i> Colin Piper KS4 | Workshop 4f <i>Using isaacphysics.org to Support GCSE and A- Level Learning (repeat)</i> Heather Peck & Rob Firth KS4 - 5 | |
| CLOSE | Evaluation forms and goody bags | | | | | | Science Department |

KEYNOTE SPEAKER: Professor Anu Ojha OBE, Director of Education and Space Communications at the National Space Centre and Director of the National Space Academy, Leicester - “Human spaceflight – the challenges, risks and opportunities.....including the trials and tribulations of getting our own experiments on board the ISS for Tim to do”

More than half a century after Yuri Gagarin became the first human to break through the “final frontier”, the total number of people who have ever seen our home planet from the extraordinary platform that human spaceflight offers would fit comfortably inside a single A380 superjumbo – and 18 have died in the process. In spite of all of our experience to date, human spaceflight still pushes our science and engineering to its limits. What were the drivers behind human exploration and the Space Race? Why did we turn our back on exploration after the glory years of the Apollo programme? What exactly are we doing in Low-Earth Orbit on the ISS? And is Mars always going to be a dream of future exploration or are we truly entering the era of humanity becoming a multi-planet species? www.nationalspaceacademy.org

WORKSHOP SESSION ONE CHOICES (11.05 – 12.05)

1a Extreme Physics – led by Neil Atkin, Teaching and Learning Coach and Gender Balance Officer, IOP

When a skateboarder learns a new trick the processes they use goes from planning, research, risk assessment (normally done very badly!) implementation then often peer feedback, evaluation and improvement. This effectively mirrors the scientific method. The skills they use are pure applied physics, but they don't consider themselves to be scientists. This session explores how we can use extreme sports as a vehicle for teaching physics as well as engaging these often hard to reach students. (KS3 - 5)

1b Physics on a Shoestring – led by Jo Kent, Teaching and Learning Coach, IOP

This session looks at cheap ways of adding more practicals into teaching. Try out a circus of activities: Balloon electroscope; Balloon in a bottle; CD hovercraft; Cloud in a bottle; Crossbow and equations of motion; Egg in a bottle; Magnetic train; Expanding universe; Large eye model; Loop the loop; Moments with chocolate. (KS3 – 5)

1c Induction and Transformers – led by Dr Rob Rutherford, Physics Network Coordinator, IOP

Transformers are interesting and hard to understand completely. There are two equations that the students need to know and use. One of these is $\text{Power in} = \text{Power out}$. If the transformer steps the voltage up, it steps the current down. This is based on the law of ‘Conservation of energy’. It is correct but it feels strange – a larger voltage produces a smaller current. Another slightly unsettling thing is that conservation of energy isn't a mechanism but rather a summary of the end result. So what is the mechanism? What is going on? Rob is hoping to shed some light on this and include some teaching tips. Useful if you teach transformers at KS4 and KS5 and like to understand physics at a slightly deeper level. (KS4 – 5)

1d (+ 2d) (double length workshop) Cloud Chambers make & take – led by Darrell Hamilton, Physics Network Coordinator, IOP

Making something abstract concrete is a useful tool for those teaching physics. Cloud chambers allow students to see the paths that ionising radiation has travelled. In this workshop you get to make and take away a pocket-sized cloud chamber. (KS4)

1e Getting students to remember all those equations – led by Colin Piper, Teaching and Learning Coach & Physics Network Coordinator, IOP

The new KS4 specification requires students to be able to recall and use 18 equations and choose and apply a further 9. 30% of the marks awarded in the Physics GCSE will be for mathematics skills. The aim of this session is to share some successful strategies for helping students remember and apply equations and will argue against the use of triangles or learning by rote. (KS4)

1f Using Isaac Physics.org to Support GCSE and A Level Learning – led by Heather Peck and Rob Firth, Isaac Physics Partnership

See how isaacphysics.org can mark your homework online for free, saving you time and giving your students immediate feedback. See how "A-level skills mastery" questions lead on to more challenging "problem solving" tasks, and be some of the first teacher to try out the new Isaac Physics GCSE resources. Discover the wide range of questions available on Isaac Physics, from mastering GCSE skills through to helping prepare students to thrive on Physics related degree courses. This session will be in a computer room and it will also be useful to bring your own tablet or laptop and if possible, register with isaacphysics.org before the event. (KS4 & KS5)

WORKSHOP SESSION TWO CHOICES (12.30 – 13.30)

2a Space Science on Earth? Physics in a Box – Led by Alessio Bernardelli, Teaching and Learning Coach & Physics Network Coordinator, IOP

Includes a 'Make-and-Take' activity. Find out how students can follow the example of Tim Peake's physics demonstrations, during his time on the International Space Station, but here on Earth! You will make and then be able to take away your own starter demonstration set up in a box, along with capturing the film footage of it and some ideas for follow-up. **You will need to bring your own smartphone.** (KS3)

2b Maths for Physics GCSE – led by Lawrence Cattermole, Teaching and Learning Coach, IOP

This session will help develop a solid understanding of the quantitative/mathematical skills needed for success in the KS4 physics curriculum. Strategies will be highlighted for key areas of difficulty for students, helping them to success in the classroom. (KS4)

2c Induction and Transformers (Repeat) – led by Dr Rob Rutherford, Physics Network Coordinator, IOP

See 1c for full description (KS4 – 5)

2d – there is no choice for 2d because it is part of the double length workshop 1d

2e Physics Practicals for the new GCSE 9-1 Combined Science - led by Liz Nourshargh, Physics Network Coordinator, IOP

Try out practicals suggested in the new specifications and discuss how to manage the required practical work to meet exam board requirements. Updated from last year to reflect new guidance from the exam boards. (KS4)

2f Unconscious Bias in the Physics Classroom – Led by Claire Aspinall, Physics teacher and Gender Balance Officer, IOP

Find out what unconscious bias is and what can be done to manage it in the Physics classroom and across the wider school community. Look at the top ten inclusive teaching tips and will get the opportunity to practice incorporating them whilst completing a fun practical circus. (KS3 – 5)

WORKSHOP SESSION THREE CHOICES (14.15 – 15.15)

3a Extreme Physics (Repeat) – Led by Neil Atkin, Teaching and Learning Coach and Gender Balance Officer, IOP

See session 1a for full description (KS3 - 5)

3b Using Flipped Learning in Physics Teaching – Led by Lewis Matheson, Head of Physics, Kingswood School (SPN Link School)

Find out about the benefits of using Flipped Learning and how it can be used to:

- get pupils learning the content and skills at home that they normally would do in class
- get pupils tackling the problems and questions in class that they normally would do at home (KS3 – 5)

3c $F=BIl$ – led by Trevor Plant, Teaching and Learning Coach, IOP

The equation $F=BIl$ has come down from A level to GCSE. Come to this workshop to find out how you might approach it. The session will also look at how to demonstrate this magnetic force qualitatively and show simple applications – for example how to make a loudspeaker. (KS4)

3d Shocked and Stunned – Led by Gary Williams, National Coordinator, Institute of Physics Teachers Network

This workshop aims to improve your knowledge of how the Van de Graaff generator works and build your confidence with effective ways of using the generator in class. These shrunk down particle accelerators can really help visualise physics and make for a memorable lesson so come along to play with the portable generators and accessories supplied and get some ideas about how to employ them in your teaching. (KS3 – 4)

3e Physics Practicals for the new GCSE 9-1 Combined Science (repeat) - led by Liz Nourshargh, Physics Network Coordinator, IOP

See 2e for full description (KS4)

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3f Year 8/9 Physics Ambassadors – Led by Claire Aspinall, Physics teacher and Gender Balance Officer, IOP

This session will provide an overview of what the SPN Science Ambassador Training Scheme is and how schools can get involved to develop their own Physics Ambassadors. These ambassadors can then deliver sessions at outreach events, primary schools or for a school STEM club. During the session participants will get an opportunity to try out some of the activities that the students complete on the training day and find out a little more about the preparatory personal development workshops and next steps. (KS3 – 4, Year 8/9)

WORKSHOP SESSION FOUR CHOICES (15.20 – 16.20)

4a The Physics of Flight – Led by Debi Hayes and the iFLY Team

This interactive session looks at how wind tunnels, parachutes, pilot chutes and reserve chutes work, with problem solving on topics such as terminal velocity, aerodynamics, friction and drag. There will also be opportunity to make parachutes and wind powered vehicles and test them in a portable wind tunnel, to investigate why surface area and air resistance are so important to skydivers. (KS3 – 5)

4b Physics on a Shoestring (repeat) – led by Jo Kent, Teaching and Learning Coach, IOP

See 1b for full description (KS3 – 5)

4c $F=BI\ell$ (repeat) – led by Trevor Plant, Teaching and Learning Coach, IOP

See 3c for full description (KS4)

4d Shocked and Stunned (repeat) – Led by Gary Williams, National Coordinator, Institute of Physics Teachers Network

See 3d for full description (KS3 – 4)

4e Energy – choosing start and end points – Led by Colin Piper, Teaching and Learning Coach & Physics Network Coordinator, IOP

The new KS4 programme of study presents fresh challenges to teachers in its approach to energy. This session will argue that the key to the new approach is the careful selection of start and end points and will allow participants to explore a variety of scenarios involving various toys and other everyday objects. (KS4)

4f Using Isaac Physics.org to Support GCSE and A Level Learning (repeat) – led by Heather Peck and Rob Firth, Isaac Physics Partnership

See 1f for full description. (KS5)

Please contact Suzy Gray sg2@soton.ac.uk for any booking queries.

Book online via Eventbrite at <http://bit.ly/2pvdOUM>

The Stimulating Physics Network (SPN) is a national education programme funded by the DfE and managed by the Institute of Physics (IOP). The University of Southampton acts as SPN Regional Coordinator for IOP for the 'South' region.