

# IOP Rugby Meeting: The 31st Annual Meeting for Teachers of Physics in Schools & Colleges, Wednesday 5 June 2019, Rugby School

## Programme

09:30 – 10:45	<b>Registration, coffee and exhibition</b> in the Temple Speech Room
10:45 – 10:55	<b>Welcome</b> in Macready Theatre
10:55 – 11:40	<b>Supermassive Black Holes: The Ultimate Galaxy Killers?</b> Dr Rebecca Smethurst, University of Oxford
11:40 – 12:25	<b>Measurements and process of the redefinition of the 4 SI units</b> Dr. Michael de Podesta, NPL
12:25 – 13:45	<b>Lunch</b> in Sports Centre Café <b>Exhibition</b> and coffee in Temple Speech Room
13:45 – 14:45	<b>Workshop session 1</b> in Science Faculty (see below for details)
14:45 – 15:45	<b>Workshop session 2</b> in Science Faculty
15:45 – 16:00	Thanks to all and refreshments in the Science Faculty Atrium

## Workshops

Embedding formative assessment in 11–14 physics teaching, Mary Whitehouse

- 1) Equipment for the 12 required practicals**, Helen Pollard and Dan Cottle
- 2) Saturday Science: Novel Physics Projects for STEM Clubs**, Neil Downie
- 3) Maths for KS3 and KS4 Physics**, Lawrence Cattermole
- 4) Barriers to physics**, Jessica Rowson
- 5) The Faulkes Telescope Project: bringing the universe in to the classroom**, Paul Roche
- 6) Press Start – a Gameful approach to curriculum development in Physics**, Richard Parker
- 7) Supporting Teachers of Physics by Coaching (Only available in Workshop session 1)** Ian Horsewell.
- 8) Supporting Early Career Physics Teachers (Only available in Workshop session 2)** Daisy Fox

## Lectures

### **Supermassive Black Holes: The Ultimate Galaxy Killers?**

Dr Rebecca Smethurst, University of Oxford

There are over 1 billion galaxies in the Universe, each home to over a billion stars and one central supermassive black hole weighing in at up to a billion times the mass of the Sun. This lecture will focus on the research of astrophysicists trying to understand the current conflict between observations of galaxies and their supermassive black holes and our current best model of the Universe.

### **Measurements and process of the redefinition of the 4 SI units**

Dr. Michael de Podesta, National Physical Laboratory

On 20th May 2019, four of the seven base units of the SI (the kilogram, kelvin, ampere and mole) were redefined. Significantly this change ushered in a subtle but profound shift in how we measure the world around us. Instead of using human-defined 'yardsticks', we will base our system of measurement on the most stable entities we have ever encountered – the constants of nature. In this talk I will discuss the rationale for the change, and the some of the details regarding the kelvin, kilogram and ampere

## Workshops

### **Equipment for the 12 required practicals**

Helen Pollard and Dan Cottle, Institute of Physics

An opportunity to try all of the GCSE practicals, or concentrate on just one or two, if you prefer. We will identify and discuss different skills assessed through practical work and alternative equipment/set-up. As the use of Vernier scales is now explicit in the specification, we will cover reading Vernier callipers and micrometers.

### **Embedding formative assessment in 11-14 physics teaching**

Mary Whitehouse, University of York

It is recognised that good formative assessment can lead to better learning. This workshop will look at strategies, together with some questions and tasks that can be used to support assessment for learning in 11-14 physics teaching

### **Saturday Science: Novel physics projects for STEM clubs**

Neil Downie

A lecture / demonstration of practical physics aimed at STEM Clubs. The novel projects from Vacuum Bazookas to Electric Worms use inexpensive kit, while some incorporate a BBC Microbit credit-card size nanocomputer. The workshop will cover the physics principles and analysis of the projects and allow for participants to have a go at a number of the demonstrations. More details on [saturdayscience.org](http://saturdayscience.org) .

### **Maths for KS3 and KS4 physics**

Lawrence Cattermole, Institute of Physics

This session will start with the idea that many students find much of the quantitative/mathematical skills needed for success in the physics curriculum difficult. We will be looking at ways to make the equations more meaningful, by grouping them and by physically modelling them. Strategies will be highlighted for key areas of difficulty to make them more understandable and provide access for as many students as possible.

## **Barriers to physics**

Jessica Rowson, Institute of Physics

For most of history, physicists have been pale and male. Is this changing? Jessica Rowson looks at recent successes and what can be done at a classroom level to encourage participation and progression of all, through contexts, careers and inclusive teaching techniques.

## **The Faulkes Telescope Project: bringing the universe in to the classroom**

Dr Paul Roche, Cardiff University

This workshop will demonstrate how schools can use robotic telescopes located around the globe to image astronomical objects, allowing students to participate in real research programmes. The session will show you how simple it is to use the telescopes (both via live access and through a queue scheduling system), and demonstrate the free classroom resources, data archives and support materials. Example projects will be outlined, e.g. asteroid rotation, creating HR diagrams, monitoring newly discovered supernovae and studying exoplanet transits. A variety of other astronomy/space science resources will be covered, including free software allowing students to analyse astronomical data.

## **Press Start – a Gameful approach to curriculum development in physics**

Richard Parker, Rugby School

More details to follow.

## **Supporting Teachers of Physics by Coaching (Only available in Workshop session 1)**

Ian Horseywell, Institute of Physics

All physics teachers are involved with coaching colleagues, whether as part of a formal role or while discussing lessons in the prep room over a coffee. In this workshop we will apply experience from the various IOP projects to make this coaching more effective, with links to evidence and resources. Particularly difficult topics will be addressed and approaches shared by all participants

## **Supporting Early Career Physics Teachers (Only available in Workshop session 2)**

Daisy Fox, Institute of Physics

In September 2018, the Future Physics Leaders Programme began its national pilot to support early career teachers in their NQT year with an eye on the recruitment and retention of physics teachers in opportunity and priority areas. In this session, we will be discussing the rationale for the support on offer and its supporting evidence, the approaches taken, and lessons learnt from the first year of the programme.

## **Lunchtime discussion**

### **Space Club - helping students aim for the stars**

Chaired by Katie Izzard (Queen Elizabeth's Hospital) with contributions from Space Club founder Dr David Boyce (Uppingham School)

Space Club is an out of this world extracurricular club run in schools across the country. We will hear from two teachers who have been successful at capturing the student imagination and enthusiasm for physics using the vehicle of astronomy, rocketry and through the building of a community of aspiring astronauts. This will be a round table discussion - please contribute with your own experiences of extracurricular activities that have inspired and share your best ideas with us.