

# Classroomphysics

The newsletter for affiliated schools

June 2014 Issue 29

## Teacher support

# IOP successfully wins extension to Stimulating Physics Network support

The Institute, in partnership with Myscience, has been awarded a new contract by the Department for Education to run the Stimulating Physics Network (SPN) until March 2016. The SPN is an important national programme supporting the teaching and learning of physics in schools across England; this contract ensures that the SPN will continue operating for at least another two years, which is an endorsement of the success and impact that has been achieved by the programme to date.

### Celebrating success

Since 2012, the Institute's SPN has facilitated more than 80,000 teacher hours of physics CPD and more than 60,000 pupils have experienced SPN engagement activities. The SPN is based around a team of 35 teaching and learning coaches (TLCs) who are all highly experienced and successful physics teachers; each TLC providing support to 12 SPN Partner Schools.

The aim of the SPN is to improve pupils' experience of physics at Key Stage 3 and 4, as measured by an increase in the number of pupils choosing to study A-level physics, particularly girls. We work with schools where these progression rates are historically low, or non-existent; typically, these are also schools with high indices of pupil deprivation.

From a lower base, the number of pupils progressing to AS-level physics from SPN Partner Schools over the last two years has increased faster than in other eligible secondary schools; the impact among girls is particularly striking, with a 25% increase



A teacher attending a "Fun is Physics" session at a Stimulating Physics Network Summer School (four-day residential CPD courses held at Oxford, Cambridge and York each year).

in the average number progressing from SPN Partner Schools, compared with a 12% increase from other schools.

### What next?

In the next phase of the programme, the SPN will be forging links with the new Science Learning Partnerships (SLPs), which are managed by Myscience. TLCs will be linked to local SLPs and will offer



free, open CPD workshops for teachers in the SLP's associated schools and the local area. These activities will complement and support the SLP and its wider objectives, and will form a national programme of physics CPD that is available to all teachers in England.

### Expansion to counter stereotyping

Over the next two years, the SPN will also be running a new pilot project called Improving Gender Balance (IGB). A team of specialist project officers will work intensively with 20 schools for two years, to identify and resolve the issues surrounding the disproportionately low number of girls studying A-level physics, including girls' confidence and resilience, teachers' classroom practice, and whole-school issues of gender stereotyping.

**For more information:** including how to become an SPN Partner School, visit [www.stimulatingphysics.org](http://www.stimulatingphysics.org) or contact David Cameron (e-mail [david.cameron@iop.org](mailto:david.cameron@iop.org)). To find out more about the IGB project, contact Clare Thomson (e-mail [clare.thomson@iop.org](mailto:clare.thomson@iop.org)).

You can follow the project on Twitter @TakeOnPhysics and on Pinterest at <http://pinterest.com/teachphysics>.

The latest physics education news, resources and classroom ideas – from the IOP education team

## In this issue



### National Curriculum

Update on the new energy content of the National Curriculum.

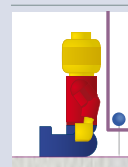
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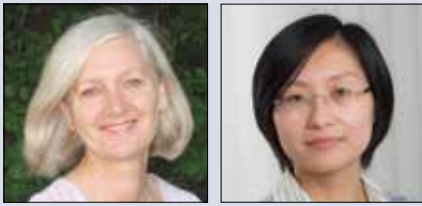


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Editorial



Welcome to the summer edition of the newsletter. The education team here at the Institute is going from strength to strength. Our recent award of £4.3 m from the government to build on the successes of the Stimulating Physics Network (p1) is fantastic news. We have also received further funding from the Drayson Foundation to run a parallel project to the IGB work, and the Capital Physics project that will focus on supporting A-level teaching in London (p3).

The Institute continues to work in partnership with other organisations that support the work of teachers, including the engineering professional bodies who have recently published new resources giving career advice in the area of engineering (p5). Copies of these will have been sent to affiliated schools.

Inspired by experiments featured on the ever-useful Practical Physics website ([www.practicalphysics.org](http://www.practicalphysics.org)) this newsletter's teaching tip focuses on using the context of astronaut training to explore the topic of centripetal force (p8). Combined with the newly created Supporting Physics Teaching website ([supportingphysics.net](http://supportingphysics.net)), these two websites form a useful suite of online resources for NQTs or early-career teachers of physics who need additional support in developing their lessons.

The Institute will be moving to a new system of electronic invoicing for affiliation payments. This is due to come online by September. All renewal notice invoices will be automatically e-mailed to the named contact on the school's record instead of being sent by post. A letter giving further details of this change has been sent out to all affiliated schools with this newsletter. If you think your e-mail has changed since your last renewal please e-mail [affiliation@iop.org](mailto:affiliation@iop.org) with your details so that you receive your renewal notices on time.

Wishing you a wonderful summer.

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Resource

# supportingphysics.net launched

The Institute's Supporting Physics Teaching (SPT) material is designed to support all teachers of physics who want to develop their subject knowledge; particularly those who are new to teaching.

The online version of the resource has recently undergone a major redevelopment to enable teachers easier web access and can now be accessed via <http://supportingphysics.net>.

This version of the material is now housed on a UK server to minimise any problems encountered through accessing the resource via school/college networks. It is also fully tablet compliant, making the user experience much friendlier on these devices.

The navigation is cleaner, all of the interactive elements will now run full screen and the various diagrams are in a format that makes exploring the resource more straightforward. The content has also evolved to ensure that the material continues to build on the best available evidence in physics pedagogy. Each topic continues to be linked to and supported from within [talkphysics.org](http://talkphysics.org) (enabling teachers to give feedback on the material).

There is also now a suite of primary topics available. This is still under development and again aimed at the development of subject knowledge. It will be of particular



Every topic can be explored in three ways: physics narrative, teaching and learning issues, and teaching approaches.

interest to any teachers who support primary colleagues.

There are significant enhancements for those who use and guide early-career teachers to the resource. Teacher trainers will find links to user guides for different scenarios in the SPT supporter's group on [talkphysics.org](http://talkphysics.org).

**For more information:** and to access the resource visit <http://supportingphysics.net>.

Teacher training

# Help out the next generation of teachers

It is essential when thinking about teacher training to spend time observing teaching in a classroom. It can be difficult to find schools that are able to facilitate this. With the known shortage of physics teachers we want to help potential trainees gain this experience, allowing them to confirm in their own mind that teaching is for them, while highlighting their commitment and understanding of the profession.

To support potential physics teachers through this process, we have used our links with teachers and schools across the UK to develop the School Experience Programme. With more than 650 registered schools nationwide, the programme involves matching a prospective teacher to a local school to gain the necessary school observation experience.

We are currently looking for more schools to help out. There is no commitment at this stage; if you're happy to help we would simply add you to the database and let you know when we pass on your details. If at any time you are unable to commit to a visit, not to worry – we'll find another school for the



Can you offer a potential teacher a chance to kick-start their career in physics teaching?

prospective teacher to visit.

For people who have struggled to arrange school experience, this programme has been a lifeline to help them enter the teaching profession.

**For more information:** and registration visit [www.iop.org/sepschools](http://www.iop.org/sepschools).

## Teacher support

# London schools needed for new IOP project

The Institute has been awarded a substantial grant from the London Schools Excellence Fund to support the teaching of A-level physics in London schools over the next 18 months.

The Capital Physics project aims to improve student attainment in A-level physics and support the establishment of more A-level physics courses in schools. It will establish six networks, each consisting of 10 Partner Schools across London. Every network will be supported by a dedicated Capital Physics coach who will be a highly experienced A-level physics teacher providing a bespoke programme of CPD for the physics teachers in each Partner School (at no cost to schools or teachers).



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Each network will also be organised around a hub Advocate School, which will host termly CPD events for the local network and the Institute will host an annual conference for all participating schools: six

Advocate Schools and 60 Partner Schools.

The London Schools Excellence Fund has been set up by the Mayor of London and the Department for Education with an aim to drive up standards in London schools, by investing in teachers and teaching, and supporting the establishment of school-to-school activity to raise pupil achievement in priority subjects, including physics.

**For more information:** about the project, including how to become a Partner School/ Advocate School, or if you are interested in working as a Capital Physics coach, please contact Trevor Plant (e-mail [trevor.plant@iop.org](mailto:trevor.plant@iop.org)).

## National Curriculum

## A new way of approaching energy

The National Curriculum (NC) has been revised and the statements on energy have some new phrasing. There is a definite change of emphasis and some of the statements might look unfamiliar. However, they describe good physics and provide opportunities to talk about energy in new, more constructive ways.

They describe a more consistent approach to the teaching of energy across the sciences than the “nine types” paradigm that is often

seen in textbooks. That paradigm, which evolved into a codified labelling system from the short-hand language used by scientists, has been given the unwarranted status of a descriptive model. And yet it provides very little that is of use to students in thinking about their world or making predictions.

In the revised NC statements, there is no mention of types of energy (let alone nine of them), conversions or transformations. Instead, there is an emphasis on:

- energy as a quantitative tool
- explanations that rely on processes rather than energy
- start and end points in energy analyses
- quantifiable terms

- heating (as a process) rather than “heat” as a substance
- differences as the cause of change
- dissipation and ideas from the second law of thermodynamics
- the Big Ideas.

All of these developments are to be welcomed. They support (and are supported by) the approach to energy that is discussed in the Institute’s Supporting Physics Teaching (SPT) resources ([www.iop.org/spt](http://www.iop.org/spt)). There will be a fuller discussion of the opportunities offered by the revised statements, and the SPT approach, in June’s *School Science Review*.

## Student competitions

## Students win trip to Rutherford Labs

The physics prize winners from this year’s national science competitions have been awarded a special trip to the Rutherford Appleton Laboratory in Oxford. Gianamar Giovannetti-Singh from Hills Road Sixth Form College won the physics prize for his impressive entry to the National Science + Engineering Competition.

“My project was a thought experiment to consider a situation in which quantum mechanics and general relativity could be reconciled. I asked the question: How much information can fit in a box?”

Two runner-up prizes were awarded to Lily Battershill from Ivybridge Community College for her project on graphene and a team from The Queen Katherine School (Abigail Robison, Rowan Boardley, Katie King and Thomas Simpson) for their entry on “How mixing polymer binders with viscosity modifiers influences viscosity and



Prof. Paul Hardaker, CEO of IOP, presenting the physics prize to Gianamar Giovannetti-Singh at the Big Bang Fair on 14 March 2014.

fibre dispersion.”

Lily was particularly impressed with the support she had received from a local university. “I was researching graphene’s

potential as an atomically thin and optically transparent microphone and loudspeaker – the intention being to create the world’s first ‘invisible sound system’. The support I received from the University of Exeter was incredible. Particular thanks to the lecturer, Dr David Horsell.”

Ricki Duffield and Peter Duffin from Wellington College Belfast won the physics prize for their entry to the BT Young Scientist and Technologist Competition on the detection and impact of solar flares in the upper atmosphere. Their teacher played a vital part in their project. “Mr Cardwell resourced materials for our antennae and having been to the competition several times before was able to give us guidance with regards to displays and pitching our results,” they said.

**For more information:** on the National Science + Engineering Competition for UK students visit [www.nsecuk.org](http://www.nsecuk.org) and on the BT Young Scientist and Technologist Competition for Irish students visit [www.btyoungscientist.ie](http://www.btyoungscientist.ie).

## Student competition

# F1 champions head to world finals in Abu Dhabi

Whittle Wonders, a team of students from North Leamington School, has been crowned F1 in Schools UK National Champions 2014 winning a place at the F1 in Schools World Finals. It has been many months of hard work for the team of 15 and 16 year olds, with their car racing along the F1 in Schools 20 m race track in a time of 1.128 s.

After receiving the trophy, Whittle Wonders' team manager Thomas Bradford said: "We're really pleased to have won today. I think we had the best car. It was the fastest car and was well engineered. We've been working on the car for a year, designing, evaluating and refining it. It's going to be brilliant to go to Abu Dhabi."

The competition, with Formula One™ at its heart, challenges teams of students to form an F1 team to design, manufacture, test and race an innovative car, as well as produce a display and printed portfolio, along with giving a verbal presentation of their work to a panel of judges.

In second place was a team of students



Leamington Spa students being crowned 2014 F1 in Schools UK National Champions.

from Robert May's School, Odiham, called Colossus F1 and the third-placed team was Infinity from St John Payne School, Chelmsford. The exceptional support given to the students by their teachers was also recognised with the Teacher of the Year

Award won by Gary Carleton, the tutor for the Northern Ireland team – Ignition – from Cookstown High School.

**For more information:** visit [www.f1inschools.co.uk](http://www.f1inschools.co.uk).

## Practical work

### Making changes to practicals in your school?

Recent reform to curriculum and assessment is leading to changes surrounding science practical work in schools at all levels. If you are already facing challenges as a teacher or technician planning your science-department budget, these new changes may be adding to your questions on space, equipment and technical-staff spending.

SCORE (a policy partnership of the Association for Science Education, Society of Biology, Royal Society of Chemistry, the Institute of Physics and Royal Society) has produced a series of tools for science departments to use in checking how departments can be adequately resourced



to enable sufficient practical work at all levels of the school curriculum.

Find out more and download the tools by visiting <http://score-education.org/publications/publications-resourcing-benchmarks>.

These tools were the result of a significant research project into Resourcing School Science and include:

- an equipment and consumables checklist organised by key stage and class size
- a means for reviewing access to outside space for science teaching

- guidance on the number, type and specification of the laboratories you need
- a tool to review levels of technician staffing.

These tools can be used in a number of ways – to create an inventory and review current stock, to plan a rolling programme of replacement, to help with budget forecasting and procurement planning, to assist with planning new laboratories and to engage senior leadership in recognising the needs of your science department.

SCORE aims to improve science education in UK schools and colleges by supporting the development and implementation of effective education policy. Follow us on Twitter: @SCORE\_news.

**For more information:** visit [www.score-education.org](http://www.score-education.org).

## Teacher events

### Moonraker g-force moments for teachers

Teachers involved (or who wish to get involved) with the Mission X Train Like An Astronaut programme will be given a unique opportunity to experience how astronauts train for launches and landings on 3 June. Following medical examinations by flight surgeons, they will be exposed to g-forces in the long-arm centrifuge operated by QinetiQ at Farnborough (made famous by



Students watching their teacher in the QinetiQ long-arm centrifuge.

the Moonraker film). Teachers who take part will find it literally jaw-dropping as they

experience the g-force simulation.

This event is one of a series of opportunities for teachers to train alongside astronaut Tim Peake, who is set for the International Space Station in December 2015. All Mission X Train Like An Astronaut resources are free to download from [www.bis.gov.uk/ukspaceagency/discover-and-learn/mission-x-in-the-uk](http://www.bis.gov.uk/ukspaceagency/discover-and-learn/mission-x-in-the-uk).

**For more information:** and to register your interest in the astronaut training event on 3 June, contact Heather MacRae (e-mail [Heather@venturethinking.com](mailto:Heather@venturethinking.com)).

## Student events

# Inspire your students with visit to CERN

Students from Neston High School have visited CERN in Switzerland for the 10th consecutive year, to be shown around by a former pupil who is now a University of Liverpool particle-physics researcher. The tour is part of a free service offered by CERN for schools, with accommodation, etc. covered by the students. It gives the students a chance to see some of the highest-profile experiments currently being undertaken in science.

The students spent three days at CERN being guided by members of the ATLAS collaboration, including Dean Forshaw who was on the first trip organised by the university with Neston High School 10 years ago. Dean is currently working on developing detectors for ATLAS, which will need to cope with up to 10 billion collisions per second and much higher radiation doses once the LHC is upgraded early next decade to become the High Luminosity LHC (HL-LHC). He said: "I never would have considered a career in particle physics without the opportunities and support given to me by Neston High School. Ten years on from my first trip to CERN, I'm about to complete my PhD at Liverpool."

Another student, Teneeka Mai from Withington Girls' School, recounts her recent visit to CERN: "At the beginning of our Easter holidays, our physics group



Students from Neston High School visited CERN in Switzerland for the 10th consecutive year.



Withington Girls' visit to CERN in April 2014.

was lucky enough to be able to take a trip to CERN. When we arrived at the famous accelerator, we were given a lecture on the site's history, which took place in the very

room that the discovery of the Higgs Boson was announced!

"We were then given an in-depth tour of LHCb, one of the experiments at CERN, which focused on exploring the nature of the Bottom quark. At the LHC we saw first-hand the immense size and amount of engineering behind the discovery of the famous boson, an experience heightened by Microcosm and The Universe of Particles museums, which provided more interactive information about CERN and physics as a whole."

Do you want to organise a school trip to CERN? Visit [talkphysics.org](http://talkphysics.org) for advice from physics teachers who have successfully organised similar visits: [www.talkphysics.org/groups/159/forums/3909](http://www.talkphysics.org/groups/159/forums/3909).

## Resource

## New support for heads of science from ASE

The Science Leaders' Hub is a new resource available from the Association of Science Education (ASE) and is a collection of professional advice to support science leaders in their departments. The hub aims to create an online space for science leaders to develop their departments, improve student outcomes for science learning and plan effectively to implement curriculum and assessment change.



There is access to advice on crucial areas, including: departmental self-evaluation; working with colleagues; student support; teaching and learning; resources and

management; and health and safety. Most of the resource is freely available to ASE members. The ASE has also just launched a Science Leaders' Survival Guide, which can be purchased by ASE members for £35.

**For more information:** and to access the resource visit [www.ase.org.uk/scienceleadershub](http://www.ase.org.uk/scienceleadershub) and join the conversation #LeadingSci.

## Careers

## Resources for students considering engineering

Affiliated schools will have received the updated *What is Engineering?* leaflet (for 11–16 year olds) and the new *Engineering at University* booklet (for 16–19 year olds). These resources have been produced as part of the Tomorrow's Engineers programme, which is a one-stop shop

## Tomorrow's Engineers

for engineering careers information. This initiative, led by EngineeringUK with support from the Institute and other professional engineering organisations, aims to

encourage more young people to consider careers in engineering.

There is also a range of other resources available to order from the Tomorrow's Engineers website, including: postcards with discussion topics for the younger 11–14 age group; leaflets for parents; career route maps; classroom posters; and teacher notes to accompany the resources.

**For more information:** visit [www.tomorrowsengineers.org.uk](http://www.tomorrowsengineers.org.uk).

## Career events

# EDT challenges families at science event

Changing the perceptions of engineering and science is an uphill struggle, but education charity EDT is taking a fresh approach by tackling the perceptions and career understanding at a family level. EDT's "STEM Family Challenge Events" recognise that the home is a major source of preconceptions and mistaken ideas about science and technology careers, and so provide short evening events for families where they can undertake team activities, get information about careers and ask questions.

These school- or college-based events can cater for up to 100 people and can also provide an opportunity to promote and raise awareness of local industry, allowing

students and their families to link with representatives of different organisations.

Katy Evans, diversity manager for EDT, said: "Students and their families have gone away with some basic shifts in attitude that will make them more receptive to STEM careers, often saying simple things like "Science and maths can be fun" and "I hadn't realised there are so many different types of jobs in engineering."

**For more information:** teachers who want to run a STEM Family Challenge Event for families in their school/college can contact the First Edition team (e-mail [firstedition@etrust.org.uk](mailto:firstedition@etrust.org.uk) or call 01707 871 504).



EDT's STEM Family Challenge Event at The Godolphin and Latymer School in London.

## Teacher courses

# Use Earth-based contexts in your teaching

The Earth Science Education Unit (ESEU) offers free CPD workshops to physics teachers across the UK that show how 14–19 physics can be taught through Earth contexts using hands-on practical activities and real-life applications. Each 90-minute session can be delivered in schools and will cover one of the following topics.

- Tackling Climate Change through Earth Physics: consider the physics behind how climate change could affect the Earth, before investigating different methods of generating power that have low greenhouse-gas emissions and decide what power source would be most appropriate for your region.
- The Seismology Story: how are seismic waves generated and detected? What can this tell us about the Earth? Try a range



of activities, including some of those from the Gatsby's Science Enhancement Programme's *Seismology* publication, to investigate how Earth physics can reveal crucial information about Earth processes and structure.

- The Geophys Story: try using the "Geophys" of "Time-Team" to detect "things beneath the ground" in the same way as geophysical

techniques find archaeological remains, buried infrastructure and natural resources.

Would you like to teach geology in your school or college? Then you may wish to consider taking the "Teaching and Learning in Geoscience Education" modules at Keele University. For example, the 2014 summer school for one of the modules runs from 19 to 25 July and is an intensive course that prepares science teachers to teach geology at GCSE and A-level, or the Higher in Environmental Studies in Scotland. The summer schools are also supported by 12 industrial bursaries and will be free to those who meet the bursary criteria.

**For more information:** contact ESEU (e-mail [eseu@keele.ac.uk](mailto:eseu@keele.ac.uk)).

## Resource

# DIY Big Bang programme for your school

Big Bang @ School is a programme designed to help teachers deliver an in-school event that excites students about science, technology, engineering and maths, as well as helping to inspire them to consider careers in science or engineering. Local Big Bang staff will be on-hand to provide support along with a toolkit containing information and resources to help plan and deliver your own fair.

The Big Bang is a UK-wide programme led by Engineering UK to bring science and engineering to life for young people. The Big Bang celebrates and raises the profile of



young people's achievements in science and engineering, and encourages more young people to take part in science, technology, engineering and maths initiatives with support from their parents and teachers.

**For more information:** visit [www.thebigbangfair.co.uk/toolkit](http://www.thebigbangfair.co.uk/toolkit).



The Big Bang Fair in Yorkshire and Humber.

## EVENTS FOR TEACHERS

### Rugby Meeting

Rugby School, Warwickshire

5 June

The 26th annual meeting for physics teachers in schools and colleges will feature talks given by leading research physicists and physics-education experts, hands-on workshops and an opportunity to browse an exhibition area. Details and booking: visit [www.iop.org/rugby](http://www.iop.org/rugby).

### Space as a Context for Teaching Science

Rutherford Appleton Laboratory, Oxford & National Science Learning Centre, York  
8–10 June and 21 October

Learn from the scientists and engineers involved in one of the most important space missions to be launched this decade: the Gaia spacecraft mission to map the Milky Way. Details and booking: <http://tinyurl.com/oox3qzd>.

### Physics Big Day Out

Cosford (M54, J3)

11 June

A day of free CPD, free lunch, includes physics workshops on forces, rocket-making, using Van der Graaf generators, looking at the latest kit and input from the National Schools. Details and booking: contact Tom Dawson (e-mail [physicsiseasy@googlemail.com](mailto:physicsiseasy@googlemail.com)).

### Teacher and Technician Physics CPD

Rugby School, Warwickshire

12 June

Spending time together as teacher and technician is a fundamental principal to this course. You will leave full of ideas and resources. Details and booking: contact the National Space Academy administrator (e-mail [nsa@spacecentre.co.uk](mailto:nsa@spacecentre.co.uk) or call 0116 2582147).

### Physics for Physics Teachers

Glasgow Science Centre

14 June and 30 August

The IOP Glasgow Science Centre family days will once more take place. In the afternoon there will be more serious physics for teachers in the family. Details and booking: contact Ronna Montgomery (e-mail [ronnamontgomery@yahoo.co.uk](mailto:ronnamontgomery@yahoo.co.uk)).

### Teacher Network for North Wales Conference

Bangor University

18 June

Dr Jonathan Hare from BBC/OU Rough Science will be giving a talk on “Hollywood science”. Other workshop topics include “make-and-take”, wind turbines and WJEC. Details and booking: contact Andrea Fesmer (e-mail [andrea.fesmer@talk21.com](mailto:andrea.fesmer@talk21.com)).

### A Day for Everyone Teaching Physics

Durham University

19 June

A free day of workshops and lectures (funded by IOP), including trebuchets and the best of *Physics Education*. Details and booking: visit [www.sciencelearningcentres.org.uk](http://www.sciencelearningcentres.org.uk) and search for course RB814F0.

### Liverpool Physics Teachers Conference

University of Liverpool

19 June

This conference has been held annually for more than 20 years, attracting enthusiastic crowds of teachers every time, it is an essential date in the calendar for secondary/FE science teachers. Details and booking: contact Lucas Hayhurst (e-mail [lucashayhurst@gmail.com](mailto:lucashayhurst@gmail.com)).

### South West Physics Day

University of Exeter (St Luke's Campus)

20 June

A day of practical workshops and inspiring talks from Dr Andrew Steele and local hero Dr Adam Hart-Davis. Details and booking: visit <https://swphysicsday2014.eventbrite.co.uk> or contact Alison Rivett (e-mail [spn@southwest.slcs.ac.uk](mailto:spn@southwest.slcs.ac.uk) or call 0117 9157167).

### National Astronomy Meeting

University of Portsmouth

23 June

A chance to attend the “Engaging the Public and Schools with Astronomy” parallel session, including talks on astronomy education, outreach, and public-engagement projects and research. Details and booking: [www.nam2014.org/public/schools](http://www.nam2014.org/public/schools).

### Particle Physics for A-level Teachers

University of Birmingham

24 June

Recent developments in particle physics, teaching aids, opportunities for hands-on physics, a talk from Dr Cristina Lazzeroni and a chance for non-specialists to ask questions. Free. Details and booking: contact Richard Bonella (e-mail [trbonella@yahoo.co.uk](mailto:trbonella@yahoo.co.uk)).

### RCUK: Astrophysics – Gaia

National Space Centre, Leicester

25 June

This will feature an update on the ESA Gaia mission and focus on school physics topics that can be explored through the mission. Details and booking: contact the National Space Academy administrator (e-mail [nsa@spacecentre.co.uk](mailto:nsa@spacecentre.co.uk) or call 0116 2582147).

### Nuclear Physics Teacher CPD

Rutherford Appleton Laboratory

3 July

The day includes practical workshops on radiation detectors, talks by UK experts in nuclear physics and a chance to get a piece

of CERN technology into your school. Details and booking: contact Elizabeth Cunningham (e-mail [elizabeth.cunningham@stfc.ac.uk](mailto:elizabeth.cunningham@stfc.ac.uk)).

### Talk Science Teachers' Course

Science Museum, London

3 July

A free one-day CPD workshop run by the Science Museum giving tools and techniques for classroom discussion about science at KS3 & 4. Details and booking: [www.sciencemuseum.org.uk/talkscienceteachercourse](http://www.sciencemuseum.org.uk/talkscienceteachercourse).

### Physics CPD

National Space Centre, Leicester

4 July

Explore ideas and develop an understanding of how practical work can be made more relevant and effective using the context of “space”. Details and booking: National Space Academy Administrator (e-mail [nsa@spacecentre.co.uk](mailto:nsa@spacecentre.co.uk) or call 0116 2582147).

### South East CPD Day

Charterhouse School

5 July

The conference will be themed around the new curriculum. There will be a keynote speech by Dr Simon Boxall, a lecturer in oceanography at the University of Southampton. Free to attend. Details and booking: contact Suzy Gray (e-mail [spn@southeast.slcs.ac.uk](mailto:spn@southeast.slcs.ac.uk)).

### Astronomy CPD

National Space Centre, Leicester

11 July

This will introduce you to a range of hands-on teaching ideas, demonstrations and activities to allow you to bring the topic of astronomy alive. Details and booking: contact the National Space Academy administrator (e-mail [nsa@spacecentre.co.uk](mailto:nsa@spacecentre.co.uk) or call 0116 2582147).

### Summer Physics Update

University of Kent

18–20 July

This three-day residential course will feature a mixture of talks, practical workshops and a visit to the Langton Star Centre, with ample opportunity – including a TeachMeet – to share school experiences with fellow physics teachers. Details and booking: [www.iop.org/update](http://www.iop.org/update).

### East Midlands Network Day

University of Lincoln

27 September

This event includes a lecture from Dr Mark Purver of Jodrell Bank, a workshop, a free raffle, lunch, short tours of the engineering department and city/cathedral tours. Details and booking: contact Helen Pollard (e-mail [helen.pollard@iop.org](mailto:helen.pollard@iop.org)).

# Astronaut training: Going round in circles

This issue of *Classroom Physics* highlights opportunities to train alongside astronaut Tim Peake in a long-arm centrifuge (see p4). The following demonstration will help students understand how centrifuges help astronauts train for launch.

## Apparatus

- Turntable (e.g. a record turntable)
- Toy figure (“astronaut”)
- Empty matchbox tray
- Pins
- A sheet of smooth paper
- Polystyrene ceiling tile

## Instructions

1. Fix a sheet of smooth paper onto the turntable and place the toy figure near the edge.
2. Gradually increase the speed until the “astronaut” slides off.
3. Replace the paper with a polystyrene ceiling tile and fix to the turntable.
4. Attach the empty matchbox tray vertically on the tile and attach at different positions (A, B, C or D) using the pins.
5. Increase the turntable speed.

## Teaching notes

- During step 2: ask students to describe what happens from the point of view of an outside observer at rest (the figure moves along a tangent) and then to speculate what that would look like from the point of view of the “astronaut” on the turntable (the initial motion of the toy is radial). When the “astronaut” slides, it does so initially at a tangent but friction with the rotating table makes its motion turn into a spiral.
- After step 2: Ask the students which position to place the support to stop the astronaut sliding off (the correct answer is C). With the extra force from the support, the table can rotate faster without the astronaut sliding.
- To help students understand how this links to launch forces ask them to think about which force accelerates an astronaut in a rocket (the support force from the Command Module couch) and then link this back to the support force from the matchbox tray in the demonstration.

