It's Different for Girls

How can parents support the take-up of A-level physics by girls?

A briefing sheet

IOP Institute of Physics

Research published by the Institute of Physics shows that a shocking 46% of schools in England sent no girls on to study A-level physics in 2011.

challenge gender stereotyping

In addition, our report, *It's Different for Girls: the influence of schools*, shows that the type of school a girl attends markedly affects her chances of taking physics A-level – something not seen with boys. As far as their experience of physics at school is concerned, it really is different for girls.

Physics graduates earn salaries well above the average and the subject is useful in a wide range of careers, as well as developing analytical skills and allowing people to understand more of the world around them. As such, the Institute of Physics believes that it is the cultural entitlement of all students to learn physics, taught by an accomplished teacher with expertise in the subject, until they can make an informed decision about whether to take it further. At the moment, too many girls are being denied this entitlement.

For both boys and girls, the biggest single external influence on their understanding and enjoyment of any subject is their teacher. So the Institute supports teachers of physics throughout their careers to ensure schools have a thriving culture of physics.

However, parental attitudes to science and their knowledge of its associated benefits also contribute to students deciding whether to continue with physics after the age of 16. This leaflet explores some of the ways that you can contribute to creating an environment in which girls and young women see doing physics as the norm rather than the exception.

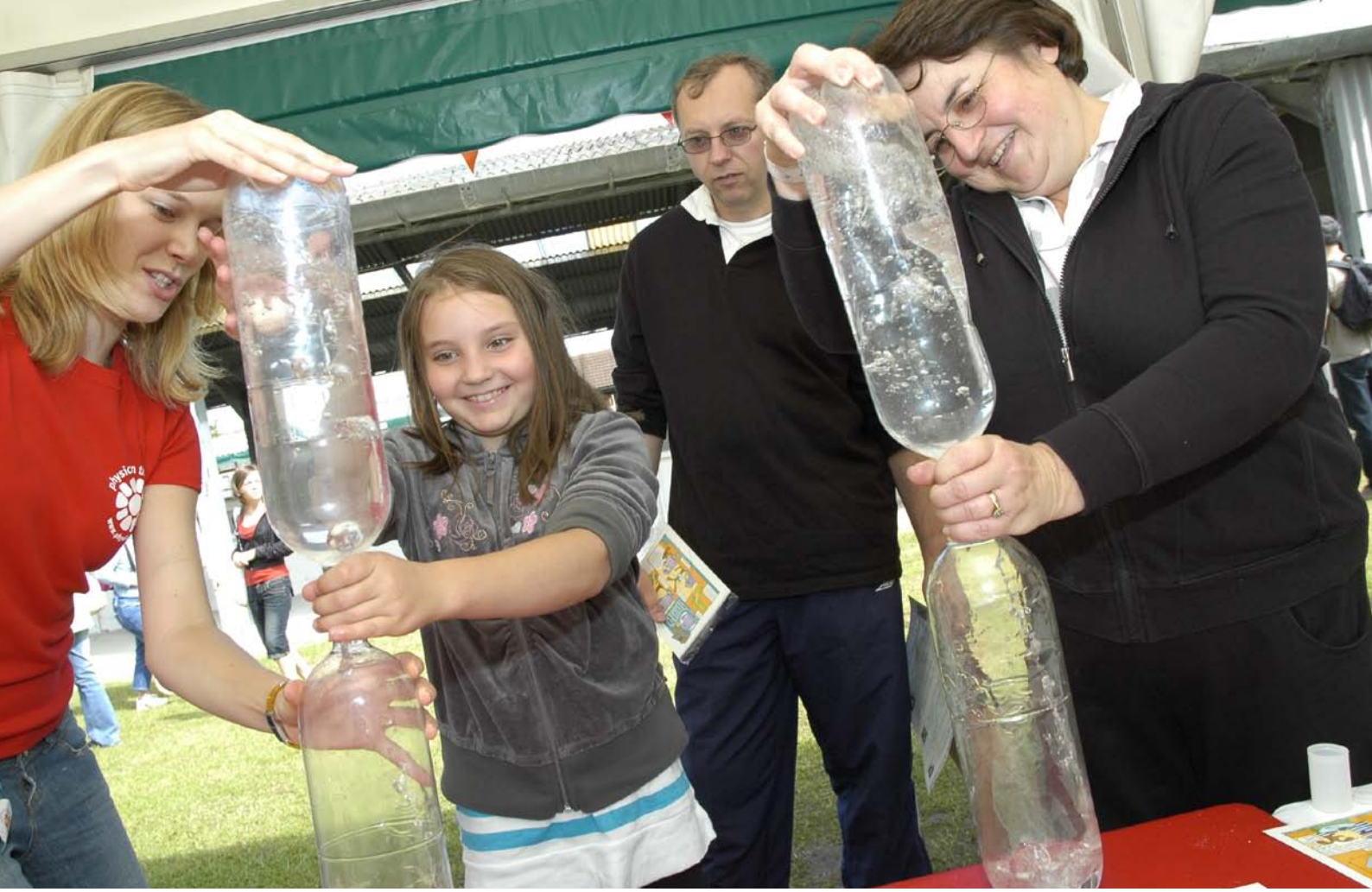
WHY DOES THIS MATTER?

20%
of physics A-level students are girls – this hasn't changed for 20 years

The government is placing an ever stronger emphasis on the role of science and technology in the UK economy. Industry has responded by creating an increasing number of science-related jobs at all levels but many companies report that they're unable to fill vacancies due to skills shortages. The nation needs more young people to take A-level physics.

Alongside this, university education is getting more expensive and university entrance is getting more competitive so subject choice at A-level is even more important than in the past. A recent report by the Russell Group of leading UK universities identified physics as one of the subjects that it recommends students take at A-level.

There is no academic reason why so few girls go on to take A-level physics – girls and boys do equally well at GCSE-level physics and science/additional science (previously called double-award science) – so by choosing not to do physics beyond age 16, girls are not only missing out on the opportunities and career benefits that physics offers, but the nation is missing out on the talents of young women.



WHAT CAN YOU DO AS A PARENT?

enjoy science with your child

1. Challenge stereotypes

As a society we deal in the cultural shorthand of stereotypes, often accepting and perpetuating them without thinking. We see them clearly in many media representations of scientists as male, mad professors with brains the size of planets but no social skills.

- Help your daughter or son to understand gender stereotypes and how they are perpetuated and used in the media, so that they can explicitly challenge them.
- Try not to use stereotypes yourself and challenge those that you come across.

2. Create a positive physics environment

A key influence on young people's attitudes to physics is self-concept – their sense of themselves in relation to the subject. By encouraging a positive physics environment at home, your children will be able to see themselves doing, and enjoying, physics more easily.

- Avoid comments like "I was terrible at physics at school", "you have to be really clever to do physics" or "I can't understand physics".
- Watch science programmes, such as the BBC's *Bang Goes the Theory*, with your daughter or son and make positive comments about what you're seeing, encourage your children to talk about science with you.
- Don't be afraid to admit that you don't know or understand something – suggest ways of finding out together.

3. Add some physics to your family days out

You may associate physics with school, but there are plenty of leisure activities that take the subject out of an academic setting and allow you to experience physics in different ways.

- See what your local science and discovery centre has to offer **www.sciencecentres.org.uk/centres**
- Many towns have science festivals offering events not just for children and families, but adults as well **www.sciencecentres.org.uk/events/science_festivals.html**
- Volunteers from the Institute of Physics take physics busking to events every summer. For this year's schedule see **www.physics.org/article-activity.asp?id=61**

19th

Physics was the 19th most popular A-level subject for girls in 2011

4. Question potential schools

Differences in teaching and school culture are significant factors in determining how successful a school is in sending girls on to do A-level physics. So when choosing a secondary school for your daughter or son, ask:

- Whether the school considers gender equity and access to all subjects.
- How many girls are studying A-level physics – this will be a good indicator of the quality of physics teaching across the school.
- In a co-educational school, what proportion of girls study A-level physics – the current national average is around 20%.

5. Encourage physics-based career aspirations

Parents can be very influential when it comes to career aspirations, but girls in particular tend to have limited knowledge and understanding of how their choices influence pay and progression routes.

- With your daughter or son, use websites such as **www.physics.org**, **www.futuremorph.org** and **www.theukrc.org/wise** to explore the range of careers that are open to people with physics qualifications.
- Ask your daughter or son's school for careers information and work experience that challenge gender stereotypes and provide insight into all the science, technology, engineering and mathematics (STEM) career pathways.
- Don't shy away from discussions with your daughter about the role that she may wish to play in the future as a parent – and how she might deal with a career break.

6. Explore physics online

The World Wide Web was invented by a physicist, Sir Tim Berners-Lee, and it's now home to a wealth of information about physics. Some of the best physics sites include:

- **www.physics.org** – a curated guide to physics on the web that highlights the best online physics content for you. Follow them on Twitter **@dotrythisathome**.
- **www.zooniverse.org** – take part in some real science and make a difference with one of the online projects hosted by the Zooniverse.
- **www.sixtysymbols.com** – a series of quirky short films that seek to explain the abundance of squiggles and letters used by physicists.
- **www.wired.com/wiredscience/dotphysics** – a blog that applies physics to solving everyday conundrums such as what's the best way to mow a lawn? How should you compare the performance of athletes competing in the decathlon? And Is it possible to run up a wall?
- **www.bbc.co.uk/programmes/b00lwxj1** – watch clips from the BBC TV show *Bang Goes the Theory*, find out more about the presenters or try some hands-on science.

WHY PHYSICS?

Studying physics not only provides a broad training in skills that are highly valued and well rewarded by employers, it also keeps your options open.

The salaries of physics graduates are well above the national average. Over a working lifetime, the average physics graduate earns around £100,000 more than graduates of non-science subjects – recognition of a physicist's problem-solving, analytical, mathematical and IT skills as well as their ability to grasp concepts quickly.

Physicists play a vital role in many technology-based industries such as optoelectronics, nanotechnology, computing and renewable energy. Others work on investigating the universe; searching for extra-solar planets or looking for the remnants of the big bang. Others still go on to apply their knowledge in healthcare (medical physics), studying the processes of the Earth (geophysics) or the climate (meteorology).

Having a physics qualification, at A-level or degree, is a good foundation for a huge range of careers

Christina Young studied physics at university after doing both science and art at A-level. She now combines both as a conservation scientist at the Courtauld Institute of Art in London.

Giulia Thompson's physics studies have enabled her to work at the forefront of medical physics, developing innovative technology that saves people's lives.

Christine Rice's experiences of drama and singing while studying physics at Oxford opened up the world of opera to her. She is now a mezzo-soprano who has performed with leading opera companies across the world.

Anne Scowcroft Rodgers' understanding of how geological materials behave when they're heated – gained during her physics studies – has been invaluable in setting up and running her pottery business.

Liv Boeree is a professional poker player and she attributes her success, at least in part, to the analytical thinking skills that she learnt while studying physics.

Catherine Goode has achieved her childhood ambition of designing computer games after gaining a solid grounding with physics.

Amira Sa'id is a professional belly-dancer who analyses each dance as if she were analysing a physics problem in order to understand the mechanics of movement better.

These profiles first appeared in *Physics World*

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