

Clue: A major city



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In physics we trust

To answer the important questions, we need physicists. Relying on combined science in schools won't address the shortage

**Adam Rutherford**

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Warning! Questions of truly universal importance are coming up. Unfortunately though, the UK is running the risk of not being invited to that particular party. A report out this week suggests that physics teachers are in desperately short supply, with up to a quarter of schools not having any at all. This is despite worthy government attempts to rekindle an interest in the subject by granting an entitlement to bright students to be taught physics. It seems they may have to be taught by other science teachers.

The report from the University of Buckingham was published at the same time as 20 Nobel physics laureates (as well as four winners in chemistry and one in physiology and medicine) gathered at Lake Constance to discuss the hottest issues in physics with 500 carefully selected students from around the world. It's at meetings such as this one in Lindau where the brilliant vitality of physics emerges.

Alongside fairly straightforward subjects such as superconductivity, quantum computing, spintronics and other phenomena that will shape our collective futures, there's even a smattering of the physics of biology. I'm reminded of that old jokey science maxim: biology is applied chemistry, which is applied physics (which is itself applied maths, but we'll ignore that for now). As a biologist, I'm very much at the non-purist end of that spectrum. The father of nuclear physics, Ernest Rutherford (tragically for me, no relation), famously said "In science there is only physics; all the rest is stamp collecting." It's a good quotation, if not quite true. But philately aside, without knowing how electrons behave, you can't know how the Krebs cycle (usefully shown here by a marching band) works, or why the kink in the H₂O molecule permits all life as we know it. You just can't understand biology.

And this is before we get to the minor matter of the most ambitious experiment in history. At some point this year - we'll find out precisely when any day now - the gargantuan large hadron collider (LHC) will go online at Cern in Geneva. Despite what you may have heard, the destruction of the Earth due to the inadvertent creation of black holes isn't very likely. Instead we'll see an incredible snapshot of what the universe looked like a few billionths of a second after the big bang. As that terrific ambassador of physics Brian Cox said in yesterday's Guardian, this exploration may very well reveal the Higgs Boson, a thusfar hypothetical subatomic particle that gives matter mass. I sometimes lament the fact that I was not good enough at maths to address questions that completely blow your mind. Physics is unlocking the secrets of the universe, and just like the Apollo missions to the moon, the LHC is a human endeavour that will inspire young scientists for many years to come.

The dearth of physics teachers is inherently linked with the emergence of combined science as a replacement for the traditional and legitimately distinct subjects of biology, physics and chemistry. I hear complaints from university tutors that some of their intake have to take remedial classes to bring them up to speed with undergraduate requirements. Furthermore, comments from science teachers indicate that combined science courses often focus on debates about scientific issues such as global warming, and one of my own hobby horses, creationism. If this very necessary education in science communication is taught at the expense of the knowledge itself, then it needs to be reined in.

Unlike physics, this is quite simple. Would you expect a history teacher to double up to do geography? Of course not. physics is a specialist subject and requires inspirational and specialist teaching. Without that expertise, our students won't be able to address the biggest questions in the universe.

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