

letters

UK blue skies need particle physics

Physics debate would benefit from the facts

David King has contributed outstandingly to the debate on climate change and energy. It is a pity that the value of his contribution to the debate on funding for particle physics [*RF 10/9/08, p1*] was diminished by errors and unsupported assertions. Let me give three examples.

First, Sir David states that 'funding of Cern is probably equivalent to [UK] government funding of medical research'. Government funding of medical research through the Medical Research Council and the NHS was £750 million in 2007. Total UK funding of particle physics, through the Science and Technology Facilities Council, is £135m per annum, including the £80m subscription to Cern. While the MRC's 2007 budget of £543m is slated to increase by 30.1 per cent over the three year Spending Review period, the STFC's budget will increase by just 13.6 per cent, entailing a well-publicised reduction in research volume.

Second, it is not true that 'particle physics has been getting more expensive over the years'. The Cern budget is today 15 per cent less in real terms than it was at its peak in 1974, and the average over the last 15 years has been about 20 per cent less than in 1974.

Third, the World Wide Web could indeed, in principle, have been invented in a solar energy laboratory. But the public, the general scientific community, and the computer industry saw no need for the web (as late as 1993 industry declined offers to collaborate in its development). The web's inventor, Sir Tim Berners-Lee, always insists that the essential impetus to fund its development was the need to share information between groups around the world that collaborate in Cern experiments.

Your own editorial in the same issue is bewilderingly ill-informed. You are incorrect in implying that the LHC budget was not 'held properly accountable by the peoples of Europe': their representatives on the Cern Finance Committee and Council have each met over 50 times since the LHC project was approved at the end of 1994.

You have got the science wrong. Your remark about general relativity, electromagnetism and lack of progress since Einstein's day in establishing unified theories only makes sense if electromagnetism is a misprint for quantum mechanics. In fact progress in unification has been enormous: the electromagnetic and weak forces have been understood in a unified way (in large measure due to experiments at Cern), and there are unified theories (with some experimental

support) that also incorporate the strong (nuclear) force.

You also got the accelerator science wrong. The suggested 10-fold intensity upgrade of the LHC would entail replacing fewer than 50 of the LHC's several thousand magnets, not dismantling it all, as you write. Needless to say, such an upgrade and construction of any subsequent accelerator could be justified only by significant discoveries with the LHC.

There are legitimate questions about the appropriate priorities for different areas of research. They should be debated on the basis of facts.

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LHC a real breakthrough

Having manned display stands, served on outreach panels and talked to the public and press throughout this week as part of the celebration of science, technology and engineering which is the British Association Festival, I found your editorial of 10 September [*RF 10/9/08, p2*] both hugely unhelpful and out of touch.

The start of the Large Hadron Collider programme is both extremely exciting to the public and genuinely does open a new era in particle physics. The LHC will achieve, for the first time, collisions whose energies greatly exceed what is considered the key energy threshold in our current understanding of the fundamental forces that shape our universe (the threshold associated with electromagnetic and weak force unification). This opens up enormous opportunities for new discoveries and insights that may greatly change our understanding of fundamental physics and could point towards new unifications and possible insights into some of the fascinating issues in astrophysics and cosmology.

I can also report that the members of the public whom I meet greatly appreciate, and are fascinated by, such research—as they surely are by research in many other fields as well. For the younger audience, the interest in studying physics as a subject has been greatly enhanced by the recent widespread coverage of our activities. The public also fully understands how research directed at esoteric, but highly challenging, areas leads to technology breakthroughs that have a significant impact on their lives.

Moreover, many concerns are also settled when it becomes clear that the LHC is just the jewel in the crown of a laboratory which pays for it, and much more besides, out of a total annual budget that is smaller

than that of one of the UK's largest universities; and that these costs are then split across nearly every major industrialised nation. Surely having one institution on the planet carrying out such groundbreaking research, which every participating nation helps pay for, is not asking that much?

For too long, those of us who work in particle physics were accused of failing to engage with the public to explain the significance of what we do. The Standard Model Lagrangian, however elegant, does not lend itself to easy explanation and so some rigour has to be lost in making the excitement of what drives particle physics more accessible. The same is true in most cutting edge science and I think the editor's choice of the word "hype" is particularly inappropriate.

The ideals of the British Association should be to celebrate all of science at its best and not get bogged down in the inevitable bitching about how the research funding pot gets divided up. We should all be uniting to argue for the pot to be enlarged, not running down each other's research areas.

Phil Allport
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Difficult to account for excitement

In your recent cover story, David King asks, "what is the level of funding for particle physics that wouldn't be justified?" [*RF 10/9/08, p1*]. Well, 2 per cent of government spend on the R&D base would not seem unreasonable, especially as these are the only funds the field receives in the UK.

In making comparisons with the UK's funding of medical research he cites the global funding for Cern. However, global spend on medical research from governments alone exceeds \$30 billion a year, which is grossly in excess of Cern's total budget. The pharmaceutical industry makes a similar commitment.

While the media overly hyped the LHC opening, almost everything associated with this event was impressive. The engineering, often overlooked in projects like this, might even accurately be described as miraculous. Such inspirational projects exude excitement, flair, and panache. Sadly, such factors are rarely taken into account in the balance sheets.

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