

## COMMENTARY

## UK physics gets a health check

The field is healthy, says **Bill Wakeham**, but scientists need to reclaim the intellectual ownership of research at the margins of the discipline such as medical or atmospheric physics.

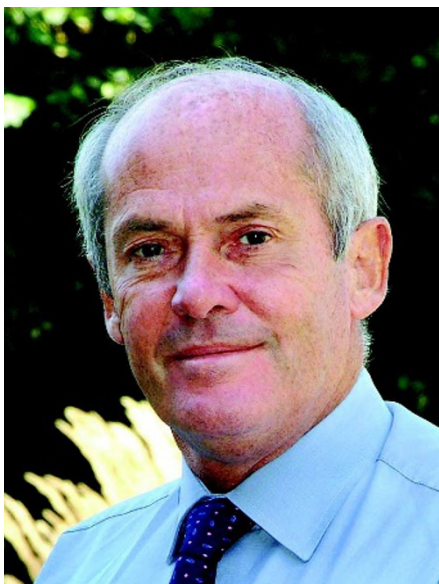
Physics research funding in the United Kingdom has been under the spotlight in the past year. In 2007, a restructuring of the research councils and a government budget settlement were perceived by the community as being unfavourable to the discipline. This prompted a wide review of the health of UK physics, looking at its international status, funding arrangements, university provision, school education, careers and skill supply. I was invited by the research councils to chair the review panel, drawing on expertise across the discipline and from overseas. Our report was published on 1 October.

UK physics is strong but faces important challenges. International reviews conducted in 2000 and 2005 recognized its outputs in terms of publications and citations. An analysis based on ISI citation data from 1998–2008 places the combination of UK physics and space science second only to that of the United States. The study we commissioned from Leiden University in the Netherlands showed that despite having a lower publication volume than Japan, France and Germany, the United Kingdom receives a higher citation rate per publication.

The discipline's impact on the wider economy is also strong. An Institute of Physics study calculated that the economic activity of physics-based sectors in the United Kingdom was £70 billion (US\$125 billion) in 2005. These include information technology, construction, transport and aerospace. Physics graduates also find employment in sectors with no obvious connection to the subject, notably finance.

The United Kingdom's academic physics workforce is stable, with around 4,000 academic and postdoctoral researchers. The annual undergraduate intake has increased from 3,415 in 2002/03 to 3,885 in 2006/07, so the appeal of the subject to a core group is clearly robust. Research in the United Kingdom has benefited from an 82% increase in the overall science and research budget in the five years to 2006/07, and physics-research funding has increased by 34% during this period, in line with the growth of UK gross domestic product.

Despite this superficial picture of stability, physics in the United Kingdom has seen significant changes during the past 20 years, with a number of departments closing



**Bill Wakeham: undoing the merger of research councils would be rash.**

or merging. Factors driving this change include the expansion of the university sector to embrace the former polytechnics, the increased focus of universities' research strategies driven by the Research Assessment Exercise and the reduction in the unit resource for undergraduate physics teaching.

Departmental focus on particular areas of physics has had a significant effect. Increasingly, physics departments rely on the core physics programmes of the Engineering and Physical Sciences Research Council and the Science and

Technology Facilities Council (STFC); the latter was formed last year through the merger of the Particle Physics and Astronomy Research Council and the Council for the

Central Laboratory of the Research Councils. Other British research councils invest in physics — notably the Medical Research Council, the Natural Environment Research Council and the Biotechnology and Biological Sciences Research Council — but 95% of their physics-related funding is spent in non-physics departments.

This tells us three things: 1) the dependence on a small number of funding streams makes physics departments vulnerable; 2) physics departments have not fully grasped the opportunities in interdisciplinary research and

some subdisciplines; and 3) the intellectual leadership of research at the margins of the discipline is often in other departments. There may be reasons for this at an individual institutional level, but at a national level it militates against the ability of the discipline to work with large sections of industry. Physics departments need to reclaim the intellectual ownership of some parts of their discipline and they need support from the funding agencies to achieve this.

Like many developed countries, the United Kingdom faces a challenge to maintain the supply and recruitment of research scientists. The problem is acute in physics and one that my panel explored at several points of the pipeline. Government intervention may be necessary to solve some of the problems. Physics needs to be taught by those trained in the subject. Too many young people are being taught physics by teachers with little relevant background. Worrying also is the decline in uptake of physics by girls, which has fallen by 16% compared with a 12% fall for boys in the four-year period assessed.

The merger of two research councils to form the STFC was generally welcomed by the research community. It would be precipitate to undo this process rapidly and we are not convinced that significant changes to the remits of individual research councils to unify physics funding or to separate facility and grant spend would be helpful. Nevertheless, the community must be confident that the current remits serve the best interests of UK research and physics and in particular, that commitments to facilities do not have an undesirable impact on the availability of grant funding. We think that government should revisit the current arrangement at a suitable time, guided by the more detailed review of STFC structures that has been commissioned.

The value of physics to the United Kingdom is such that weaknesses in its structures and in the skills pipeline must be addressed. Some aspects of this problem have been recognized, but action now needs to be pursued with greater urgency. ■

**Bill Wakeham** is chair of the Research Councils UK Review of Physics. He is a member of the Council of the Engineering and Physical Sciences Research Council and vice-chancellor of the University of Southampton, University Road, Southampton SO17 1BJ, UK.

e-mail: vice-chancellor@soton.ac.uk

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**"95% of physics-related funding is spent in non-physics departments."**