

International Perceptions of UK Research in Physics and Astronomy 2005

The Science Board's response to the
International Review Panel's report

21 April 2006

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Professor John O'Reilly
Chief Executive
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Institute of **Physics**

Dear Professor O'Reilly

International Perceptions of UK Research in Physics and Astronomy 2005

The Institute of Physics is a scientific membership organisation devoted to increasing the understanding and application of physics. It has an extensive worldwide membership (currently over 35,000) and is a leading communicator of physics with all audiences from specialists through government to the general public. The Institute believes in and promotes ethical integrity in all scientific activity, including education, research, publication and the exploitation of knowledge. Its publishing company, Institute of Physics Publishing, is a world leader in scientific publishing and the electronic dissemination of physics.

Please find attached the official response of the Institute's Science Board to the Panel's report, *International Perceptions of UK Research in Physics and Astronomy 2005*.

If you need any further information on the points raised, please do not hesitate to contact me.

Yours sincerely

Professor Carole Jordan CPhys FInstP
Chair, Science Board

cc: Keith Mason, Particle Physics and Astronomy Research Council
David Elliott, Royal Astronomical Society
Robert Kirby-Harris, Institute of Physics

Institute of Physics

Response of the Science Board to the report, *International Perceptions of UK Research in Physics and Astronomy 2005*

OVERVIEW

The Science Board wholeheartedly welcomes the Panel's report, *International Perceptions of UK Research in Physics and Astronomy 2005*. The Board is pleased that the Panel identified improvement in UK physics research since the 2000 review but noted that the Panel share the Board's concerns that the erosion of physics within the higher education system could jeopardise this progress. The Board agrees with the Panel that it is heartening that the government has recognised the importance of science, engineering and technology (SET) and has increased its investment into the SET base, through the research councils. It is essential for the benefit of the nation that the UK capitalises on the expertise, skills and knowledge of people working in physics and astronomy.

The Board particularly welcomes the Panel's views and recommendations relating to responsive mode funding within EPSRC, concerns expressed over the reduction in the number of graduate students associated with the use of central facilities, and those relating to postgraduate teaching issues.

The Board is keen for the Institute to work with the other sponsoring bodies to the Review, in order to take forward some of the Panel's recommendations as follow-up studies, to explore some of the problems they highlighted and to look at some of the opportunities that are available further to strengthen the UK's physics and astronomy research base.

FOLLOW-UP STUDIES

1) The Panel stated a number of concerns relating to the training of British PhDs. In particular, the length and breadth of the UK's PhD programme. It recommended "...that the UK needs to make an informed decision about the future of its graduate training programme. In order to do this should commission an in-depth review of graduate level education, which needs to incorporate comparisons with its leading scientific competitors, and address the implications of the Bologna Process..."

In response to this, the Institute is keen to:

- ascertain the number of UK physics and astronomy PhD students, which will include the disaggregation of those that are UK domiciled;
- work with the other sponsoring bodies to commission an in-depth review of UK graduate training programmes, which will compare the merits of three and four-year programmes;
- investigate the issue of whether UK postgraduates are able to compete with their European counterparts for academic positions both at home and abroad; and

- ascertain whether a 4+4 first (4-year MPhys) and second (4-year PhD) cycle qualification model, amongst others, would be feasible within the Bologna Declaration framework.

2) The Panel expressed continued concern regarding the situation of the UK's physics PDRAs. In particular, the issue of them working indefinitely on short-term contracts is neither the best environment in which to nurture their talent, nor for departments to plan and undertake long-term research projects.

The Institute will work with the other sponsoring bodies to explore the possibility of commissioning a review of the EU's fixed-term work directive, and its implications for the continued employment of physics PDRAs on short-term contracts and their career paths.

3) The Panel commented that it is their perception "*...that there are fewer theorists in UK physics and astronomy departments than is the international norm...*"

It is most probable that quite a number of theoretical physicists are undertaking their research in university mathematics departments which were not visited as part of the Review. Hence, the Institute plans to undertake an in-depth survey to ascertain the number of theoretical and experimental physicists in UK universities, and compare that number with other leading scientific nations.

4) The Panel commented "*... that the majority of the internationally visible biophysics research is not conducted in physics departments...*" Furthermore, "*Internationally, the recognition that biophysics and soft matter physics are mainstream physics disciplines is increasingly reflected in the structure of physics organisations (e.g. APS: Division of Biological Physics...)*"

The Institute, as the professional body for physicists in the UK, is actively involving scientists working at the interface between physics and biology in discussions to find the best way to support their work. One possibility is the establishment of one or more subject groups. The Institute's subject groups organise meetings and conferences, produce regular newsletters to keep their members abreast with the latest developments in their sub-fields and provide information on relevant meetings organised by other bodies.

Such an initiative will help provide focus to those areas where physics and physicists can work with their counterparts in the biosciences, combining their skills, approaches and knowledge to address complex problems bridging the physical and biological sciences. Such problems will usually involve matching fundamental intellectual challenges for both communities.

5) The Panel commented that "*...every department should have an aspirational target of employing at least two female academic members of staff on its faculty by the end of the decade. To achieve this goal, special focus to attract (and subsequently to retain) women into science is needed from the very early stages onward.*"

The Board is of the view that a target of ensuring that there is at least one female on each academic short-list is more realistic. The Institute's Diversity Committee will consider this issue.

6) The Panel made a number of comments relating to the funding of physics and astronomy research in the UK. In particular, they focused on the on-going concerns amongst the physics academic community with regards to responsive mode funding, the balance between managed programmes, the length of research grants, and funding for curiosity driven research.

These are perennial concerns, and the Institute will continue its dialogue with both research councils to find an appropriate resolution.

COMMENTS FROM THE PHYSICS COMMUNITY

The Institute invited comments from its membership on the Panel's report. A number of detailed comments were received, most notably relating to the omission of a number of sub-fields. While these comments do not necessarily reflect the views of the broader physics community, they raise specific issues that the research councils should consider when reviewing the implications of the report, and informing their policy decisions regarding the direction of the research they support.

Plasma physics:

The lack of plasma physics coverage could have far-reaching consequences of its perception as a current and vibrant area of research. Its omission is unfortunate, especially as it was covered in the 2000 review.

The highly positive view of plasma physics taken by the 2000 Panel remains valid. Indeed there are clear indications of further strengthening, due in part to the incorporation of the UK fusion programme at Culham into EPSRC's portfolio in 2003. For example, the number of plasma physics PhD students associated with this programme has greatly increased during the past few years. Laser-plasma interaction physics continues to thrive, benefiting in particular from the world-leading short pulse facilities at CCLRC.

Atomic, molecular and optical physics:

While the report covers adequately some areas of current importance including cold atoms and quantum information, other areas that are as important were not commented on.

Although UK activity in ultra-fast optical physics was briefly recorded, there was no mention of the work in strong field physics. Given that this area was highlighted and praised in the 2000 report as an area where the UK had internationally important activity, it is regrettable that it was not commented on this time.

Aside from cold molecules, the rest of molecular physics received no mention. There is significant activity within UK physics departments in several highly topical areas including coherent control and ultra-fast measurement. In molecular physics, the UK molecular physics community has an international reputation in several areas including coherent control, molecular reaction dynamics, laser spectroscopy, quantum chemistry, the study of surface reactions and the development of STM techniques for chemical control.

Nanoscience:

The Panel identified nanoscience as "requiring attention" and lacking visibility. The Institute's Nanoscale Physics and Technology Group agrees that "visibility" issues are a problem; hence the Institute has agreed to support the group in organising a town meeting to discuss what measures can be taken to improve the impact and profile of the current portfolio of nanoscience research.

The meeting is scheduled to take place at the Institute on 17 May 2006.

Surface science:

The Panel's comments that surface science is still suffering from "patchy coverage", and "does not have the expected international leadership", reflects the fact that the Panel did not have the opportunity to view the full picture of UK activity in this sub-field, which also takes place in chemistry, materials science and at the central facilities.

It was encouraging to note that at the launch of the report, Professor John O'Reilly stated that given the emphasis that the Review has placed on surface science, it was perhaps appropriate for an EPSRC initiative in this area. This would be wholeheartedly welcomed.

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