

# Review of UK Physics

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Institute of Physics response to  
Research Councils UK

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12 November 2008

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Professor Ian Diamond  
Chair of the Executive Group  
Research Councils UK  
Polaris House  
North Star Avenue  
Swindon SN2 1ET

## **IOP** Institute of Physics

Dear Professor Diamond

### **Review of UK Physics**


The Institute of Physics is a scientific membership organisation devoted to increasing the understanding and application of physics. It has an extensive worldwide membership and is a leading communicator of physics with all audiences from specialists through government to the general public. Its publishing company, IOP Publishing, is a world leader in scientific publishing and the electronic dissemination of physics.

The Institute welcomes the publication of the Review of UK Physics. The report provides a positive statement of the importance of physics, particularly to other disciplines, and we commend its clear overview of the state of physics research and higher education in the UK and also its prescription for the means to strengthen the system and deal with some areas of concern.

Following consultation with our membership and the wider physics community, the attached annex is the Institute's formal response to the recommendations, in which we provide commentary and highlight points of action which we (and in conjunction with others) plan to undertake.

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

Yours sincerely



**Professor Peter Main**  
Director, Education and Science

## Review of UK Physics

**Recommendation 1:** *The Panel recommends that the UK Government should continue to fund research in both basic and applied physics across a broad spectrum of sub-disciplines, at the level required to retain international competitiveness.*

Commentary:

The Institute welcomes the recommendation, and is pleased to note that it has been accepted by DIUS. However, in general terms it begs the question, what is an appropriate level of funding for individual sub-areas of physics research? On this note, we would like to reiterate perhaps the most important statement from the 2005 International Review of Physics and Astronomy Research<sup>1</sup>, that the increased investment made to physics (as part of the overall Science Budget) has made a marked difference to the research environment and the status of physics in the UK, but this progress is predicated on maintaining the increased level of funding that has taken place over the last few years.

Proposed action:

The Institute urges DIUS to develop metrics to determine international comparisons of research funding for individual science-based subjects. In the meantime, the Institute is in the process of commissioning a study to analyse UK and overseas funding for physics; in the first instance, the amount of funding allocated to physics in the UK, over an agreed period of time, will be ascertained, followed by the search for a robust metric/indicator that can be used to compare the UK's funding for physics with its leading international competitor nations. We would welcome support from RCUK in this endeavour.

**Recommendation 2:** *The Panel recommends to the Funding Councils and Research Councils that they work together to consider how they can encourage physics departments to reclaim the intellectual leadership in the broader spectrum of physics supported across the full science base.*

Commentary:

The Institute welcomes the recommendation which we have interpreted as suggesting that physics departments should take a stronger leadership role in the more applied areas, which to date have not been considered to be leading edge, particularly by RAE physics sub-panels. As the funding base for physics is narrow, physics departments need to diversify their funding streams, and attempt to increase volume in a wider range of research activities. Normally, such changes evolve slowly which would appear to indicate that the best way to change the situation is to change the environment with appropriate incentives.

Something which the report did not address is the pressure imposed by the continual need to bring in new grants and do well in the RAE which means there is little flexibility for academics to change to emerging areas where they have no standing and little knowledge or experience. Such a change of direction, in mid-career for example, has large risks for the individual, particularly in this era of continual

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<sup>1</sup> [www.iop.org/activity/policy/Projects/International\\_Review/file\\_6364.pdf](http://www.iop.org/activity/policy/Projects/International_Review/file_6364.pdf)

assessment at every level; therefore, academics will require adequate support from their universities.

There is an implication that the issue of the 'intellectual ownership' of physics, and the interface between physics departments and others where physics is practised, is the one that needs to be addressed from the bottom up, i.e. by universities and the way in which they structure themselves. While applied elements (e.g. medical physics and environmental physics) sit outside of physics departments, they are not regarded as being 'physics'. Bringing them back into physics departments not only broadens the research funding, but it also changes the way prospective students view the subject. Furthermore, there is a critical issue here that once important areas of research move out of physics departments they lose international impact. For instance, UK output in EPSRC areas such as condensed matter (both hard and soft) and optics have a relatively low output relative to France, Germany and Japan. These are important areas where technological innovations are most likely to be generated.

Even though the Institute supports the recommendation, it is also essential to preserve the specialism of physics within universities and the specific culture and perspectives that accompany this, not least for the teaching capability. In the US, for example, physics departments survive by service teaching to engineers, medics and others. There is little physics service teaching in the UK, even in the first two years. This is regrettable as this could provide an exposure of the culture and skills of physicists to a wider scientific and technological cohort of students; this is the broadening of the income streams which helps keep US departments solvent.

Proposed action:

The Institute will consider setting up a formal working group consisting of heads of physics departments and senior university staff to consider the issue of reclaiming intellectual leadership.

**Recommendation 3:** *The Panel recommends to the Funding Councils that they work closely with Research Councils to ensure that physics that may be currently conducted outside physics departments and that has application in other disciplines, and in industry and commerce is fully recognised in the post-RAE environment. This also has important implications for the correct sign-posting (to prospective A level and Scottish Highers students or physics undergraduates) of this broader role for physics.*

Commentary:

The Institute supports the recommendation which follows concerns that the more applied end of physics research has been undervalued by the RAE process. It also reflects the number of applied physics departments that have closed.

The Institute concurs with the RCUK response that interdisciplinary research needs to be encouraged and that physics departments need to work with others in addressing important interdisciplinary problems. However, this may prove difficult for smaller physics departments due to a lack of sufficient resources and staff capacity.

Proposed action:

The Institute will investigate how much 'physics' research is undertaken outside of physics departments.

**Recommendation 4:** *The Panel proposes:*

a) *to DCSF that physics should be taught by those trained in the subject, and the same successful ideas that were applied to raising mathematics take-up in schools by improving mathematics teaching be extended to physics; and*

b) *that research is undertaken by RCUK and DCSF to identify factors influencing non-take up of physics in post-compulsory schooling amongst those from wider social and ethnic backgrounds and from women.*

Commentary:

The recommendation reinforces the Institute's strategy in this area, and we are pleased to note that RCUK in its response referenced a number of projects that the Institute is engaged in, which we will continue to support.

The Institute supports the idea that enabling teachers to teach physics and mathematics might make teaching more attractive to physicists (but divisions between school physics and mathematics departments will need to be overcome). However, if the recommendation is suggesting a Physics Network comparable with the Further Mathematics Network, the Institute would not support this without considerable further discussion about the effect on physics teaching at GCSE (or equivalent) level.

In addition, the absence of mathematics from A-level physics is of some concern to physics departments. Hence, there could be value in developing a qualification that bridges the link between physics and mathematics at this level, with the intention of providing an optional qualification that would motivate and engage students with an interest in physics, overcoming barriers to university entry.

Proposed action:

a) The Institute will lobby DCSF to take action in this area, particularly given the recent admission that it is unlikely to meet the 2014 targets. We will press for all teaching of physics GCSE (i.e. physics component of triple science) and above to be the province of physics specialists.

b) We are pursuing extensive work on this issue and are keen to share our expertise with RCUK and DCSF. The Institute and Royal Society of Chemistry jointly commissioned the National Foundation for Educational Research to undertake a study to look at the factors affecting A-level and undergraduate subject choice in physics and chemistry ethnic groups. The report, 'Why choose physics and chemistry? The influences on physics and chemistry subject choices of BME students', will be published shortly; it follows on from the 2006 statistical analysis, 'Representation of Ethnic Groups in Chemistry and Physics'<sup>2</sup>.

**Recommendation 5:** *The Panel proposes that DIUS works closely with the Institute of Physics and Universities UK to ensure compatibility of current physics qualifications with the Bologna process.*

Commentary:

The recommendation supports Institute policy. Recent conversations that the Institute has had with academics from other European countries have indicated that they do not consider UK Masters' degrees to be consistent with the Bologna Process.

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<sup>2</sup> [www.iop.org/activity/policy/Publications/file\\_8863.pdf](http://www.iop.org/activity/policy/Publications/file_8863.pdf)

There is a real risk of the UK's Masters courses, i.e. standalone (e.g. MSc) or integrated (e.g. MPhys/MSci), not being recognised throughout Europe as second cycle qualifications. Currently, with no pressure to change, most university departments would defend the integrated Masters. They would, however, embrace the standard 3+2+3 Bologna model, provided the second cycle was properly funded. If we do keep the integrated Masters, we have to do it properly and not side-step the issue by attempting to pretend that it is consistent with the Bologna Process. However, moving to strict compliance (3+2) would run the risk of discouraging students from studying physics and would also have a significant impact on university staff as the extra teaching load would reduce the time available for research.

A further issue to take into account is that the research councils are keen to develop a four-year vision of the Doctorate (currently with a mix of three-and-a-half- and four-years funding). They are actively pursuing this through reductions in the funding for standalone Masters courses and the increased funding of DTC programmes which contain a significant taught element in the early part. Both universities and students have embraced this situation, so that in effect we will increasingly have a 3+1+1+3 model. Therefore, it appears that a decision has been made that our path is integrated Masters/Doctorate and any attempt to fit in with the Bologna Process may need us significantly to change our current plans.

Proposed action:

The recommendation will be useful in re-opening dialogue with government and its agencies (particularly the funding councils and the QAA) on this issue, as it has been impossible to have a sensible debate on the impact of the Bologna Process without them taking ownership of the key issues and showing leadership at both a national and European level. We are pleased to note that DIUS will continue to liaise with relevant bodies on this important issue.

The Institute will consult with the heads of physics departments and others on the best UK solution in the post Bologna environment. The Institute is currently looking at the accreditation of Masters' programmes but, of necessity at present, that process will not be making judgements about Bologna compatibility.

**Recommendation 6:** *The Panel recommends that:*

*a) the STFC be required at each CSR to bid for and allocate specific funds to former PPARC facilities and grant funding together. This would avoid the undesired tensioning of these grants and facilities support against national facilities and the project for the development of science and innovation campuses.*

*b) the existing structure should be allowed time to develop, given it was founded on the basis of extensive positive consultation. However, at an appropriate point following the review of STFC management currently being conducted by Dr David Grant, DIUS should commission a review to examine STFC operations.*

Commentary:

The Institute agrees that the amount of money spent on curiosity-driven research should not depend on whether quite unrelated facilities can meet their budgets. There is a real distinction between facilities like Diamond, which provide a service to a broad range of scientists and engineers, and those like the LHC, where the facility is designed by and created for a specific group of scientists.

We also agree that it would not be sensible to put astronomy, nuclear physics and particle physics funding in competition with other grant applications due to the

timescale required for the projects, the level of collaboration and the intimate relationship between the facilities and their exploitation. Furthermore, a large fraction of the expenditure is via subscriptions to CERN, ESO and ESA, with additional contributions to instruments for these facilities supplied through university research groups and research council institutions. This approach has been effective and cost-efficient, delivering high-quality science and increasing spin-out into UK industry. However, there has often been a mismatch in the ability to deliver the underpinning support that allows UK scientists to benefit appropriately from the subscriptions, with insufficient resources available for project support and exploitation. It is important that this problem is addressed.

In the report, although a clear solution is not given as to how to insulate the domestic research budgets in the areas affected from the impact of currency fluctuations, it does include suggestions of either meeting these centrally from HM Treasury (analogous to the solution in many other countries) or making the payments in Euros or Swiss Francs out of receipts due to the UK in these currencies, which we welcome and support. In addition, we understand that many universities have Euro accounts – could RCUK not have the same, and avoid this situation?

Proposed action:

The Institute is disappointed to note that RCUK in its response has rejected the suggestion that more separation is needed between STFC's competing priorities, stating that councils need to "tension their expenditure across the whole range of their activities". This raises significant questions about whether the recent problems with STFC funding can be avoided in the future. Hence, we will lobby in support of the report's recommendation.

**Recommendation 7:** *The Panel recommends to DIUS that the membership of STFC's Council be broadened to include more of the stakeholders in the science activity at the highest level, and to redress the balance between executive presence and non-executive oversight.*

Commentary:

The Institute supports the recommendation, as the lack of representation of scientists at the highest level of STFC has been a common criticism of late.

The Institute is pleased to note that RCUK has agreed to allow two scientists to join the Council, which is the maximum permitted by STFC's Royal Charter. However, this may not be sufficient as the overall make-up of the Council remains unbalanced. The executive representation needs to be reduced relative to the number of scientists, so that the non-executive members form a clear majority and the range of STFC science is covered better.

Proposed action:

None appropriate.

**Recommendation 8:** *The Panel recommends to RCUK that in developing large facilities and their scientific priorities, consideration should be given to distinguish between those that serve a range of Councils, and those which are germane to a single Council.*

Commentary:

The Institute supports the recommendation. There is an issue, however, as to what 'distinguish' means in this context; we would argue that it is important in the context of funding, as in recommendation 6.

Proposed action:

The Institute will lobby for a separation in the management models for the two types of facility. On this point, we are pleased to note that RCUK stated in its response that it aims to discuss with DIUS a proposal that "facilities that are relevant to several research councils should have separate evaluation criteria". We will also press for explicit attention to be given to discussing the siting of international facilities in the UK as a major boost to regional scientific development, and push for clarity of costing for any large facility that the UK invests in.

**Recommendation 9:** *The Panel recommends:*

*a) that given this interaction of the science policy with regional development policy that DIUS and BERR should consider a restatement of the Haldane Principle for the modern era; and*

*b) that the Director General of Science and Research (DGSR) would benefit from advice from a small, but well informed advisory group from outside DIUS during the CSR allocation process to ensure there are no unintended consequences of allocations and to ensure appropriate accountability to the science community. This does not need to be a large bureaucratic body.*

Commentary:

Part (a) refers to the conflict between the Haldane Principle and the need to consider equity in regional development, where decisions that should be taken predominantly for scientific merit are being confused by the relative funding behaviour of the RDAs. The Institute supports the original Principle that decisions should be taken on scientific merit. However, there is a deeper question concerning the Principle, which is the issue of curiosity-driven research versus directed programmes. Any reworking of this Principle should take this into account. In addition, if there are going to be political considerations in a revised Principle, the timescale of the issues should militate against party political solutions and should reflect national priorities.

Part (b) is not likely to lead to major changes in the allocation of funds but will help improve the transparency of the arrangements. The Institute supports the recommendation, although it is hard to see how such an arrangement would have made any difference to the recent problems with STFC funding. In addition, it will be of interest to observe how this advisory group will complement/interact with bodies of experts that already exist, such as the EPSRC Physical Sciences SATs, etc.

Proposed action:

a) The Institute will lobby for transparency, i.e. who is making the decisions and at what levels?

b) The Institute is pleased that RCUK has accepted the recommendation. The Institute will lobby to ensure that physics is well represented and that any advice provided is in the public domain.

**Recommendation 10:** *The Panel recommends that:*

*a) physics departments through their own endeavours and those of the Institute of Physics continue their valuable work to publicise all activities of physicists after graduation so as to enhance intake. Companies that employ physicists need to promote the value of a physics training, and this should be reflected in schools career advice.*

*b) universities, Funding Councils and Research Councils should seek to develop, with the finance sector, masters courses that exploit the synergy between these apparently disparate areas. The possibility should also be explored of running joint masters courses between universities and the financial sector that exploit the particular skills that physicists have that are germane to finance in areas where such training is not currently available.*

*c) The Panel recommends to university physics departments that they should re-consider the provision of practical skills for their students perhaps in conjunction with the large facilities in the UK and perhaps with industry. The Panel was pleased to learn of the recent RCUK initiative on skills for international competitiveness, and urges RCUK to work with all stakeholders to encourage the development of transferable practical skills into the curriculum at all levels of undergraduate and postgraduate training.*

Commentary:

These are three distinct recommendations all of which impinge directly on Institute activities.

a) The main issue behind the recommendation is that companies either are not aware that they employ physics graduates or do not publicise the fact through job adverts and other means. The importance of this recommendation is underlined by the view that a key part of the recent upturn in students taking physics is the call for more physics graduates from industry, government, etc. General careers advice and guidance needs to be provided at the sector level and not at the individual employer level, especially for schools. Information needs to be tailored to the specific point in a student's career and professional bodies, such as the Institute, could have an important role to play in helping to facilitate this. Currently, most employers will speak privately about how they value physics graduates but will not say so publicly.

b) The Panel did, apparently, consider the relatively few Masters' programmes offered by physics departments and the recommendation is an attempt to increase that number. This is also an important issue in terms of physics department finances. The Institute's report, 'Study of the Finances of Physics Departments in English Universities'<sup>3</sup>, stated that "evidence from those departments that have specialist-taught Masters programmes indicates that they can contribute significantly to the financial health of a department. Physics departments therefore need to examine their scope for running niche postgraduate-taught programmes that may be able to command high fees from both home (sponsored) and overseas students."

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<sup>3</sup> [www.iop.org/activity/policy/Publications/file\\_21216.pdf](http://www.iop.org/activity/policy/Publications/file_21216.pdf)

c) We share the Panel's concern about decreasing practical skills among physics graduates, and note that this has an impact not only on the contribution physics graduates can make to industry, but also on their potential as academic researchers. With the Panel, we welcome the recent recognition by the government that training physicists in practical work needs extra funding, but note that much more needs to be done in this direction. However, we have strong concerns about a change in emphasis in the wording related to 'practical skills' within the Review.

The original issues highlighted were the need to increase the level of experimental and 'practical skills' in physics graduates. This has been transformed into increasing the level of 'transferable practical skills' and then only to 'transferable skills' in the subsequent RCUK response. The reduction in hands-on practical skills is the concern and it is certainly true that many physics projects involve either theory or computer modelling and analysis of data. This is a difficult issue, however, because, while some employers require specific practical skills, others value computer analysis more highly and, in areas of physics research such as particle physics and astronomy, this type of approach is the norm.

Proposed action:

a) The Institute will discuss with employers of physics-trained people (at CEO level) about how to transmit a clear careers message to prospective students. In addition, we will continue to lobby the government to provide reliable, independent data on the career prospects of graduates in the different disciplines. One source for obtaining that information could be the Student Loan Company, which already carries salary information over an extended period for all graduates.

b) The Institute is well placed to facilitate such conversations with its Physics in Finance Group<sup>4</sup>, and will be happy to act as a broker for such discussions.

c) The matter will be referred to the Institute's Degree Accreditation Committee<sup>5</sup>, and we will report back to RCUK in due course. In addition, the Institute will consider whether to survey employers to ascertain the demand for skills.

**Recommendation 11:** *The Panel recommends:*

*a) that universities consider their internal funding models and structures to make sure they consider physics broadly than simply at the level of the department of that name, and encourage working between departments. They should also be careful to distinguish between cost and price in working with business, particularly perhaps in physics where the business base of applicability is wide; and*

*b) that DIUS and RCUK work together to develop mechanisms which enable the easy flow in both directions between industry and academia (though this point is not specific to physics).*

Commentary:

a) The Institute supports this recommendation. fEC is an important issue here, particularly in the context of interacting with businesses. The view of the business community is that if universities offer better value for money, they will be used more; this means the total package, including direct/indirect costs and the assured delivery of outputs.

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<sup>4</sup> [www.iop.org/activity/groups/subject/Physics\\_in\\_finance/index.html](http://www.iop.org/activity/groups/subject/Physics_in_finance/index.html)

<sup>5</sup> [www.iop.org/activity/policy/Degree\\_Accreditation/index.html](http://www.iop.org/activity/policy/Degree_Accreditation/index.html)

However, the recommendation is more far reaching than just physics. One obvious question is why universities should do this – what is the driving force that would cause them to examine structures in this manner? A potential hazard if all barriers break down is that we lose the essence of ‘thinking like a physicist’.

b) We welcome this recommendation and are pleased to note that it has been accepted by RCUK and DIUS. For exchanges to be successful in the long term, relationships need to be formed at vice-chancellor/CEO level. A major issue is to ensure that such exchanges are not seen to be detrimental to career development.

Proposed action:

a) None appropriate.

b) The Institute would be happy to act as a conduit between academia and business, although we would not be able to run a national scheme. Such a scheme would only work if there was a perceived benefit.

**Recommendation 12:** *The Panel recommends that responsibility be transferred to the Natural Environment Research Council for those parts of solar terrestrial physics research which are most relevant to the NERC mission. That transfer should be accompanied by sufficient funds to enable NERC to administer and support the current level of research.*

Commentary:

The recommendation is eminently sensible although the transfer of funds should be based on new money, otherwise the exercise would reduce further the funds available at STFC for exploitation grants. In addition, the STP community should be consulted and/or given the opportunity to provide input on any decisions that NERC and STFC agree upon.

Proposed action:

The Institute will monitor the situation.

**Recommendation 13:** *The Panel recommends that an investigation into balance between QR and Research Council funding in supporting physics infrastructure should be completed so that it is clear to the entire community what amounts are being spent in total on which branches of science. The Panel does not advocate a redistribution of the funding (as noted in the report, there are logical reasons for this), merely transparency.*

Commentary:

One of the proposed benefits of the creation of DIUS was to bring both sides of university funding under the same government department and this recommendation seems very sensible and plausible although, of course, it should not be restricted to physics. We welcome the suggestion that DIUS will convene a working group to investigate this issue further.

We certainly support more transparency on STFC, both in terms of what FEC is being used for in universities and the issue concerning grants where the infrastructure is funded by non-university means, such as at CERN.

The Institute consulted the physics community on fEC in its response to ‘The impact of fEC of research’<sup>6</sup> consultation that was recently submitted to RCUK and UUK. However, a point that we did not make but would like to suggest is to remove PI (and others) funding out of fEC and transfer it to QR; we think this will simplify a rather complicated funding mechanism, and also remove potential conflicts associated with researchers trying to buy themselves out of teaching.

Proposed action:

None appropriate.

**Recommendation 14:** *The Panel recommends to the HEFCE that it should consider the long term implications of strategic support for funding consortia of physics departments in more detail, and that clear criteria be developed for measuring and ensuring quality and sustainability in all the different components of consortia.*

Commentary:

The Institute appreciates the reasoning behind this recommendation of the need for clear success criteria in establishing strategic initiatives. However, we would like to point out that both SUPA and the Midlands Physics Alliance have been very successful and the participating universities will want to develop the programmes further. It would not be sensible to delay further support on the basis of this recommendation.

Proposed action:

The Institute’s role will be consultative, particularly in the development of any criteria.

**Recommendation 15:** *The Panel recommends that RCUK develop a review of the priorities in nuclear physics research to ensure they best match the needs of the UK.*

Commentary:

The Institute welcomes the recommendation that there should be an independent review of both the strategic direction of UK nuclear physics research and its application. It is important that the review is independent and that the panel includes both prominent nuclear physicists from abroad and representatives from among end-users of the research in healthcare, the power industry, national security and defence. The academic community is essential for training people in the nuclear skills needed in these areas. It is important that the review clearly addresses the questions of how the UK can maintain a vibrant community, working at the frontiers of nuclear physics and ensuring that it trains the people needed and the resources that are required to support the nuclear physics community.

Proposed action:

The Institute will liaise with its members who work in the field of nuclear physics.

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<sup>6</sup> [www.iop.org/activity/policy/Consultations/Research/page\\_29797.html](http://www.iop.org/activity/policy/Consultations/Research/page_29797.html)

**Recommendation 16:** *The Panel recommends that Universities, Funding Councils and Research Councils work together to develop the research concordat so that realistic career advice is given to junior scholars and that mechanisms to ensure early career opportunities are maximised in strategic areas of the research base.*

Commentary:

The need for such action emerged from the Institute's 'Women in Physics'<sup>7</sup> site visits and has been confirmed by the witnesses to the Panel. The Institute has been fully involved with the establishment of the research Concordat, to which it is now a formal supporter.

Proposed action:

The Institute will continue to press the research and funding councils to ensure that the Concordat has 'teeth'. At present, the implementation of the Concordat is largely dependent upon goodwill. Without some independent review the Concordat lacks weight. We propose the introduction of a monitoring scheme, which should not place a burden on employers. An independent body should conduct site visits to randomly selected departments, rather than a regular wide-scale review. This process should ensure the Concordat is being upheld whilst minimising the burden to employers, managers and researchers.

**Recommendation 17:** *The Panel recommends that RCUK should promote the use of HPC in physics, and more generally by:*

*(a) continuing a programme of sustained investment in HPC facilities and*

*(b) co-ordinating activity across all the Research Councils that support both physics and other disciplines, taking account of the needs and aspirations of the various constituent communities. The Panel endorses EPSRC's efforts to develop a strategy for replacing HECToR in a timely fashion. STFC should, as a matter of urgency, likewise develop and implement a long-term, sustainable policy for HPC for its community within the overall context and strategy of RCUK.*

Commentary:

While the recommendation for STFC to develop a realistic strategy for supporting HPC is welcome, this does not go far enough; in this as in many other areas, there must be coordination between STFC and EPSRC (and possibly even BBSRC, MRC and NERC, given the impact of HPC on the areas supported by these research councils) for any long-term strategy to be effective.

Proposed action:

None appropriate.

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<sup>7</sup> [www.iop.org/activity/diversity/Gender/University\\_site\\_visits/page\\_31790.html](http://www.iop.org/activity/diversity/Gender/University_site_visits/page_31790.html)

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