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House of Commons
Science and Technology
Committee

Astronomy and Particle Physics: Government and Science and Technology Facilities Council Responses to the Committee's Fourth Report of Session 2010–12

Seventh Special Report of
Session 2010–12

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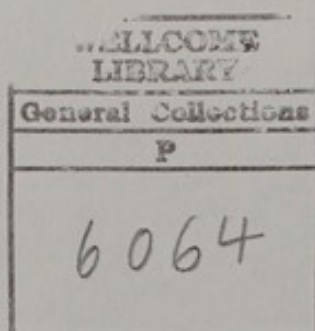
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Seventh Special Report

On 13 May 2011 the Science and Technology Committee published its Fourth Report of Session 2010–12, *Astronomy and Particle Physics* [HC 806]. On 8 July 2011 the Committee received a memorandum from the Government which contained a response to the Report. The memorandum is published as appendix 1 to the Report, together with a response received from the Science and Technology Facilities Council (STFC), dated 6 July 2011, which is published as appendix 2.

Appendix 1: Government response

The Government welcomes the Select Committee's report on these two important disciplines, and its continued interest in the work of the Science and Technology Facilities Council (STFC).

Our world class science and research base is inherently valuable, as well as critical to promoting economic growth. Despite enormous pressure on public spending, the £4.6bn per annum funding for science and research programmes has been protected in cash terms and ring-fenced against future pressures during the Spending Review period. This strong settlement for science and research was a demonstration of the Government's commitment to rebalancing the economy and promoting economic growth. The ring-fence around science and research funding, including for the first time HEFCE research funding, provides stability and certainty to the research base.

Engaging people with science and engineering, together with developing and maintaining a Science, Technology, Engineering and Mathematics (STEM) workforce, has never been more important. The Government's Science and Society Programme provides a framework of support to help us to achieve this and there is a £13 million commitment in the science budget this year alone for outreach in schools and public engagement. As well as key national programmes such as STEMNET, Research Councils UK (RCUK) and individual Councils have their own outreach programmes and are committed to working with researchers to encourage them to engage the public with their work.

Detailed responses to specific recommendations from the Committee are provided below in relation to matters for which Government is responsible. This Government Response should be read in conjunction with the separate response submitted by STFC, an independent, non-Departmental public body of the Department for Business, Innovation and Skills. STFC is one of the UK's seven Research Councils and its remit includes astronomy and particle physics.

Existing infrastructure

13. While in the short-term the impact of capital reductions on existing facilities may be manageable, the STFC must ensure that, if opportunities for increased capital investment arise during the next four years and beyond, it prioritises maintaining the

cutting-edge capabilities of the UK's existing scientific infrastructure. To enable the STFC to plan properly for the next four years, we urge the Government to make clear its allocations to Research Councils for capital spending beyond 2011/12 as soon as possible. (Paragraph 83)

The Government agrees that it is very important that STFC protects its past capital investments in science infrastructure, through a programme that includes capital maintenance expenditure. This should be sufficient to ensure the availability of its facilities in a proper state that allows world class research programmes to continue. The Government has already published indicative capital budgets for the Research Councils for the whole of the SR10 Spending Review. This should allow STFC to make forward plans with reasonable confidence. STFC is encouraged to share its plans for future years with the Government and to seek agreements for commitments as required.

The UK's international reputation

15. We are concerned that past and future decisions to withdraw the UK from internationally collaborative projects and the subsequent impact on the UK's international reputation may affect the potential future gains from such collaboration that the STFC, and other research councils, expect to achieve. Indeed, there appears to us to be a danger that the UK's track-record may hinder its ability to join, and be seen as a leader in, future collaborations. The assessment by Sir Adrian Smith, Director General for Knowledge and Innovation at BIS, is that the UK is not seen as an unreliable international partner. We conclude, however, that this does not fit with the assessment of the Institute of Physics and Professor Stephen Hawking who, in our view, are in a better position to make a judgement on this important matter. (Paragraph 89)

Whilst the Government understands the Committee's concerns, the recent decision by nine national governmental and research organisations to base the Square Kilometre Array (SKA) Project Office at the Jodrell Bank Observatory near Manchester is evidence of the continued high reputation of Britain's management of international science projects. The Government will protect the vital components of research infrastructure and maintain membership of international facilities, providing researchers with access to key large scale research infrastructure, both here and abroad.

The UK has shown considerable leadership in securing savings from the international operational budgets for CERN, the Institut Laue-Langevin (ILL) neutron source and the European Synchrotron Radiation Facility (ESRF). The UK has received praise for formally stating its position and for confronting the issues.

STFC engagement with researchers

17. We conclude that one simple step towards winning back the trust of researchers would be to ensure that researchers and academia are sufficiently involved in the high-level decision making in the STFC on a consistent basis. We recommend that the STFC make a permanent commitment to ensure that at least 50% of STFC Council members are practicing academics and include at least one individual from each of the core scientific fields for which the STFC is responsible—astronomy, particle physics and nuclear physics. (Paragraph 95)

The composition of STFC Council is set out in STFC's Royal Charter. On the recommendation of the 2008 Wakeham Review of UK Physics, two additional scientists were appointed as non-executive members of Council (the maximum permitted by the Royal Charter) to broaden the Council's membership.

STFC Council has agreed to carry out a skills audit of Council members to inform future Council recruitment exercises. The Government welcomes in principle the Committee's suggestion concerning the composition of the STFC Council and has suggested that the STFC Council skills audit takes this into account.

Future communication and the next STFC Chief Executive

18. The next STFC Chief Executive must make it clear from the outset his or her commitment to work with researchers and academics, and act as an advocate for all of the science disciplines covered by the STFC. We will continue to scrutinise the actions of the STFC throughout this Parliament, and will invite the next STFC Chief Executive to appear before us at the earliest available opportunity. (Paragraph 99)

The Government agrees with the Committee that the next STFC Chief Executive must have a background that enables him/her to effectively address the challenges facing the STFC and to be able to demonstrate the skills, competencies and track record required.

Recruitment of a new Chief Executive from 1 April 2012 is currently underway. A number of mandatory requirements were set out in the personal specification accompanying the advertisement.

The National Schools Observatory

23. It is unacceptable that senior civil servants have passed the buck on the future of the NSO. This 'silo mentality' which pervades government and is a clear barrier to any notion that Whitehall is becoming more 'joined-up' means relatively cost-effective educational research projects, such as the NSO, which are so important to inspiring the next generation of scientists, risk being lost. Clear mechanisms must be put in place to stop issues like this falling between ministerial, departmental, and research council responsibility. (Paragraph 121)

The Government agrees with the Committee. The Department for Business, Innovation and Skills (BIS) will work with the Department for Education (DfE) and its agencies to agree responsibility for the exploitation of research facilities through projects such as the National Schools Observatory (NSO). A dialogue between Liverpool John Moores University, STFC, DfE and BIS will be initiated to discuss the particular issue of the future of the NSO.

Appendix 2: Science and Technology Facilities Council (STFC) Response

Summary

1. The Science and Technology Facilities Council (STFC) welcomes the Committee's continued interest, and notes that the Committee chose to focus in this inquiry on the disciplines of Astronomy and Particle Physics. In addition to these inspiring and important disciplines, STFC also: supports Nuclear Physics; operates and/or manages large neutron, photon and laser research facilities in the United Kingdom and overseas used by a wide variety of researchers from the physical, life and heritage sciences; provides extensive support for innovation activities and cross-disciplinary research efforts; has responsibility for the two National Science and Innovation Campuses; operates national research laboratories and other research infrastructure, and; provides, through funding support and direct efforts, a significant public engagement programme with a particular emphasis on improving the take-up by younger people of STEM subjects.

2. STFC is an advocate to Government, Parliament, domestic and international research communities, the media and the general public for our research disciplines, facilities, international subscriptions and other activities. Our efforts in this regard helped secure our positive 2010 Comprehensive Spending Review settlement which, despite the difficult economic climate, provided full funding for the international science subscriptions we manage on behalf of the UK, the operations of the three world-class domestic research facilities at the Harwell campus in Oxfordshire, and resource funding to deliver the programme identified in our 2009 prioritisation, although as the Committee notes the outcome of capital funding remains more difficult across government.

3. STFC has invested significant effort over the past four years in listening and responding to the concerns of our stakeholders and communities. We have introduced new and more effective methods of engagement with key stakeholders, including our research communities, Government and Parliament, the private sector and universities. The recognition of these efforts by our communities, and the Committee, is obviously welcome. New initiatives to build even stronger links and partnerships are already underway with universities, public engagement partners and the community.

4. The Committee notes a concern within the academic community in relation to maintaining a 'healthy diversity' across the STFC research programme. STFC's research programme has been approved by our Council based on rigorous scientific advice from our Science Board, which comprises leading members of our scientific community, and which in turn benefits from an advisory structure involving the wider members of our research communities. In formulating the programme, Science Board has had to balance the requirements of excellence and breadth of research against affordability. Science Board, our Council and our Executive have already noted with concern the concentration of research in fewer, larger and more expensive projects as a result of recent prioritisations and funding settlements. As a result STFC is working to allow grant panels some flexibility to broaden the programme by supporting new opportunities. Decisions on these investments will, as usual, be made through a rigorous peer-review process.

5. STFC notes the Committee's message to the Astronomy and Particle Physics communities that it is time to put the past behind us and move on. We agree, and will remain heedful of lessons learnt.

6. Set out below are STFC's responses to the Committee's specific recommendations for action in relation to matters for which we are directly responsible.

Specific STFC Responses to Conclusions and Recommendations

Nos 1&2: Given the evidence and documentation presented to us, we accept that there was a stated long-term intention to withdraw from some facilities following ESO accession. We note and welcome the clarification by the STFC that this was a financial rather than scientific strategy. (Paragraph 32)

However, while ESO accession required some strategic restructuring of UK investments, as set out in the 2001 PPARC papers, the strategic decision does not provide cover for all future reductions in spending on astronomy. We find it inexplicable that the planned withdrawals detailed in the 2001 PPARC papers were not incorporated into all subsequent PPARC and STFC policy documents. This would have given the UK astronomical community the opportunity to challenge this policy in more detail, particularly as it was suggested to us that more than double the savings had been made than were required to join ESO. Unfortunately, this failure by STFC to communicate is chronic and typical and is the reason why its client communities have such a low opinion of it. (Paragraph 33)

7. STFC notes the Committee's observations. We note that the astronomy community was, and is, fully engaged in the PPARC and now STFC decision-making process through our advisory structure, and that access to northern hemisphere facilities has been regularly reviewed through this process. Evidence strongly indicates that confidence in the STFC by its science communities is higher than it has been in the past and continues to improve.

No 3: For the benefit of transparency, we recommend that the STFC make publicly available all PPARC and STFC council minutes and strategy documents which discuss UK spending on, and involvement in, ground-based astronomical facilities over the last ten years. (Paragraph 34)

8. STFC will examine the relevant documents with a view to publication online if they do not contain commercial-in-confidence or other confidential information, noting that Council Minutes of STFC since April 2007 are already online.

No 4: Withdrawal from all Northern Hemisphere ground-based optical and infrared facilities risks, in our opinion, surrendering the UK's prominence in this field to other ESO member states and depriving UK astronomers of a leading role in future discoveries and instrumentation development. It is essential that the STFC re-examine the case for retaining access to those telescope that it owns, especially in light of the relatively small amount of money that would allow continuity. We have concerns that it could be to the detriment of UK astronomy if the UK presence in all ground-based optical and infrared facilities outside of the ESO were to be lost. (Paragraph 45)

9. STFC must balance the UK astronomy community's requirements for access to astronomical observatories against excellence and affordability. Decisions on the timing of withdrawal from individual telescopes or facilities will be made on scientific advice given the financial circumstances. We have recognised that there remains considerable scope for UK astronomers to undertake excellent research using facilities in the Northern Hemisphere but, where this requires additional funding, access has to be tensioned against other opportunities. STFC has been working with international partners to identify new ways of providing access to these telescopes. As a result, the STFC with its Canadian and Dutch partners has been able to extend support for the James Clerk Maxwell Telescope (JCMT) in Hawaii until 31 March 2013. This decision also allows continued operation of the UK Infra-Red Telescope (UKIRT) until the same date. Further options for these two telescopes are the subject of ongoing discussion. Similar negotiations are underway with our partners in the Isaac Newton Group of Telescopes on the Canary Islands. It should be noted that UK access to any facility does not necessarily require the facilities to be under full or part UK ownership.

Nos 5&6: We welcome the recent decision to locate the SKA project office at the Jodrell Bank Observatory near Manchester. This will enable the UK to take a leading role in the ongoing development of this project, and reflects the high-regard for UK astronomy and astronomers internationally. This happy conclusion would not have been possible if the STFC had not reversed its original intention to remove funding for the e-MERLIN radio telescope at Jodrell Bank, an issue our predecessors had raised serious concerns about. (Paragraph 49).

We are concerned that short-term funding constraints may hinder the UK's ability to lead on the ongoing development and construction of priority astronomical projects such as the Square Kilometre Array (SKA) and the ESO's European Extremely Large Telescope (E-ELT), though our concerns were eased by the recent funding announcements. This is an issue we shall keep under review and expect to return to later in the Parliament. (Paragraph 50)

10. We welcome the Committee's recognition of recent developments with regard to SKA and E-ELT and look forward to reporting progress later in the Parliament.

No 7: We welcome the STFC's commitment to maintain its resource spending on research grants over the next four years. We also commend the high priority and value the STFC places on investment in researchers. (Paragraph 56)

11. STFC welcomes this acknowledgement.

No 8: We would be concerned if the budget for postdoctoral research grants was still seen as a resource that could be raided to fulfil shortfalls elsewhere. We conclude that this would be unacceptable. If the UK is to continue to attract, train and retain the very best scientists, and reap the future economic and social rewards that they will inevitably bring, the STFC must invest in researchers at every stage of their career. Any gaps or instability in funding during a scientist's career path risk losing the next generation of UK astronomers and particle physicists to other countries, disciplines and careers. We welcome the introduction of the STFC's new STEP awards for postdoctoral students, but we are concerned that the money used to fund these awards is simply being

redirected from elsewhere in the STFC's programme. We recommend that the STFC now make a commitment to address over the next four years the recent decline in Post-Doctoral Research Assistant positions that it funds. (Paragraph 62)

12. STFC has made clear in its Delivery Plan that it will maintain resource spending on grants at the current levels over the period of the comprehensive spending review. STFC notes that projects fund PDRAs, in addition to PDRAs being directly supported by grants. Balancing investment between grants, studentships and projects is a complex issue, and our Particle Physics, Astronomy and Nuclear Physics Science Committee (PPAN) is currently considering this balance.

No 9: We also recommend that the STFC carry out detailed research into the post-doctoral geographic and work destinations of the researchers that it funds. We would expect the STFC to report on this in its 2012/13 annual report. (Paragraph 63)

13. STFC already tracks the destinations of funded students and we will build on this information, working with our partners. However, we note that this research may be affected by privacy concerns.

No 10: We are concerned that the reduction in STFC capital grants available to universities over the next four years will mean that vital work in the field of instrumentation R&D, as well as the essential support and follow-up work that requires investment in computing capacity and other supportive equipment, will be neglected. We conclude that the consequence will be a loss in the UK's prominence in these areas. (Paragraph 69)

14. STFC recognises the Committee's concerns. We are working hard to prevent any overall loss in prominence, not least by encouraging the shared use of capital resources available to research groups and reducing replication in the procurement of capital intensive equipment.

No 11: Important decisions will shortly have to be made about the allocation of relatively scarce resources for accelerator R&D over the next four years. These decisions will determine whether the UK has a significant part to play in this field for decades to come. Given the widespread applications and benefits of this area of science, the STFC must ensure it makes these decisions on the basis of a long-term, scientifically informed, strategic vision that ensures the UK stays at the forefront of activities in developing new technologies. (Paragraph 76)

15. STFC's Accelerator Strategy Board, a body made up of external experts including international members, is developing a strategy designed to ensure the UK maintains its world-leading status. The major stakeholders from our laboratories and the major UK university groups active in this area are involved in this process.

No 12: We welcome the STFC's clarification that proposals in its delivery plan will not impact on technical R&D work carried out in universities. However, the STFC must ensure that what it says is a restatement of the current working relationship between university groups and the STFC's own laboratories does not result in the construction capabilities and the expertise within UK universities being underused in favour of focusing future construction activities at the STFC's own laboratories. (Paragraph 80)

16. STFC is maintaining a dialogue with relevant sections of our science communities in relation to the rebalancing of activities within our national laboratories.

No 13: While in the short-term the impact of capital reductions on existing facilities may be manageable, the STFC must ensure that, if opportunities for increased capital investment arise during the next four years and beyond, it prioritises maintaining the cutting-edge capabilities of the UK's existing scientific infrastructure. To enable the STFC to plan properly for the next four years, we urge the Government to make clear its allocations to Research Councils for capital spending beyond 2011/12 as soon as possible. (Paragraph 83)

17. For Government response.

No 14: We recognise the significance of astronomy and particle physics to a wide range of important scientific developments. We conclude it is therefore important that the STFC ensures current and future investment decisions protect the breadth of this work and ensure the UK is at the forefront of future developments in astronomy and particle physics. (Paragraph 86)

18. See paragraph 4.

No 15: We are concerned that past and future decisions to withdraw the UK from internationally collaborative projects and the subsequent impact on the UK's international reputation may affect the potential future gains from such collaboration that the STFC, and other research councils, expect to achieve. Indeed, there appears to us to be a danger that the UK's track-record may hinder its ability to join, and be seen as a leader in, future collaborations. The assessment by Sir Adrian Smith, Director General for Knowledge and Innovation at BIS, is that the UK is not seen as an unreliable international partner. We conclude, however, that this does not fit with the assessment of the Institute of Physics and Professor Stephen Hawking who, in our view, are in a better position to make a judgement on this important matter. (Paragraph 89)

19. For Government response.

No 16: We note the President of the Institute of Physics' comments on recent improvement made by the STFC in its engagement with researchers. Some lessons from earlier failures in communication and engagement have been learned but there is still a large amount of room for improvement. (Paragraph 92)

20. See paragraph 3.

No 17: We conclude that one simple step towards winning back the trust of researchers would be to ensure that researchers and academia are sufficiently involved in the high-level decision making in the STFC on a consistent basis. We recommend that the STFC make a permanent commitment to ensure that at least 50% of STFC Council members are practicing academics and include at least one individual from each of the core scientific fields for which the STFC is responsible—astronomy, particle physics and nuclear physics. (Paragraph 95)

21. The composition of STFC Council was established by the sponsoring Department (DIUS) at its creation, based on the wide range of responsibilities which it is required to

discharge (see paragraph 1). At the STFC Council meeting of 24 May 2011, STFC's Chairman and Council undertook to carry out a skills audit of Council members to inform future Council recruitment exercises. The appointment of membership of STFC's Council members is managed in accordance with the Commissioner for Public Appointments' "Code of Practice for Ministerial Appointments to Public Bodies"¹.

No 18: The next STFC Chief Executive must make it clear from the outset his or her commitment to work with researchers and academics, and act as an advocate for all of the science disciplines covered by the STFC. We will continue to scrutinise the actions of the STFC throughout this Parliament, and will invite the next STFC Chief Executive to appear before us at the earliest available opportunity. (Paragraph 99)

22. The STFC welcomes the continued interest of the Select Committee in our work.

No 19: We conclude that outreach is essential. We believe there is scope for a more dedicated and defined outreach role for some researchers and institutions funded by the STFC. We recommend that the STFC investigate opportunities within specific grant applications of university groups and institutions to allocate defined, ringfenced funding for the employment of active researchers to carry out dedicated outreach and public engagement activities as an integral part of their role. (Paragraph 105)

23. STFC provides funding support for university-based researchers to undertake public engagement through two mechanisms—specific Science in Society grants and fellowships, and by encouraging university departments and/or projects to bid for specific resources within their research grants to be used for public engagement. STFC expects all grant holders to examine the public engagement opportunities from their work so as to maximise the impact of their research. STFC also supports the RCUK public engagement programme.

No 20: We believe the STFC should exploit its network of strategic partners in the public sector, universities, learned societies and industry and act as a conduit in developing, coordinating and promoting a formal programme of outreach between these partner organisations and schools. The STFC's delivery plan specifically outlines plans to strengthen its strategic partnerships and we recommend that outreach be seen as a key element of work in this area. (Paragraph 110)

24. STFC's existing public engagement programme works through an in-house team and an extensive network of partners to link young people and schools with our science and technology. We are developing new, and strengthening existing, partnerships to increase visibility of our sciences, which we believe are among the most inspiring and exciting of any research disciplines.

No 21: At a time when the public profile of astronomy and particle physics is high, we are concerned to learn that the funding made available for public engagement award schemes within the STFC's Science in Society programme has already been squeezed. The STFC must look to protect and increase this area of funding wherever possible. (Paragraph 113)

¹ <http://www.bis.gov.uk/policies/science/research-councils/public-appointments>

25. As STFC's Delivery Plan makes clear, funding for the Science in Society programme is protected across the CSR period, at the same level as previous years. In addition, our in-house programme of activities is being expanded through new partnerships and enhanced staff effort.

No 22: Especially in these financially constrained times, the Department for Education and RCUK should seek to foster relationships between research councils, local education authorities and schools in order to enable research council employees, and research council funded-researchers, to carry out outreach activities on a more systematic and coordinated basis in primary and secondary education. (Paragraph 116)

26. All the Research Councils work together through RCUK to provide a systematic approach to outreach activities in both primary and secondary education² as well as to the general public at large³. We also set out expectations for employed and grant funded researchers to engage young people in their work⁴. STFC examples of such outreach activities include Particle Physics Masterclasses and Education Access Days for schools at our laboratory sites⁵, to name just two, as well as offering grants to funded researchers and others to enable them to undertake school outreach work⁶.

27. At all times, including during the current financially constrained circumstances, we look for new opportunities to work harder with limited resources. A key aspect of this in STFC's forward operational plan for the current CSR period is the development of improved partnering arrangements. We will explore, with RCUK and fellow Research Councils, how best to further embed existing relationships with the Department of Education and other Government Departments.

28. STFC recognises that the science we support is unique in attracting future generations into STEM disciplines across the board, not just Astronomy, Particle Physics and Nuclear Physics, and we work with our Research Council counterparts and other partners with this in mind.

No 23: It is unacceptable that senior civil servants have passed the buck on the future of the NSO. This 'silo mentality' which pervades government and is a clear barrier to any notion that Whitehall is becoming more 'joined-up' means relatively cost-effective educational research projects, such as the NSO, which are so important to inspiring the next generation of scientists, risk being lost. Clear mechanisms must be put in place to stop issues like this falling between ministerial, departmental, and research council responsibility. (Paragraph 121)

29. STFC will examine with our sponsoring department and other Research Councils the issues raised by the Committee.

² <http://www.rcuk.ac.uk/per/Pages/Schools.aspx>

³ <http://www.rcuk.ac.uk/per/Pages/Home.aspx>

⁴ <http://www.rcuk.ac.uk/documents/scisoc/SchoolsPolicyfactsheet.pdf>

⁵ <http://www.stfc.ac.uk/Public+and+Schools/1286.aspx>

⁶ <http://www.stfc.ac.uk/Public+and+Schools/1342.aspx>



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The second part of the paper discusses the methodology used in the study. It describes the data collection methods and the statistical analysis techniques used to analyze the data.

The third part of the paper discusses the results of the study. It presents the findings of the research and discusses the implications of the results for the field of study.

The fourth part of the paper discusses the conclusions of the study. It summarizes the main findings of the research and provides recommendations for future research.

The fifth part of the paper discusses the limitations of the study. It identifies the weaknesses of the research and discusses the implications of these limitations for the study.

The sixth part of the paper discusses the significance of the study. It explains the importance of the research and its contribution to the field of study.

The seventh part of the paper discusses the future research. It identifies the areas for further research and provides suggestions for future studies.

The eighth part of the paper discusses the conclusion of the study. It summarizes the main findings of the research and provides a final statement on the study.

The ninth part of the paper discusses the references. It lists the sources used in the study and provides a bibliography of the research.

The tenth part of the paper discusses the appendix. It contains additional information related to the study, such as tables, figures, and charts.



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