Labour Party plan: RAS response

The Royal Astronomical Society (RAS) has around 3800 members (Fellows) and is the leading UK advocate for the fields of astronomy, space science and geophysics. Our membership includes professional scientists working in academia and industry as well as many people with occupations across diverse sectors of the economy who use the skills and knowledge obtained during their time in academic research.

We therefore welcome the opportunity to contribute to the Labour Party consultation on science policy and would be happy to discuss this further.

Science investment

Q. How can we make better use of the UK's resources to support science and innovation?

The report recognises that by international standards the UK spends a relatively low proportion (1.72%) of GDP on research and development. As a country we have not joined other EU nations in setting a target of between 2% and 4% R&D intensity for 2020 (set out in 'Europe 2020 Targets: Research and Development'). Whatever other measures are put in place, it is hard to see how the UK can retain its leading position in many areas of research if our investment in science and innovation remains significantly lower than that of our peers.

The RAS strongly agrees with the statement that governments should support the areas of research that are not attractive to the private sector. As a 'blue skies' subject, astronomy is a publicly funded discipline where the UK excels in comparison with other countries and we are for example ranked second in the world for citations per paper in this field (see e.g. the STFC impact report from 2012 at http://www.stfc.ac.uk/resources/pdf/stfcimpactreport2012.pdf). Geophysics is an area that sees strong collaboration between industry and academia, but still requires public funding for the most cutting edge work.

Although by its very nature blue skies research does not usually mean a rapid commercial return, there are many examples where initial work has led to a significant benefit for the wider economy, from instrumentation for medicine to software and security systems and of course a steady supply of highly trained people. A number of these cases are set out in the Society's three publications on wider impact, 'A New View of the Universe', 'Beyond the Stars: Why Astronomy Matters' and 'Going Underground: Why Geophysics Matters' at http://www.ras.org.uk/publications/other-publications.

The long term investment framework of a decade or more referred to in the paper is also essential to see many scientific ideas through from inception to fruition, something typical in astronomy, space science and geophysics. The short term cycles of grants prevalent in the UK (often 3 years) can make it hard to hold on to the expertise needed for the duration of the project. As an overarching point, future capital spending decisions should also make proper provision for the resources necessary to exploit that investment, rather than assuming that they are in place in existing research budgets. This not only applies to major astronomy and space facilities such as observatories and space probes but also to the ships and aircraft used in geophysical research.

We welcome the pledge to respect the Haldane principles in research funding and the peer review process for decisions.

Q. Do you believe the previous Labour government's 10 year approach was a success and how can we learn from this in the future?

Overall there were many benefits to a stable investment framework, where resources available to the research councils increased in real terms for the first part of this period. The Labour government also supported more active international activity, taking the UK into the European Southern Observatory in a decision broadly welcomed by the astronomical community.

There were however serious issues of management from 2007, most prominently in the Science and Technology Facilities Council, where available research funding became vulnerable to shifts in the exchange rate and a still present tension between support for facilities and grant funding for projects.

The intervention of the then science minister Lord Drayson was very helpful in this, in that he engaged directly with the scientific community and his resulting review mitigated some of the worst effects described above. If Labour is elected in 2015, we urge the incoming science minister to seek advice in the same way.

Strengthening British science

Q. What more can be done to improve the way science is driven by British universities?

One area of concern to the Society is the recent cut (announced in February this year) to HEFCE grant support for teaching in universities. At the same time as requesting a large expansion in undergraduate places, the recurrent grant for teaching is set to fall by more than 40% from 2013-14 to 2015-16.

This change exacerbates an already difficult situation for STEM subjects created by the current fees regime. Flat fees across all subjects create an implicit cross-subsidy for STEM subjects and a situation where fee income does not meet the cost of delivery. The additional cut in support will have a further negative impact on the quality of teaching and learning for STEM undergraduate students.

If the UK wishes to encourage young people to pursue careers in science, then it is essential that undergraduate STEM courses are instead adequately resourced and that HE policy is changed to make that happen.

Another issue of particular importance for academic researchers in universities is the effort of European countries including the UK to align their higher education systems in the so-called 'Bologna Process'. Although some of this has been successful, there is concern that the shorter time spent in formal education by UK students (six or seven years in total for first and PhD degree programmes) places them at a competitive disadvantage compared to their peers in other European countries where the total period of study from undergraduate entry to the completion of a PhD is typically eight years. The European students are then seen to be trained to a higher standard at the point where they enter the academic employment market.

On a more specific point, astronomy is recognised as a 'STEM attractor' subject, cited by 50% of physics undergraduates as an area of interest that encouraged them to take their degree course (see http://www.iop.org/publications/iop/2009/file_38212.pdf). At postgraduate level, both astronomy

and geophysics are significantly better at recruiting women than physics as a whole (see e.g. the RAS Demographic Survey of 2010-11 at http://www.ras.org.uk/images/stories/ras_pdfs/Demographics%20and%20Research%20Interests%20of%20the%20UK%20Astronomy%20and%20Geophysics%20Communities%202010%20-%20Revised%202013.pdf).

Q. What more can the UK do to ensure that science is embedded in our international relationships?

The report rightly notes the importance of international collaboration in science. Astronomers, space scientists and geophysicists routinely collaborate with their peers overseas. They are active partners in the European Space Agency scientific programme, in EU programmes like Horizon 2020 and are very successful at obtaining funding from the European Research Council (ERC), in many years receiving more grants from the ERC than any other nation. The UK takes a leading role in projects like the European Southern Observatory (ESO) and the Square Kilometer Array (SKA). A number of leading UK space scientists are also developing strong links with emerging research powers like China.

All this makes the UK an attractive place for the most talented researchers around the world, reflected in the makeup of leading research groups in universities and research establishments. This however has been harmed by the anti-immigration rhetoric from the government in recent years and the increasingly stringent rules on migration that make it harder than ever to employ the best people, even where domestic expertise simply does not exist. Possible UK withdrawal from the EU following a future referendum is also a serious concern. It would make international collaboration far more difficult and many UK research groups would be hit hard by the loss of ERC and similar funding, unless that was replaced by equivalent domestic support. Even the discussions in the run up to a referendum add to the impression that the UK is less outward looking than in the past.

In geophysics it is important to note that this issue is not confined to public sector research, with for example restrictions in immigration policy a major concern for the many small and large companies (for example in oil exploration) that rely on geophysicists for the success of their business.

Q. What does the UK need to do more to place science at the heart of government and policy making?

Learned societies like the RAS are uniquely placed to offer independent advice to ministers and decision makers in government. We ourselves represent several thousand people and therefore have a large pool of expertise. The RAS is happy to offer that and other evidence as part of the policy making process.

Q. What steps would help deliver a joined-up approach to science that plans for the world of 2030?

As in our previous response, the RAS is able to offer advice and expertise from a large number of astronomers, space scientists and geophysicists to help shape this approach. We would of course want to see a good awareness and use of science in all government departments, rather than just BIS.

The Rungs on the Ladder

Q. What additional policy measures are needed to ensure the UK has a strong pipeline of STEM skills?

The document recognises the need for effective information, advice and guidance for study and careers. We welcome this, as for example many young people are not aware of the opportunities that courses in geophysics in particular can offer. Our Fellows cite employment rates of close to 100% for their geophysics undergraduate courses, with students moving in large numbers to industries that depend on this expertise. Giving advice before students are committed to a path that excludes them from such attractive careers (i.e. in the early years of secondary education) is vital.

Q. How can the UK ensure there are inclusive routes in STEM careers?

This also depends on advice and guidance as set out above. Like other physical sciences, astronomy and geophysics are poor at recruiting women (though better than physics itself) and UK citizens from black and minority ethnic (BAME) backgrounds. The adoption of measures set out by Project JUNO and Athena SWAN seems to be leading to a slow improvement in the number of women retained in science. There is however scant evidence of any progress in recruitment and retention of people from BAME backgrounds, something that should be a priority for the public and private sectors alike. If elected next year, an incoming Labour government should ensure that its diversity policy for science addresses this long neglected area.