

Physics an investment for the future

The Institute of Physics manifesto for the Scottish election of 2011

Physics is central to our society and essential for our economy; in 2005 levels of gross value added (GVA) due to the physics-based sectors were about £8 bn, making up 9.4% of the economic output of Scotland.

Investment in physics is part of the solution to many of the big issues of our time. Physics offers key contributions to many of the Scottish government's purposes, including sustainability.

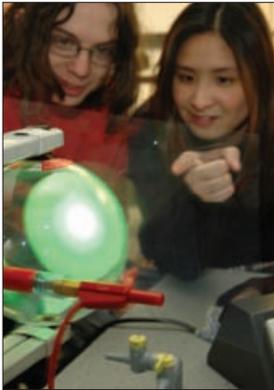
The Institute of Physics has set four priority goals, which we would ask all prospective MSPs to support.

Our goals are:

1 Access to high-quality physics teaching for every Scottish child	X
2 Support for STEM subjects in higher education	X
3 Funding for science that will keep Scotland at the forefront of research	X
4 A fiscal and regulatory environment that fosters science-based innovation	X

1

Access to high-quality physics teaching for every Scottish child



“We ask for investment in a ‘Stimulating Physics’ programme for Scotland to achieve a step change in the teaching of physics.”

Despite an encouraging upturn in the past two years, the number of young people choosing to study physics at Higher has fallen from 13 500 to around 10 000 over the last 25 years. We know that a key factor in subject choice is the quality of teaching. The Department for Education has invested in continuing professional development (CPD) for teachers of physics in England and Wales in order to increase the numbers of pupils taking physics at A-level.

We ask for:

- investment in a “Stimulating Physics” programme in Scotland to achieve a step change in the teaching of physics;
- a commitment to support practical physics teaching with adequate funding for equipment and technicians in school physics departments;
- at least one specialist physics teacher maintained in every secondary school. To achieve this, more physics graduates must be given incentives to enter – and remain in – teaching;
- incentives for schools to teach strategic but challenging subjects, like physics, rather than choosing subjects that might improve their examination results;
- an inclusive curriculum, engaging girls and boys equally, and reaching across ethnic and socioeconomic barriers while offering challenges to the most able;
- training and information for teachers and careers advisers to ensure that they are knowledgeable about the opportunities opened up by studying physics.

We pledge:

- to support the development and implementation of Curriculum for Excellence;
- to provide advice and support to government and government agencies;
- to develop inspiring educational and careers resources;
- to expand our work with teachers and pupils in schools through workshops and online support;
- to promote an inclusive culture that makes physics more accessible regardless of gender, ethnicity or socioeconomic background.

2

Support for STEM subjects in higher education



“Scotland has less than two years to settle on an approach to bridging the predicted funding gap.”

A radical new approach has been announced to the funding of university education in England, involving replacement of much of the central grant for teaching with increased student fees. Unless Scotland develops its own solution to the rapidly changing financial situation, this is likely to mean that in less than two years the current funding arrangements for higher education will be completely non-viable. Scotland needs to find an alternative approach quickly.

We ask for:

- immediate all-party discussions to examine the options for higher-education funding in the light of the October 2010 CSR;
- a well thought-out approach to bridging the predicted funding gap in 2012, without recourse to wholesale cuts to academic departments in universities;
- protection for funding for teaching priority subjects, including STEM, due to their importance to the Scottish economy.

We pledge:

- to continue to support the excellent quality of teaching of STEM subjects in Scottish universities;
- to continue to support students through free electronic membership of the Institute, funding physics societies and providing careers advice.

3

Funding for science that will keep Scotland at the forefront of research



“Upholding Scotland’s world-class position in research output is our best guarantee of maintaining a knowledge-led economy.”

Science in Scotland has benefited hugely from steady growth in public funding for research over the past 10 years. In most sciences, including physics, Scotland is among the top-four countries in the world in terms of research output, in part due to the innovative Scottish Universities Physics Alliance (SUPA). In many specific areas it is pre-eminent. Upholding this position is our best guarantee of maintaining a knowledge-led economy, recruiting and retaining the brightest minds, producing spin-out companies and attracting inward investment from research-based companies in the face of the dramatic growth of technology in China and India, and the impact of the stimulus package for science in the US.

We ask for:

- a continued commitment to maintain government funding for science for the wider benefit of society. We recognise the pressures on government expenditure, but additional investment over the next budget period will enable our scientists to stay internationally competitive;
- continued support for curiosity-driven research, at which Scotland excels, whether for the development of fundamental understanding or the creation of new technological capability. This is a long-term investment for the public good and a core responsibility of government;
- an integrated model for funding and managing research in national priorities such as sustainability and health. Consideration should be given to addressing the grand societal challenges through focused programmes, directed by relevant government departments and appropriately resourced to achieve practical solutions on realistic timescales;
- support for postgraduate students and early-career researchers, to maintain the excellence of the skills base in Scotland.

We pledge:

- to promote, support and communicate the vital contribution that physics makes to the wider economy, and the inspiration that it provides for the next generation of scientists and engineers;
- to support the physics research community through publications, specialist group activities and conferences;
- to keep policy- and decision-makers abreast of the latest advances in physics research through our publications, reports and seminars.

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A fiscal and regulatory environment that fosters science-based innovation



“We ask for improvements in national infrastructure for transport and electronic communications.”

Physics-based innovation is a fertile area for new business start-ups. However, many growing companies have relocated outside Scotland to take advantage of preferential tax and grant regimes. We believe that the the Scottish government should provide all the support it can, within national and international legislative frameworks, to retain the benefits of innovation in Scotland and create new billion-pound businesses in the high-technology sector.

We ask for:

- enhanced support for collaboration and people exchange between universities and industry;
- a more creative approach to public-sector procurement, directing a fixed proportion of public expenditure to foster science-based businesses and support innovative solutions;
- provision of long-term investment in start-ups through a large-scale science-focused venture capital fund;
- improvements in national infrastructure for transport and electronic communications (e.g. broadband) to facilitate the development of knowledge networks.

We pledge:

- to demonstrate the vital role of physics in industry and the wider economy through media briefings and public-engagement programmes;
- to create and support new networks bringing together business people and academics;
- to help these networks generate new research-based solutions for industrial challenges and fertile fields of enquiry for researchers.

The Institute of Physics in Scotland aims to promote the role of physics in education, health, the environment, technology and scientific literacy. Its membership is wide-ranging and multidisciplinary, including the educational, industrial, medical and general public sectors. The Institute seeks common purpose with other organisations to promote science and science-based learning and to influence science policy. Special emphasis is placed on supporting physics teachers by promoting in our schools the value, joy and benefits of a knowledge of physics and its applications.

The Institute of Physics is a scientific charity devoted to increasing the practice, understanding and application of physics. It has a worldwide membership of around 40 000 and is a leading communicator of physics-related science to all audiences, from specialists through to government and the general public. Its publishing company, IOP Publishing, is a world leader in scientific publishing and the electronic dissemination of physics.

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