

Institute of Physics Submission to HM Treasury for Spring Budget 2024

The Institute of Physics is the professional and learned society for physics in the UK and Ireland. Our members come from across the physics community – industry, academia and education as well as those that have retired from a physics career. As a registered charity we are dedicated to maximising public good through the advancement of physics and its applications.

We believe that strategic investments in scientific research and innovation are essential for the economic prosperity and societal well-being of the United Kingdom. We are writing to urge the government to continue to generously fund UK science to ensure that we can continue the UK's tradition of world changing research, reaping the benefits of boosted productivity, economic growth and technical advancement. As such we would like to draw your attention to the following key areas that we believe warrant specific consideration in the upcoming budget:

- 1. Setting a new, ambitious R&D investment target**
- 2. Properly resourcing university departments to maintain high quality research and teaching**
- 3. Utilising any remaining underspend from late Horizon association to boost science ambitions**
- 4. Delivering on the commitment made to fund the UK-Africa partnership programme**

This investment needs to be backed up by clear action to address the STEM skills shortage: innovation is powered by people, by their knowledge, skills, diverse backgrounds and experiences. For the UK to become a more innovative economy – and realise the full benefits in terms of improved growth, prosperity and living standards – it requires a skilled, diverse and adaptable workforce.

1. Setting a new, ambitious R&D investment target

The IOP has welcomed the government's reassurance that it is maintaining its commitment to science and research, with a promise to spend £20 billion on R&D in 2024–25. We now call on the government to set a new, aspirational target for R&D investment in the UK that matches our aspirations to be considered a Science Superpower and an Innovation Nation. **R&D investment should be increased to match or exceed the top OECD countries and boost economic growth, productivity and job creation across all parts of the UK.** This target will signpost future policy decisions and investments in R&D, driving further investment in R&D from basic research through to new product development, facilitating

much-needed productivity growth while unlocking solutions to the pressing issues our nation faces such as climate change and increasing healthcare costs.

In 2022 the Office of National Statistics (ONS) made significant changes to the methodology used to estimate R&D performed by businesses and the higher education sector. As a result of using the revised methodology the ONS found that there is substantially more R&D in the UK economy than previously captured by official statistics¹. This is cause for celebration, and an indication that the efforts of the government and businesses to increase ambition and invest significantly in R&D have been effective. In particular, they highlight how small businesses spend far more on R&D than previously estimated, and therefore have an important role in contributing to the UK's ranking as a global research power.

Now is not the time to relax that ambition, but to double down. While we worked towards the 2.4% target our peer countries did not stand still. Even if the UK reaches 3% of GDP invested in R&D in 2024/25², we are behind the leaders in R&D. Israel (5.56%), Korea (4.93%) and the USA (3.46%) invested a significantly higher proportion of GDP in R&D in 2021 and are likely to maintain or increase these levels of expenditure. Closer to home, Belgium (3.43%), Sweden (3.40%), Switzerland (3.36%) and Germany (3.13%) have invested in R&D at levels over and above the UK³. By investing less in R&D we are at a competitive disadvantage, and our lagging labour productivity rate indicates that we are falling behind our peer countries.

Progress towards government's ambition can be accelerated by physics-based businesses: a survey of physics innovators⁴ showed that 63% of respondents expect their R&D/innovation spending to increase over the next five years relative to the previous five years. With the right conditions in place, physics-based firms can play an even greater role in helping the UK government achieve its R&D and science ambitions.

2. Properly resourcing university departments to maintain high quality research and teaching

To make sure the UK is able to continue driving future technological advances that will power up the country's economic engine and shape the society we live in, our universities need to remain world-

¹ [Business enterprise research and development, UK - Office for National Statistics](#).

² See projections by the Campaign for Science and Engineering: [R&D investment in the UK continues to increase](#).

³ OECD (2023) GERD as percentage of GDP. MSTI database.

⁴ CBI Economics (2021) Paradigm shift: Unlocking the power of physics innovation for a new industrial era. Commissioned by the Institute of Physics.

leading. **That means putting university research funding for physics on a sustainable footing, and investing in world-class teaching.**

The UK has a proud history of world leading physics discoveries. Quality related (QR) funding is a highly competitive funding source which has enabled universities to improve the UK's ability to maintain scientific and technological advantage against international competitors. However, analysis from the Russell Group revealed that there was a 22% real-terms decline in QR across the higher education sector in England between 2010/11 and 2020/21⁵. Though there have since been announcements of increases to QR funding, **to sustain UK university research at the forefront of global science, the government – working in partnership with UKRI – must ensure levels of QR funding take account of rising inflation and running costs.** A more sustainable balance between QR and Research Council funding will allow universities to continue to forge new partnerships with business and industry, invest in the talent pipeline, build research capacity, support ground-breaking discovery science and use R&D to help power future economic growth.

In addition, research in the UK's universities is currently funded at levels below the full cost of performing that research, with the total deficit for research activity in universities in England and Northern Ireland reaching more than £4 billion in 2021/22. In particular, universities only recovered 68% of the full economic costs (FEC) of research funded by the Research Councils, a substantial deterioration compared to 2010-11 when the recovery rate for research peaked at 77.8 per cent. This deficit requires universities to cross-subsidise research from other income generating activities and leads to an unsustainable system in which research capacity is dependent on factors, such as tuition fee income from overseas students, which are out of their control and vary between institutions. **The government should increase support to allow the proportion of FEC recovered on all publicly funded research grants to safeguard the sustainability of the world-leading research that takes place within the higher education sector and ensure long-term capacity exists in all universities, in all parts of the UK, to deliver an increase in research activity.**

As well research, the challenges facing the future financial sustainability of universities will inevitably start to undermine the quality and international competitiveness of the teaching that they deliver. In particular, the combined effect of inflation, an increase in the cost of teaching, not accompanied by a proportional increase in grant funding and with student fees frozen since 2017/18, is that universities now face deficits across all subjects. The Russell Group estimates that across the sector deficits average

⁵ [Russell Group response to Research England funding budgets 2022-25.](#)

£1,940 per student per year in STEM subjects, and that without further intervention the average deficit universities would incur for teaching each undergraduate student would increase from £1,750 in 2021/22 to approximately £4,000 in 2024/25. Furthermore, a recent report⁶ has found that UK universities are facing major financial challenges, warning that pressure is acute for some institutions and may lead to some loss of provision across the sector.

3. Utilising any remaining underspend from late Horizon association to boost science ambitions

The IOP and the physics community have warmly welcomed the UK's reassociation to Horizon Europe and Copernicus – an outcome we strongly advocated for. As we joined Horizon Europe part-way through the funding cycle and the UK will be contributing on a pro-rata basis, there should be a remainder of the originally assigned funding from the Treasury. **We ask that these funds are utilised to accelerate the realisation of the UK's science, innovation and technology ambitions, for example by boosting the implementation of the Science and Technology Framework.** Additionally, we call on all funding decisions regarding this ringfenced fund to be publicly announced, to continue to publicise the importance of investing in UK science, and for bodies such as UKRI to continue to fund a diverse range of researchers to deliver research and innovation.

4. Delivering on the commitment made to fund the UK-Africa partnership programme

With a £10.7 million commitment, the Africa-UK Physics Partnership Programme can be a productive and effective partnership between the UK and Sub-Saharan Africa (SSA) to develop physics capacity, including access to facilities, in the region as well as strengthening the region's physics talent pipeline, and facilitating stronger equitable research and innovation linkages across SSA and with the UK. The programme will focus on key issues of tackling climate change, weather management and delivery of sustainable energy. The IOP asks the government to formally announce the commitment and looks forward to working with the Science Technology and Facilities Council (STFC) to ensure the smooth delivery of the programme and achieve maximum impact.

⁶ UK higher education financial sustainability report, PwC (January 2024).

A note on skills

Financial commitments for science are very welcome. But progress and innovation can only be made in scientific discovery and innovation if there are enough scientists and technicians from all backgrounds and with the right skills to undertake important research and development.

If the UK is to maximise the benefit of the government's significant investment in R&D, we must address the skills shortages that are already preventing businesses from investing more in R&D, and ensure that we have enough people from diverse backgrounds and with the right skills to do the work.

This can only be achieved with a sustainable pipeline of education and training from well delivered and inclusive primary and secondary science curriculums (with adequately trained and qualified specialist teachers); university courses that are welcoming to all, suitably funded, taught and staffed; and in-work training to keep the existing workforce up-to-date with the latest science and technology. Access to internationally located specialists is also an important catalyst for scientific progress.

Of UK physics innovation firms polled for our Paradigm Shift report, 63% expected their R&D/innovation spend to increase in the next five years. This represents a major opportunity for the UK. However, two thirds (66%) of firms reported suspending or delaying R&D/innovation activity in the past five years due to skills shortages. This represents a big, missed opportunity and a major challenge for the future. Only one in ten (11%) physics innovators said that they did not experience any difficulties recruiting. Finding people with a combination of commercial and specialist/technical knowledge was the most widely reported issue in every nation of the UK⁷.

Moreover, IOP engagement with the physics community on specific technologies (including critical technologies identified by the government's Science and Technology Framework such as quantum and semiconductors) has highlighted that ensuring the necessary skills are available will be one of the key factors that will enable the healthy development of these technologies. For example, 85% of the quantum innovators surveyed (above) reported that R&D activity had been suspended or delayed because of skills shortages, showing that concerns around workforce skills were felt particularly acutely by businesses engaged in quantum innovation.

⁷ CBI Economics (2021) Paradigm shift: Unlocking the power of physics innovation for a new industrial era. Commissioned by the Institute of Physics.