

Institute of Physics Submission to HM Treasury for Autumn

Statement 2023

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 of research and teaching**
- 3. Ringfencing remaining Horizon/Pioneer budget for science**
- 4. Delivering financial commitments to quantum and semi-conductors**

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.

Revised R&D spending statistics from the Office of National Statistics show the UK exceeding the 2.4% of GDP target set for R&D spending in the UK economy. 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.

This is not an opportunity to relax that ambition, but to double down. While we worked towards the 2.4% target our peer countries did not stand still. Even spending near 3% of GDP, as indicated by the most recent ONS data, 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 UK.¹ 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.

We 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.

2. Properly resourcing university departments to maintain high quality research and 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 2020/21, and that the balance of funding between QR and Research Council funding had fallen from 80p in the pound in 2007 to 50p in the pound in 2018. 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

¹ OECD (2023) GERD as percentage of GDP. MSTI database.

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 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 £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.

3. Ringfencing remaining Horizon/Pioneers budget for science

We warmly welcome the news that the UK has reassociated to Horizon Europe and Copernicus – a policy we strongly advocated for. We echo ministers' calls that UK researchers should endeavour to maximise the opportunity afforded by our re-association and secure as much support from the programme as possible, forging links with diverse collaborators across Europe in the process.

As we have joined Horizon Europe part-way through the funding cycle the UK will be contributing on a pro-rata basis, meaning there should be a remainder of the originally assigned funding from the Treasury. **We ask that these funds remain ringfenced for science and call for the ringfenced funds to be given to the Department of Science, Innovation and Technology to boost the implementation of**

the UK Science and Technology Framework and accelerate the realisation of the government's science, technology and innovation ambitions. 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 financial commitments to quantum and semiconductors

We welcome this year's National Quantum Strategy and National Semiconductor Strategy and the financial commitments to supporting these strategies. Committing £2.5 billion over 10 years to quantum technologies will go a long way to providing stability for physicists from all backgrounds working in this area and ensuring investor confidence that the UK is serious about quantum research and development. The UK has an opportunity to be a world leader in this field of emerging technologies and this strategy and funding will support researchers as they push the boundaries of our understanding. This in turn will be beneficial to the UK's economy and society, bringing forth opportunities for life-enhancing technological innovation, high-skilled jobs, enhanced national security and international competitiveness.

The commitment of up to £1 billion to semiconductors for the next decade is similarly encouraging, and will help support the UK's semiconductor industry, securing our place as a leader in semiconductor design and research. **We ask for a firm commitment of the full funding amount to the semiconductor strategy in the upcoming Autumn Statement** in order to increase confidence in the government's commitment to the industry and to encourage further domestic and foreign investment into UK semiconductors, securing jobs and our global reputation for years to come.

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. 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 do 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 UK.²

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.

² CBI Economics (2021) Paradigm shift: Unlocking the power of physics innovation for a new industrial era. Commissioned by the Institute of Physics.