IOP Institute of Physics

IOP Response to the PAC Inquiry on the Financial Sustainability of the Higher Education Sector in England

The Institute of Physics is the professional body and learned society for physics in the UK and Ireland, inspiring people to develop their knowledge, understanding and enjoyment of physics. We work with a range of partners to support and develop the teaching of physics in schools and universities; we encourage innovation, growth and productivity in business including addressing significant skills shortages; and we provide evidence-based advice and support to governments across the UK and in Ireland.

Our members come from across the physics community whether in industry, academia, the classroom, technician roles or in training programmes as an apprentice or a student. However, our reach goes well beyond our membership to all who have an interest in physics and the contribution it makes to our culture, our society and the economy.

In order to inform our response to this consultation the IOP has drawn upon evidence and perspectives collected from our work with senior representatives from a broad range of physics departments across the UK. This statement draws together the key concerns facing the discipline on the topic of financial sustainability. We call for government to:

- increase the proportion of full economic costs covered by all publicly-funded research grants to safeguard the sustainability of the world-leading research in the UK
- ensure that the financial incentives for UK universities to take international students do not limit opportunities for domestic students
- recognise the high cost of teaching physics and provide sufficient funding and rewards that prioritises and recognises pedagogical best practice
- ensure that a diverse set of higher education institutions can continue to provide physics courses across a broad range of geographies and routes into higher education

Physics is a high-value, high-return subject and vital to the UK economy but it is expensive to teach

Measuring the performance and growth of the physics sector[1] between 2010-2019, the Institute of Physics (IOP) and the Centre for Economics and Business Research (CEBR) found that, in 2019 alone, physics directly generated £229bn gross value added (GVA) or 11% of total UK gross domestic product (GDP)[2]. Within the UK physics sector, there are more than 2.7m full-time employees –

[1] Defined here as physics-based industries whose enterprises demonstrate ongoing research and development which consistently makes use of physics knowledge (and the R&D activity can be expected to significantly affect the fortunes of businesses within the industry), or where underlying technology supporting the industry requires significant physics knowledge for continued operation

[2] Physics and the Economy – 2022 findings | Institute of Physics (iop.org)

accounting for 10% of total UK employment, and labour productivity in the sector is strong, at £84,300 per worker, per year[1].

Physics is also a high return subject that provides students with highly transferable skills. The median level of student employment within 15 months of completing a physics degree, across all universities is 90%. This compares favourably against other STEM disciplines (Engineering 94%, Chemistry 88%, Computer Science 88%, Maths 85%, Earth/Marine Science 82.5%, Biosciences 80%)[3].

But at the same time lab-based disciplines such as physics are expensive subjects for a university to deliver, both in terms of teaching and research. The Russell Group of Universities, for example, report that universities teach science and technology subjects at a loss, and that the shortfall is already over £1,500 per student per year[4]. Higher Education Statistics Agency (HESA) data demonstrates the high expenditure of universities on physics[5]. This means the discipline comes under intensive pressures, and is vulnerable when universities face financial constraints.

Recent higher education policy reforms such as those recommended in the Augar review[6] have rightly concentrated on ensuring value for money for students and taxpayers. Part of the OfS response has been to focus on student outcomes[7]. This could pose risks to course provision where HEI administrators do not fully appreciate, or are not able to evidence or communicate the economic benefits of physics degrees.

In response to the increased focus on student outcomes there is pressure on universities to prioritise vocational disciplines with strong and immediate links to industry. However, despite the high economic impact and high employability of physics graduates, there isn't a 'typical' physics employer. Demand for physics skills and knowledge is widely distributed throughout the labour market (spanning sectors including construction, digital, engineering, health and public and regulatory) and rising fast outside traditional physics workplaces (such as roles in software, data science or financial settings)[8]. The breadth of this distribution makes it harder for physics departments to clearly define obvious vocational routes for their students.

The sustainability of high quality physics provision in the UK is dependent on sufficient funding for research.

The UK has historically been a world leader in physics research. For example, the UK's field-weighted citation index for the physical sciences has been consistently well above the global average[9]. This has made the UK an attractive place to study and research physics. The long-term sustainability of this position, however, is dependent on continued high quality research.

As mentioned previously, there isn't a 'typical' physics employer. A further result of this is that physics departments have historically had less connection with industry than other STEM disciplines and have been more dependent on research council funding. For example, HESA data[10] shows that

[3] The Guardian University Guide 2022 – the rankings | University guide | The Guardian
[4] response-to-consultation-on-implementing-teaching-grant-savings.pdf (russellgroup.ac.uk)
[5] What is the expenditure of HE providers? | HESA
[6] Independent panel report to the Review of Post-18 Education and Funding (publishing.service.gov.uk)
[7] Student outcomes - Office for Students
[8] Physics-in-demand-labour-market-skills-uk-and-ireland.pdf (iop.org)
[9] International Comparative Performance of the UK Research Base – 2016 (elsevier.com)
[10] What is the income of HE providers? | HESA

the total income to UK universities from industry for physics research in 2019/20 was considerably lower than for other subjects (physics £7.7m, chemistry £14.1m, materials science £14.6m, biosciences £22.8m, engineering £23.5m).

Due to the high costs of science research it is becoming increasingly difficult for UK universities to fund the 20% Full Economic Costs (FEC) not covered by UKRI grants and other sources of research grant funding. The funding available to universities to subsidise physics research through revenue from tuition has been reducing as a result of fees not being indexed against inflation[11]. The DfE announcement that tuition fees will be frozen for another two years[12], and possible reductions in tuition fees as proposed in the Augar review will further limit the R&D that a university is capable of supporting. Additional financial pressures, such as costs associated with COVID[13], have further heighted these difficulties.

Further exacerbating this financial pressure, the proportion of FEC covered by UKRI grants, industry, and EU and UK charities has either gradually decreased or remained flat at levels substantially below 80% in recent years[14] – for example, HEIs only recovered 71% of the full economic costs of research funded by UKRI in 2019/20[15]. The deficit for research activity exceeded £4bn in 2019/20[15]. This could threaten the sustainability of HEIs which are particularly successful at winning research grants, and lead to a scenario in which institutions find certain types of grants economically unviable. The IOP has already received anecdotal evidence that this has been the case for some smaller physics departments.

The value of quality-related (QR) funding (often used to shore up teaching costs – see below) has declined by 17% in real terms since 2010, with the balance between QR and Research Council funding falling from 80p in the pound in 2007, to 64p in the pound in 2021/22[16]. In addition to this QR Funding is allocated at the discretion of HEIs, so while physics as a discipline performs well in the REF, this does not necessarily result in increased resources for physics departments.

In response to these increasing pressures the IOP calls for the government to 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.

The sustainability of high quality physics provision in the UK is dependent on sufficient funding for teaching.

To attract the most able students from the UK and internationally (which is essential for financial viability of physics departments), teaching quality standards must be kept high. The ability of HEIs to attract the best teaching talent is essential to this aim. But, in addition to the financial pressures facing physics research, there are a number of constraints that impact high quality teaching.

[11] Universities, students and inflation - dataHE
[12] Higher and Further Education Minister Michelle Donelan speech on the Augar Review - GOV.UK (www.gov.uk)
[13] Coronavirus: Financial impact on higher education - House of Commons Library (parliament.uk)
[14] *https://www.ucl.ac.uk/research/sites/research/files/supporting_uk_research_nov_2019.pdf*
[15] *https://www.officeforstudents.org.uk/publications/annual-trac-2019-20/*
[16] *https://www.russellgroup.ac.uk/media/6004/russell-group-spending-review-2021-submission.pdf*

OfS data shows that the estimated average full teaching cost for physics in 2019/20 for home students is not covered by the combined income from tuition fees and government funding[17]. These costs need to be subsidised by universities from other areas of revenue and is a cause for concern regarding universities' decisions on which subjects to prioritise or limit in the future.

There are also specific regional challenges facing university teaching in the UK, such as the discontinuation of London weighting in teaching grants. Historically EU structural funds like the European Regional Development Fund (ERDF) have been used to develop university education provision in struggling regions. There is evidence to suggest that the loss of access to EU structural funds post EU-exit will not be adequately made up for by levelling up funding[18].

DfE must ensure that the UK remains an attractive place to pursue a career in academia throughout all regions of the UK. Academic salaries, working environment, mechanisms to ensure career recognition and investment in training are all important aspects of this.

In response to the issues outlined above, the IOP calls for recognition of the high cost of teaching physics and provision of sufficient funding, reward and prioritisation for pedagogical best practice. This could be supported through amendments to OfS's price grouping (either creating a revised grouping, increasing the funding available to price group B, or moving physics to price group A).

The UK needs to provide measures to ensure a strong balance between domestic and international students.

The financial pressures outlined so far are pushing universities to favour course provision aimed at increasing their cohort of international students who bring in greater revenue. There is a risk that institutions' emphasis on the attraction of international students may skew course provision away from the economic needs of the UK or the needs of domestic students.

Some IOP stakeholders have reported very high cohorts coming from individual countries (in some cases up to 30% from one country). This makes some institutions vulnerable to changes in the international higher education market.

In addition to this HESA data suggests that UK domiciled enrolments into the physical sciences has reduced steadily over the last seven years, with total first year enrolments in 2020/21 down by one third compared to 2014/15[19].

Physics courses are provided by a diverse range of institutions and need a correspondingly nuanced approach to funding.

One of the strongest messages coming from our research into the financial sustainability of physics departments is that there is a complex range of contextual issues facing different departments.

[17] Development of the OfS's approach to funding (officeforstudents.org.uk) – Figure B2
[18] Northern regions lose out on levelling up funding post-Brexit - Northern Powerhouse Partnership
[19] Table 10 - First year UK domiciled HE student enrolments by subject of study and highest qualification on entry 2014/15 to 2018/19 | HESA

Intake demographics (including levels of international students), courses offered, and financial models vary widely between HEIs.

It is important to broaden the diversity of students with access to physics higher education[20]. The IOP therefore strongly supports the maintenance of diversity in the types of HEIs providing physics courses and calls for support to higher education that caters to a broad range of operating contexts.

The IOP calls for more nuanced education policies that avoid universal indicators that do not take into account differences in student demographic, such as blanket measures for evidencing value for money.

To protect diversity in physics smaller departments must be protected.

The financial pressures outlined so far have been especially acute for smaller universities. Smaller departments may be considered easier to close than larger ones, and if such departments are costly and require subsidising then it could be seen as a quick win by university administrations to do so.

Smaller departments often cater to a different student demographic than larger universities (and provide corresponding tailored student support structures relevant to their intake). Many of these departments are situated in economically deprived regions of the UK and engage closely with their local populations. Therefore their closure will negatively impact the diversity of the students able to receive higher education in physics in the UK.

IOP has gathered anecdotal evidence that researchers in smaller departments have been prevented from applying for UKRI funding due to their university's inability to fund the required 20% FEC. In addition to this, HESA data suggests that there has been a steady concentration of research funding allocation to a smaller number of universities between 2010 and 2019 (with some indication that this may have levelled out a little in 2020)[21]. If funding continues to concentrate among a smaller number of departments, this heightens the risk of closures and further narrows the breadth of the UK physics research base.

There are also heightened pressures on teaching requirements among smaller departments. For example, high-cost STEM funding only applies to HEIs with at least 30 students and these departments are more vulnerable to fluctuations in student intake. In addition to this, smaller departments still have to teach a similar number of physics modules to larger ones – but with fewer staff, which creates increased workloads for staff in smaller departments. In practice, this reduces the time available for research and further exacerbates the concentration of research into a smaller number of universities.

Recent work by the IOP has demonstrated that the demand for physics skills is spread widely throughout the UK[22]. Narrowing the geographical spread of physics higher education provision will reduce this spread of these skills and the associated economic benefits, contrary to levelling up ambitions.

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[20] IOP-Case-for-EDI-English.pdf
[21] What is the income of HE providers? | HESA
[22] Physics-in-demand-labour-market-skills-uk-and-ireland.pdf (iop.org)