IOP
Institute of Physics

IOP submission to the Higher Education Futures Taskforce Call for Input

Executive summary

The IOP welcomes this opportunity to contribute to a new policy framework for higher education on the island of Ireland. As the professional body and learned society for physics in the UK and Ireland we work on an all-island basis across Ireland and Northern Ireland. This response, while specific to the Higher Education sector, is closely aligned with our key strategic priorities[1] to unlock the potential of physics and its impact in society. This response has been formulated through consultation with our membership body whose voice is important to shaping the future of Higher Education.

We believe we are on the cusp of a new industrial era, powered by science, technology and engineering. Governments all over the world recognise the potential of these developments to shape the social and economic futures of their countries and this is driving investment in education, skills, research and innovation.

To make sure that Ireland and Northern Ireland can realise the full societal and economic benefits of this scientifically inspired revolution, our STEM community needs to be world-leading. This means investing in our Higher Education systems, supporting our research and innovation ecosystem and building more productive ties between universities, research institutes, businesses and governments. This will ultimately produce more versatile and resilient graduates, which will fundamentally benefit the island as a whole.

Physics is fundamental to the health, wealth, security and advancement of society and has a vital role to play in helping make Ireland fit for this new industrial era. Decisions taken today around the future of Higher Education on this island, and policies that will support and grow this sector will shape our society for decades to come. If we commit to investing in Higher Education, we will be in the strongest position to realise the associated benefits in terms of economic growth, skilled jobs, and improved quality of life.

We have outlined below the 10 priority actions which we believe are fundamental to the capacity of the higher education sector to thrive, which will provide young people with equal opportunities and access to pathways into higher education, and which should be incorporated within the new policy framework for higher education on the island of Ireland.

1. Develop world-class further and technical education routes.
2. Increase diversity of those entering Higher Education.
3. Create supportive structures for those within the Higher Education system.
4. Increase investment in research and development within third level institutions.
5. Re-balance research funding between fundamental and applied research.
6. Sustain funding for disciplinary pedagogic research.
7. Safeguard cross border and international research and collaborations.
8. Strengthen linkages across HEIs and industry.

[1] https://www.iop.org/strategy

9. Increase regional investment and planning.
10. Plan for future skills requirements.

In support of these priority actions, IOP has undertaken some initial analysis on funding for physics, and on student and staff demographics within Higher Education in Ireland and Northern Ireland – this is presented in Appendix 1.

We welcome the opportunity to discuss these recommendations in greater depth at the forthcoming roundtable sessions.

Sincerely,

Dr Yvonne Kavanagh, Chair of the Institute of Physics Ireland

About the IOP

The Institute of Physics (IOP) 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; 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.

The IOP represents physicists from the UK and Ireland at the highest level, as a member of key international groupings, most notably the International Union of Pure and Applied Physics (IUPAP), the European Physical Society, and the UK Government's 'High-Level Stakeholder Working Group on EU Exit, Universities, Research and Innovation'. We work closely to broker relationships and facilitate discussion among government, industry, enterprise, social partners and Higher Education. We are also a world-leading science publisher and we are proud to be a trusted and valued voice for the physics community.

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.

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IOP Institute of Physics

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10 Priority Actions

1. Develop world-class further and technical education routes

Ireland currently ranks second out of twenty OECD countries for the proportion of employees with technical qualifications – however just 15% of these are in STEM subjects[2]. In Northern Ireland, almost three-quarters of businesses are not confident they can fill highly skilled roles, including those related to STEM skills[3]. These skills are essential to high-tech industries and innovation, and it is crucially important to develop further and technical education pathways in these high demand sectors. We need to see increased investment in, and reform to, further and technical education to put them on an equal footing with academic education.

There is a particular opportunity here to increase visibility and relevance of apprenticeship schemes as an alternative to University education for those aged 16+. While current discussion in this paper centres on Higher Education, and by this, mostly the University sector, less than half of school leavers (43%[4]) in Northern Ireland pursue the university route – we must provide adequate opportunities for those who do not proceed to University, for the benefit of these individuals, and for the growth of a competitive economy in Northern Ireland.

Not all degree paths need to be, nor should they be, constrained to the lecture halls of a university campus - the BSc/MSc in Immersive Software Engineering launched recently by the University of Limerick could work well for applied physics degrees where students 'learn by doing' in an industry/university partnership model. In addition, for those already in the workforce, professional upskilling opportunities must be fostered through stronger links between industry and all groups involved in higher and further education. A successful example of this is the Irish Medtech Skillnet programme[5] - a learning network in the medical technology and engineering sector where companies share best practice to respond effectively to the specific skills needs (technical and non-technical) of the sector. This approach supports Ireland's emerging position as a global medical technology hub by enhancing the specialised knowledge and skills that exist within the sector. Equally, the opportunities presented through the Springboard+ programmes[6], which offers incentivised places for graduates to reskill in areas of skills shortage and emerging technologies, and the Skills Focus and InnovateUs programmes in Northern Ireland, should be scaled and made

[2] Source: OECD (2014) Skills Beyond School Synthesis Report, http://www.oecd.org/education/skills-beyond-school/SkillsBeyond-School-Synthesis-Report.pdf
[3] https://www.economy-ni.gov.uk/publications/northern-ireland-skills-barometer-2019-update
[4] As above
[5] https://www.irishmedtechassoc.ie/Sectors/IMDA/IMDA.nsf/vPages/About_us~irish-medtech-association-strategy-the-global-medtech-hub/$file/Irish+Medtech+2020+Strategy+The+Global+Hub.pdf
[6] https://springboardcourses.ie/

more visible as a viable option for reskilling and upskilling while working within a relevant company/industry.

2. Increase diversity of those entering Higher Education

A core goal of the IOP's strategy is to improve the participation of under-represented groups in physics at all levels, a goal that is relevant across all STEM disciplines. We must focus efforts on improving diversity to ensure that those taking part in Higher Education, and working within the broader STEM workforce, better reflect society. We must also ensure that Higher Education Institutions are welcoming and supportive places for people from all backgrounds, as many physicists will work in or pass through them.

It is important to begin early in promoting the benefits and enjoyment of participation in Higher Education, as well as reducing the barriers to those who may not have considered this as an option. There needs to be a widening of the pool of people considering, applying for, and studying within Higher Education, to include more people in underrepresented groups in terms of colour, gender, sexual identity, disability, social and economic backgrounds.

Our respective Governments should work with organisations across all sectors including education, media, industry and enterprise to engage with underrepresented groups to highlight the many and varied higher education options available to them. In addition, new resources should be developed to highlight the various educational routes, training and opportunities and to ensure more people see such pathways as genuinely open and available to them.

We draw attention here to the IOP Limit Less[7] campaign, the goal of which is to increase the number of young people from underrepresented groups in our society who do physics from age 16 by addressing barriers which limit their potential. The lived experiences shared as part of the campaign offer an insight into the influences and moments that shape the perception that a young person has of their own abilities and potential. While this campaign is specific to physics, its core message about breaking down barriers is relevant to this broader discussion on engaging underrepresented groups in Higher Education.

There is also a role for the media who can help young people and their families to see physics, and higher education opportunities, as open to all. Within the IOP Limit Less campaign, we are asking the media to do this by communicating a more diverse representation of physics and emphasising the contribution that physics makes to solving the problems that young people and others care about.

Underrepresented groups must be engaged with early on and in a sustained manner – for example, by encouraging more pupils to study science subjects at school, this will both help to address the current disparities in uptake of subjects such as physics, increase the

[7] https://www.iop.org/about/strategy/limit-less#gref

numbers applying and studying these subjects at in Higher Education. As detailed in Appendix 1[8], in 2018/19 a total of 1,242 Physics undergraduates and postgraduates were enrolled in Ireland, with 77% of the students being male. In Northern Ireland the figures are similar, with only one third of students studying Astronomy, Mathematics and Physics identifying as female.

To achieve greater balance, and increase engagement among underrepresented groups, we must also increase investment in teacher recruitment, training, and retention to ensure every secondary school student has access to a specialist physics teacher and receives a high-quality learning experience in the classroom.

The STEM Education Policy consultation report has highlighted the issue of a severe shortage of teachers in physics in Ireland[9] and out-of-field teaching is commonplace. The recent announcement of the Professional Diploma in Teaching Physics[2],Professional Diploma in Teaching Physics[10], delivered by DCU in partnership with NUIG and UL, is a very welcome initiative to address this by supporting teachers to acquire the theoretical and experimental knowledge of physics as well as pedagogical content knowledge that is necessary for effective physics teaching at post-primary level.

Teachers are important professional role models to aspire to, as well as someone who can help students to explore potential education and career options and this is particularly important for girls[11] who are underrepresented in the physical sciences at Leaving Certificate and A-Level examinations. An added barrier to students, especially female school students taking physics as a Leaving Certificate subject is that it is not valued equally as a science subject in terms of being a required subject for application to certain science-related HE choices.

While secondary level education may be seen as tangential to a review of Higher Education, we cannot ignore the issues and needs of such a fundamental building block in the future of our Higher Education system.

3. Create supportive structures for those within the Higher Education system

In addition to encouraging more pupils to study STEM subjects, it is also important to consider the environment in which those who move into the Higher Education sector study, work and operate. In addressing disparities, our respective Governments should consider

[8] IOP PHYSICS INSIGHTS DATA BRIEF (Appendix 1)

[9] Source: STEM Education Policy consultation report (2017): https://www.education.ie/en/The-Education-System/STEMRegistered

[10] https://www.dcu.ie/www.dcu.ie/scienceandhealth/professional-diploma-physics-teaching

[11] Note: Particular encouragement should be made for girls to study physics beyond the age of 16, given the ongoing underrepresentation in the numbers of pupils studying physics for A-level (22% in both 2019 and 2018), AS level (26% in 2019, 25% in 2018), and Leaving Certificate (In 2019, only 3.59% of girls chose to study Leaving Certificate physics, compared to 9.91% of boys, and of those studying physics 26.64% were girls).

current initiatives such as the IOP's Project Juno[12], which recognises and rewards departments and schools of physics, institutes and organisations that are able to demonstrate that they have taken action to address gender equality in physics and to encourage better practice for all staff. The Jocelyn Bell Burnell Medal[13], which is awarded annually to exceptional early-career contributions by early career female physicists, should also be noted as a means of engaging talented researchers in an underrepresented group.

A breakdown of Higher Education staff by gender is presented in Appendix 1. Initiatives such as the Senior Academic Leadership Initiative[14] (SALI) are welcome interventions to accelerate gender balance at senior levels in Ireland. Such initiatives must be sustained and supported by wider ranging measures to highlight and address the invisible barriers in place which impact the appointment level and career progression opportunities open to female and other underrepresented staff members.

It is important that staff within institutions feel valued and supported – one aspect of this is to develop a more structured career framework/pathway, including career metrics to support flexibility of choice around ways of working. There is also an uncertainty around tenure in many institutions where short term contracts are the norm for researchers and which are unsustainable in the longer term. Coupled with is the need for a fundamental review of promotion performance indicators to address the risk of bias in appointment processes – addressing these barriers will be a step towards creating a more inclusive and supportive working environment.

IOP is working to develop the Juno programme, to build on the successes it has brought over the last decade in making workplaces more supportive and equitable places for women academics, researchers and students. As recent Juno Champion submissions have all indicated, activity within their departments and universities is more extensive – with actions that look to find and remove barriers for underrepresented groups that include (but are not restricted to) people of ethnic minority heritage, people from the LGBTQ+ community, disabled people and people from socioeconomically disadvantaged backgrounds.

As part of Project Juno, IOP is working with university physics departments, laboratories and research facilities, across the UK and Ireland, to look at the root causes of these challenges. We will work in close collaboration with the leadership, staff, and students at the institutions, to develop concrete plans for addressing those challenges, adopting a supportive and collaborative approach throughout. We will be supported by the diversity and inclusion practice of consultants PwC, who recently supported the IOP on its Giving Voice to Inclusion[15] programme.

[12] https://www.iop.org/about/IOP-diversity-inclusion/project-juno#gref
[13] https://www.iop.org/about/awards/2020-jocelyn-bell-burnell-medal-and-prize#gref
[14] https://hea.ie/funding-calls/senior-academic-leadership-initiative/
[15] https://www.iop.org/about/IOP-diversity-inclusion

The professional conduct of those involved in Higher Education should also be considered, building on the requirement demonstrated in the UK, by UKRI for organisations in receipt of funding to adopt good practice guidance[16] on bullying and harassment.

4. Increase National commitment to investment in research and development

Despite attracting world-class business and talent from abroad, Ireland and Northern Ireland both rank among the lowest investors in Research and Development, with Ireland investing just 1.24% of its annual GDP on R&D (2017[17]) and Northern Ireland just 1.55% of GDP in 2016[18]. This compares to 3.1% in Germany, 2.2% in France, and 1.7% for the UK as a whole. Central to achieving this ambition is for there to be clear roadmaps and funding commitments from the UK and Irish Governments that propel research and development investment towards the OECD average of 2.4% of gross domestic product, and in addition, providing clear incentives to support business to achieve this target. Globally, our competitors such as Germany, Israel, South Korea and Japan already invest more than 3% of their GDP in research and development.

The STEM community across Ireland and Northern Ireland has the talent, skills and knowledge to capitalise on these investments and fuel far-reaching scientific, technological, social and economic change. As an island we boast world-class institutions, a reputation for excellence in science and engineering and a track record of ground-breaking discoveries.

However, we need a coherent long-term plan to build our position as the global hub for new world-leading technologies, to draw on our strengths across multiple disciplines, to attract talent from around the world and to promote entrepreneurship. This long-term plan must couple a clear investment roadmap with fresh thinking about the balance, distribution, sources and scale of funding and how to identify prospects with genuine potential for scientific, economic or societal transformation. While this is a National issue that goes beyond third level institutions, it very much impacts the level of funding available within the Higher Education Sector.

5. Re-balance research funding between fundamental and applied research

There is a need for a more balanced investment between fundamental and applied research where, through SFI's Agenda 2020, there has been a disproportionate level of funding going only to applied research - i.e. in areas with immediately economic return. It is increasingly difficult for those involved in fundamental research (or curiosity-driven research) to access funding, which has a knock-on impact on the ability to build research groups and compete internationally. There is further impact on the future economy and on knowledge transfer to the next generation of researchers. An increase in funding for fundamental research

[16] https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-BullyingAndHarassmentPositionStatement.pdf
[17] https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm
[18] https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/northern-ireland

would support efforts to attract students into STEM areas, for example, Astronomy, where graduates have high-level analytical and programming skills which are valuable to a myriad of fields. Increasing research funding in this area would support more graduates at MSc and PhD level which in turn would feed into the knowledge economy, and who can act as national role models to inspire the next generation of young students in primary and secondary schools. It would also support delivery of the objectives of the National Space Strategy for Enterprise 2019-2025[19], the success of which is underpinned by Ireland's achievement in space research and recent membership of ESO - the European Southern Observatory.

IOP has undertaken some initial analysis on funding for physics research, based on publicly available data, full details of which are included in Appendix 1. Key findings support the above concern about the reduction in funding available for research in physics over the past decade in both Ireland and Northern Ireland:

- In Ireland, physics and other fundamental science disciplines have seen decreased funding over the last decade, as a greater focus has been placed onto applied research areas. When SFI grants are looked at on a per subject basis, the category of 'physics and astronomy' has dropped from representing 11% of grant value in 2010 to 6% of the known value in 2019.
- In Northern Ireland, the situation is similar - Higher Education Institutions received 1.11% of all physics funding via UKRI grants in 2020 which is a reduction from the 1.94% share in 2010. In 2020, Northern Ireland's share of funding for physics was lower than the overall share (1.11% for physics, and 1.18% for all subjects), and since Northern Ireland makes up 2.83% of the UK's population[20], Northern Ireland's research grant share is comparatively low.

6. Sustain funding for disciplinary pedagogic research

Disciplinary pedagogic research is critical to the development of best practice teaching, learning, assessment and curriculum development and yet there is a significant gap in available funding for such work in Ireland and Northern Ireland. Research into best practice and methodologies in physics teaching, learning, assessment and curriculum development requires more sustained support and funding - without excellent physics teaching in higher education, as well as at second level, you cannot get excellent physics graduates for the workplace or for postgraduate study.

Anecdotally, teaching excellence itself is not valued sufficiently in higher education – career progression is often decided via publications and research grants; supporting a perception

[19] https://enterprise.gov.ie/en/Publications/Publication-files/National-Space-Strategy-for-Enterprise-2019-2025.pdf

[20] https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2019estimates

that teaching is important but secondary. We need to recognise and reward the many different actors in producing an excellent physics eco-system in higher education.

Although physics has been at the forefront of tackling COVID-19, the impact of COVID-19 on teaching and learning has been a huge disruptor within Higher Education, with the forced move to remote teaching and learning over such a short period in early 2020. The longer-term impacts of such a change on teaching and learning outcomes remain to be seen, but it is clear that elements of blended learning will be here to stay in terms of increasing accessibility, reducing the costs to students to engage with distance learning, and flexibility around delivery and assessments. There are, however, significant challenges around standards, assessments, and, particularly for STEM subjects, and physics in particular, challenges around practical, lab-based work. This presents a huge challenge, and yet also an opportunity to rethink how we deliver key learning experiences which are core to a student's physics education and experience but this must be underpinned with evidence based research to develop best practice approaches and methodologies.

In addition, the soft skills that students gain through collaborative working, are very valuable attributes and we must be careful not to lose these opportunities through the increase in remote and distance learning - soft skills such as problem solving, group work, communication, and other transferable skills necessary to succeed in diverse professional workplaces.

7. Safeguard cross-border and international research and collaborations

The physics community in Higher Education is closely intertwined with international networks, infrastructures, facilities and investment streams so, to stay at the forefront of scientific discovery and innovation, we must ensure that we maintain a strong presence in international networks, partnerships and programmes and that we remain open and attractive to talented researchers and innovators. The physics sector in Ireland and Northern Ireland must continue to be able to bring together scientists and organisations from around the world, building the cross-border and international links that fuel scientific discovery and technological innovation.

In light of Brexit, the continued access to cross-border collaborations and relationships is even more important, and it is imperative that future negotiations between Ireland, the EU and the UK must continue to allow science professionals to move and collaborate easily between countries, and especially within the island of Ireland.

Brexit also brings opportunity, as Ireland and Northern Ireland are now well placed as English-speaking gateways into the EU and UK respectively which presents opportunity to attract research and manufacturing companies who are reliant on highly skilled graduates and where English is a key language, although we must ensure a continued supply of such graduates to meet this demand. IOP has published targeted information on what the agreements between UK and EU mean for everyone in the physical sciences, IOP members and non-members alike. This information looks at how the changes affect employers, workers and students, trade rules, and funding and investment opportunities in our sector.

Since the publication of Innovation 2020, Ireland has joined a number of European research bodies, providing increased access to new scientific research programmes. However, Ireland is currently one of only three European countries which is not a member or associate of CERN, the European Organisation for Nuclear Research. In November 2019 the Government of Ireland Joint Committee on Business, Enterprise and Innovation recommended Ireland seek associate membership of CERN 'as soon as possible'. The ability to easily collaborate with European colleagues is fundamental to the success of Ireland's physics community. With the joining cost at less than €1 million[21], experts have estimated the economic return to be in the region of €90 million in terms of industrial contracts for high tech equipment. In addition, membership would allow scientists and students in Ireland to take up research positions, as well as provide further training, workshops, placements and apprenticeships at one of the most cutting-edge facilities in the world – the importance of which cannot be underestimated for the Higher Education system.

8. Strengthen linkages across HEIs and industry

Physics is a recognised engine for discovery and innovation and a significant contributor to our economy and we are committed to ensuring that physics (and the physical sciences and engineering more broadly) delivers on its exceptional potential to help society. From IOP 'Physics in the Economy[22]' series of research reports, published in 2017, Physics-based industries made a €23.3 bn GVA contribution to Ireland's GDP in 2014, and in Northern Ireland this was estimated at £3.2 bn. IOP is currently commissioning new research to provide a timeseries of reports with updated data on the contribution of physics, and physics-based industries to our economies.

It is important that we have a better understanding of the factors which drive or inhibit innovation in the physics community so that we can develop ways to support robust and innovative links between HEIs, large businesses and SMEs. The purpose of Higher Education is more than as a conduit to fulfil industry needs, but we cannot ignore the importance of ensuring strong linkages between the two, and of understanding the opportunities that will be available to future graduates.

IOP is undertaking research[23] to analyse national innovation data and to survey physics-based businesses to better understand the needs and opportunities in this area. We want to support physics-based businesses to develop an ecosystem of productivity which gives the UK and Ireland a competitive edge in a global economy. To do this, we first need to understand the conditions that physics-based businesses are currently operating in, what drives and inhibits them, and the challenges and opportunities they face. Our intention is to

[21] Source: Joint Committee on Business, Enterprise and Innovation; The Case for Irish Membership of CERN (November 2019): https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_business_enterprise_and_innovation/reports/2019/2019-11-13_report-on-the-case-for-irish-membership-of-cern_en.pdf

[22] The role of physics in supporting economic growth and national productivity in Ireland and Northern Ireland

[23] IOP Innovation Survey Project

gain a deeper understanding of the innovation landscape and physics-specific drivers and challenges. This work will in turn inform the Institute of Physics R&D roadmap for how we can best support both our community and the governments' ambitions and stimulate and encourage collaboration and debate across the sector.

9. Increase regional investment and planning

It is important that we can maintain, and where necessary, strengthen our research infrastructure, and to do this there must be a comprehensive, coherent, strategic and long-range approach to planning, maintenance and investment.

Our respective Governments should consider new opportunities to invest in, renew and expand the research infrastructure, particularly in areas that could underpin major scientific advances, help to address global challenges and stimulate economic activity on a large scale.

Science and engineering clusters are vitally important to their local economies, but they also have a magnetic effect in the wider region and beyond (sometimes nationally and internationally), drawing in people, skills, suppliers, innovators and investment.

We must encourage the active planning and building of key infrastructure across the island e.g. putting in place policies to support local skills development, supply chains and building application infrastructure around centres, facilities and clusters.

For our part, the IOP is committed to working with our community to build the first network connecting physics-based innovation centres and facilities in the UK and Ireland.

10. Plan for future skills requirements

Innovation surveys have shown us over many years that many companies can find it challenging to access the skills needed to undertake or integrate high quality R&D within successful, competitive businesses[24]. There is a clear need, and opportunity, for the Higher Education sector to work more closely with industry, to identify and fill these skill shortages through a range of pathways from technical to academic offerings.

The Northern Ireland Skills Barometer[25] highlights the importance and value of skilled workers, from apprentice to graduate level, to the economy in Northern Ireland. In particular, it notes that the sectors contributing the largest absolute increase in jobs over the period 2018-28 are professional scientific and technical services (11,780), however the demand will not be met by the current numbers within the education system, and the support of vocational and technical routes are crucial in this regard.

[24] Skills shortages 'stifling innovation': Some 75% of survey respondents say their company is facing 'talent constraints' https://www.pwc.ie/publications/2019/hrd-survey-report-getting-your-people-strategy-right.pdf
[25] https://www.economy-ni.gov.uk/publications/northern-ireland-skills-barometer-2019-update

Aside from the acute financial and opportunity costs of these shortages and gaps there is a further fundamental drawback. Without sufficient numbers of skilled STEM workers, we cannot realise the benefits of additional financial investment in R&D. So, the future of HE must be considered in light of an R&D roadmap and a National Skills Strategy in both Ireland and Northern Ireland.

To help inform the national debate about skills and future skills policy, the IOP is undertaking a quantitative assessment of the occupations and sectors which make use of physics-related skills across the economy[26], and the extent to which there is a shortage of these skills, as well as a more qualitative assessment of future demand for skills in a number of focus areas that make significant use of physics-related technologies of economic and societal importance.

[26] IOP Workforce Skills Project

Appendix 1: IOP PHYSICS INSIGHTS DATA BRIEF

Data brief for the Republic of Ireland and Ireland looking at Physics Funding in Higher Education as well as student and staff data in Higher Education.

Physics Funding in Higher Education in the Republic of Ireland

This section includes a brief overview of research funding for physics via Science Foundation Ireland and Irish Research Council.

Breakdown of Science Foundation Ireland Grants, 2010 to 2019

Science Foundation Ireland (SFI) is the largest grant funder of physics in the Republic of Ireland, and the largest R&D department / agency in Ireland with a 2020 budget of €198m- 22.9% of the total R&D budget for 2020.

Method Notes

The following takes grants from https://www.sfi.ie/about-us/governance/open-data/ using subject labels from https://www.sfi.ie/funding/researcher-database/. Primary subjects are allocated a physics level, and the value of grants split into physics and non-physics.

Grant values are split evenly across the start and end dates of the grants but are estimated values. They represent estimated spend and do not exactly match the Irish government's budget allocation for SFI's R&D for the same year. For example, total grant values in the table below sum to €242m in 2019, while the 2019 budget outturn for SFI in the Republic of Ireland's R&D Budget[27] was €188.3M.

Findings

Broadly, physics and other fundamental science disciplines have seen decreased funding over the last decade, as a greater focus has been placed onto applied research areas.

In Figure *1- SFI grants by subject* the grant value has been split into

- Grants specifically labelled as physics or astronomy
- The portion of all other grants estimated to be physics-related
- The remaining value of those grants, which is non-physics
- Unlabelled grants (unknown)

This indicates that physics and astronomy has dropped from representing 11% of grant value in 2010 to 6% of the known value in 2019. Non-physics funding has grown from 66% of the known total in 2010 to 70% in 2019.

[27] https://enterprise.gov.ie/en/Publications/Publication-files/The-R-D-Budget-2019-2020.pdf, page 18

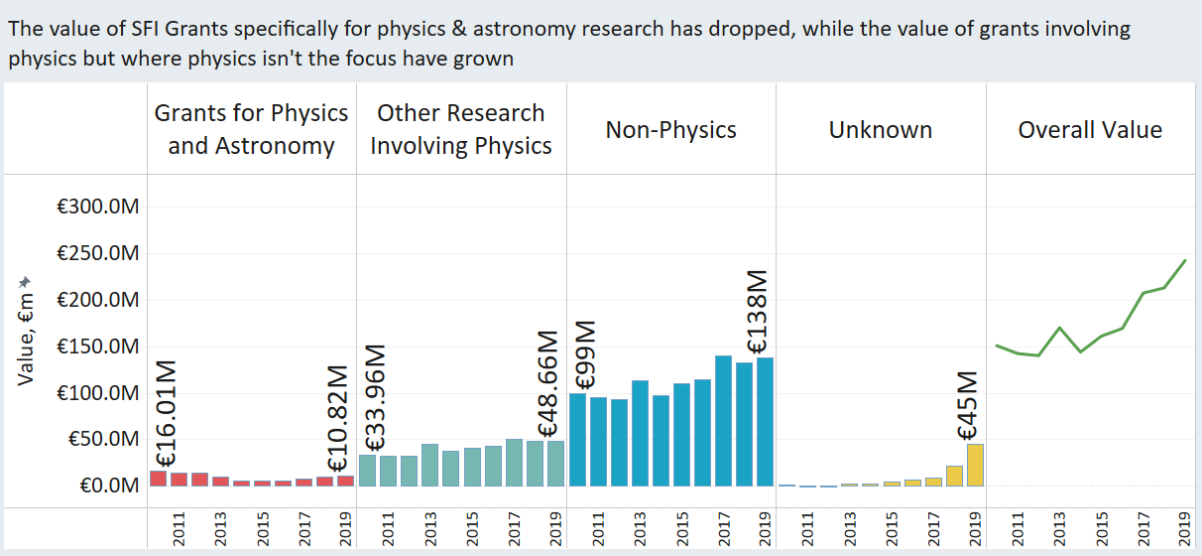


Figure 1- SFI grants by subject

Grant funding: Physics and non-physics: Millions of €

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Physics & Astronomy	16.0	14.0	14.0	10.0	6.0	5.0	5.0	7.0	10.0	11.0
Other Physics	34.0	33.0	33.0	45.0	38.0	41.0	43.0	51.0	48.0	49.0
Non-Physics	99.0	95.0	93.0	113.0	98.0	110.0	114.0	140.0	133.0	138.0
Unknown	2.0	0.0	0.0	2.0	3.0	5.0	7.0	9.0	22.0	45.0
Overall	151.0	143.0	140.0	170.0	144.0	161.0	169.0	207.0	213.0	242.0

Share of Total, ex. Unknown

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Physics and Astronomy	11%	10%	10%	6%	4%	3%	3%	4%	5%	6%
Other Physics	23%	23%	24%	27%	27%	26%	27%	26%	25%	25%
Non-Physics	66%	67%	66%	67%	69%	71%	70%	71%	70%	70%
Overall	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 1 – value & share of SFI grants by subject

Breakdown of grants by subject

Table 2 indicates that recent grants involving physical sciences focussed more on engineering and materials science than on physics and chemistry.

Computational subjects and engineering have attracted a greater share of grants

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
astronomy	€1M	€0M	€0M	€0M	€0M	€0M	€1M	€1M	€1M	€1M
physics	€15M	€14M	€14M	€10M	€6M	€5M	€5M	€7M	€10M	€10M
agriculture	€1M	€1M	€1M	€1M	€1M	€1M	€2M	€4M	€3M	€5M
biochemistry	€8M	€7M	€6M	€6M	€5M	€3M	€3M	€3M	€2M	€1M
biomedicine	€9M	€9M	€11M	€14M	€13M	€20M	€20M	€30M	€25M	€21M
chemistry	€11M	€10M	€9M	€12M	€13M	€14M	€15M	€16M	€14M	€9M
computational and mathematical biology	€3M	€3M	€3M	€7M	€12M	€11M	€10M	€10M	€10M	€9M
computer and information sciences	€19M	€17M	€17M	€23M	€12M	€21M	€21M	€23M	€25M	€30M
earth and environmental sciences	€2M	€1M	€1M	€1M	€1M	€3M	€5M	€4M	€5M	€9M
energy, energy storage, renewables	€4M	€5M	€6M	€6M	€5M	€7M	€8M	€8M	€8M	€7M
engineering	€9M	€9M	€9M	€11M	€12M	€13M	€16M	€23M	€23M	€36M
food science	€0M	€0M	€0M	€0M	€0M	€0M	€1M	€2M	€2M	€2M
genetics and genomics	€5M	€5M	€3M	€3M	€2M	€2M	€2M	€4M	€4M	€4M
immunity and infection	€9M	€9M	€8M	€8M	€6M	€5M	€6M	€7M	€7M	€6M
materials science	€11M	€10M	€10M	€19M	€15M	€14M	€15M	€21M	€19M	€16M
mathematics	€6M	€6M	€6M	€4M	€3M	€3M	€2M	€1M	€2M	€3M
microbiology	€7M	€7M	€9M	€17M	€16M	€13M	€12M	€13M	€11M	€6M
molecular and cell biology	€14M	€14M	€13M	€12M	€10M	€7M	€5M	€8M	€5M	€4M
networking and communications systems	€8M	€8M	€9M	€10M	€6M	€10M	€11M	€10M	€10M	€11M
neuroscience and behaviour	€6M	€6M	€5M	€4M	€3M	€3M	€4M	€5M	€6M	€8M
n/a	€2M	€0M	€0M	€2M	€3M	€5M	€7M	€9M	€22M	€45M

Table 2- annualised grant value by primary subject. n/a indicates no subject was found

Irish Research Council Awards

The Irish Research Council (IRC) had a budget for 2020 of €40.5M. It funds a range of humanities and science research.

Method Notes

The following is based on an analysis of https://research.ie/awardees/ since 2013, when more detailed discipline information was made available. Most of the awards relate to Early Career award categories.

Findings

STEMM awards are more likely to go to biology, chemistry, and or medicine than physics, but physics awards have been consistent over the last 7 years.

The overall number of awards to STEMM subjects is a little lower than the number of awards to other subjects, with 165 STEMM awards in 2020 compared with 199 for other subjects.

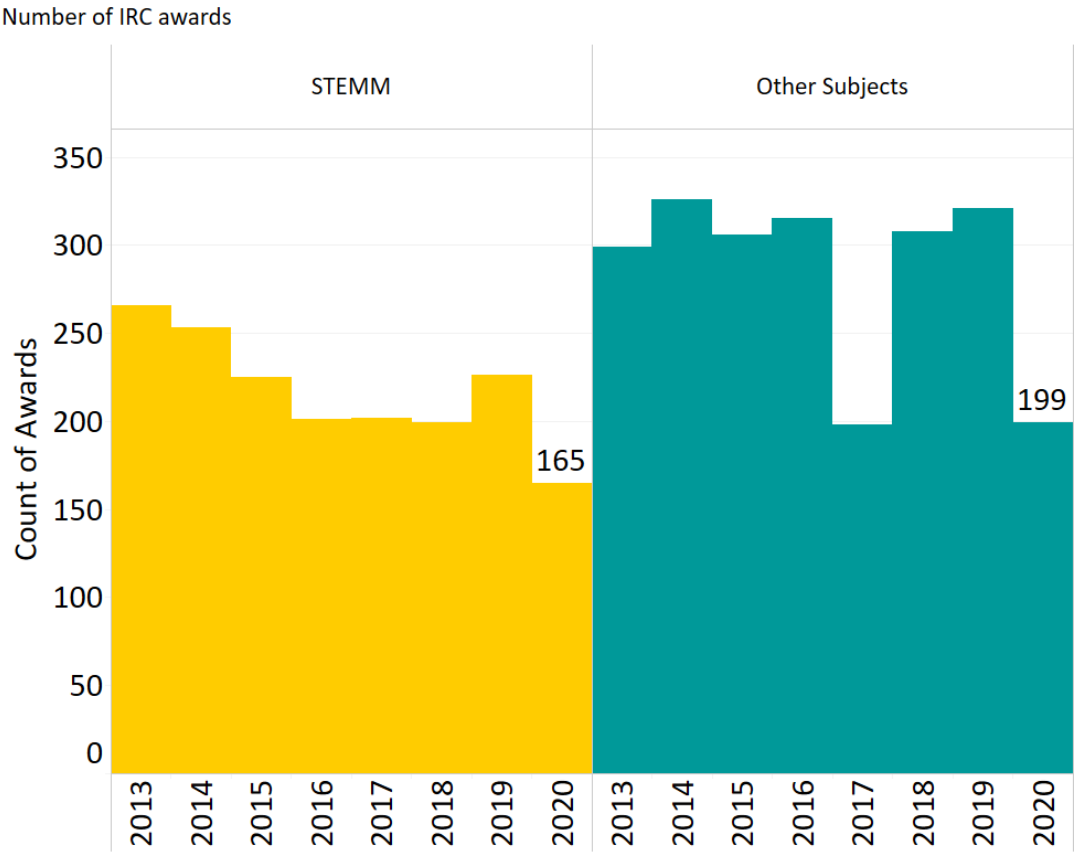


Figure 2 – number of IRC Awards broken down to STEMM and non-STEMM, 2013 to 2020

There were 21 physics awards in 2020 – the fourth-highest among the STEMM subjects.

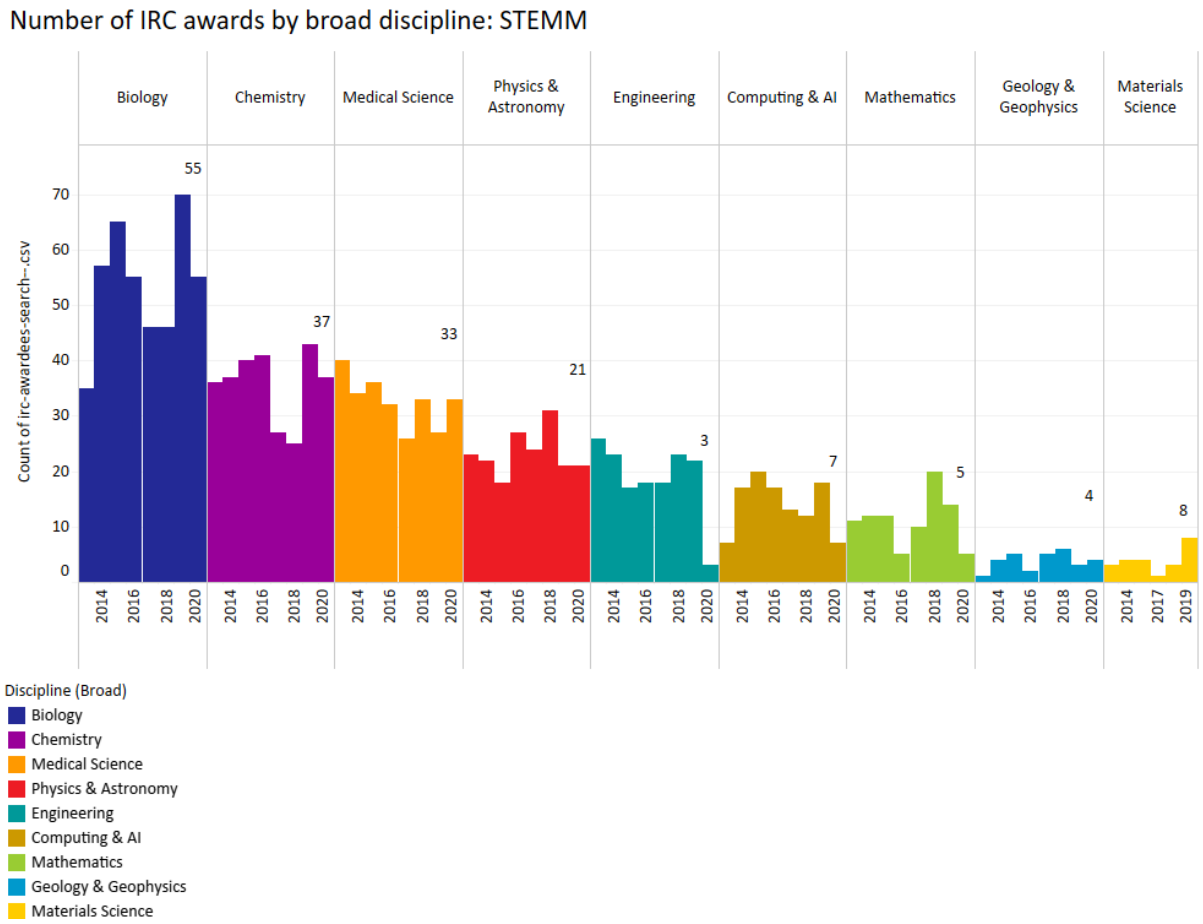


Figure 3- STEMM awards broken down by broad discipline

Physics Funding in Higher Education in Northern Ireland

This section includes brief analysis of physics' share of funding for recurrent "QR" funding and targeted grant funding via UKRI.

QR Funding for Physics in Northern Ireland

QR recurrent funding is based on submissions to the Research Excellence Framework. The funding is not provided with a specific purpose in mind, but is based on research in given subjects, including physics.

https://www.economy-ni.gov.uk/publications/university-recurrent-research-grant-summary-tables

The allocation to subjects in Northern Ireland in 2018/19 indicates that physics is responsible for just over 4% of universities' recurrent research funding; the 6th-highest-ranked subject.

QR Funding by subject in Northern Ireland, 2018/19

Subject	Allocation	
Physics	£1.2M	4.31%
Allied Health Professions, Dentistry, Nursing and Pharmacy	£5.3M	18.24%
Clinical Medicine	£1.7M	5.87%
Electrical and Electronic Engineering, Metallurgy and Materials	£1.4M	4.92%
Architecture, Built Environment and Planning	£1.4M	4.85%
Agriculture, Veterinary and Food Science	£1.3M	4.43%
Business and Management Studies	£1.2M	4.15%
Law	£1.1M	3.92%
English Language and Literature	£1.1M	3.75%
Aeronautical, Mechanical, Chemical and Manufacturing Engineering	£1.1M	3.68%
Computer Science and Informatics	£1.1M	3.64%
Music, Drama, Dance and Performing Arts	£1.0M	3.59%
Psychology, Psychiatry and Neuroscience	£0.9M	3.16%
Modern Languages and Linguistics	£0.8M	2.78%
Art and Design: History, Practice and Theory	£0.8M	2.72%
Social Work and Social Policy	£0.8M	2.71%
History	£0.8M	2.64%
Earth Systems and Environmental Sciences	£0.8M	2.60%
Public Health, Health Services and Primary Care	£0.7M	2.51%
Education	£0.7M	2.50%
Chemistry	£0.7M	2.42%
Geography, Environmental Studies and Archaeology	£0.6M	2.18%
Civil and Construction Engineering	£0.6M	2.17%
Politics and International Studies	£0.5M	1.88%
Anthropology and Development Studies	£0.3M	1.08%
Sociology	£0.3M	0.90%
Communication, Cultural and Media Studies, Library and Information Management	£0.2M	0.77%
Sport and Exercise Sciences, Leisure and Tourism	£0.2M	0.70%
Mathematical Sciences	£0.2M	0.59%
Philosophy	£0.1M	0.33%

Table 3- QR Funding by subject in Northern Ireland, 2018/19

UKRI Grants in Northern Ireland

The following data are based on an IOP analysis of grants between 2010 and 2020 from https://gtr.ukri.org/.

Method Notes:

Project values are split into physics and non-physics portions using a classification model based on projects' research topics, and this generates an overall physics funding level and a non-physics funding level.

Grant values are split equally between each month of operation between the start date and the end date of a grant, then aggregated to an overall annual value. A project starting in January 2020 and ending in December 2021 would only have half its value included.

As this analysis focuses on university funding, all research council grants are included, but not grants from Innovate UK.

Regions are based on the region of the institution, where known. The lead institution and department is allocated 100% of the grant value.

Northern Ireland's Share of UK Physics Funding

Higher Education Institutions in Northern Ireland received 1.11% of all physics funding via UKRI grants in 2020.

Northern Ireland's 1.11% share of UK physics funding is a reduction from the share in 2010, when 1.94% of UK physics funding went to Northern Ireland Higher Education Institutions. In 2020, Northern Ireland's share of funding for physics was lower than the overall share (1.11% for physics, and 1.18% for all subjects). Since Northern Ireland makes up 2.83% of the UK's population[28], Northern Ireland's research grant share is comparatively low.

Physics and All Subject Funding by Region, 2020
Northern Ireland's share of physics funding is lower than its share of all grant funding

UK Region / Nation	Physics Funding	All Funding		
South East (England)	£169M	£496M	19.66%	17.27%
Scotland	£108M	£353M	12.56%	12.30%
North West (England)	£100M	£284M	11.65%	9.88%
London	£96M	£410M	11.23%	14.28%
East of England	£84M	£313M	9.77%	10.91%
Yorkshire and The Humber	£82M	£251M	9.52%	8.75%
South West (England)	£55M	£215M	6.37%	7.48%
West Midlands (England)	£49M	£160M	5.70%	5.57%
East Midlands (England)	£40M	£145M	4.66%	5.05%
North East (England)	£37M	£108M	4.27%	3.78%
Wales	£30M	£102M	3.52%	3.54%
Northern Ireland	£10M	£34M	1.11%	1.18%
			£0M £100M £200M Physics Funding	200M 400M 600M All Funding

Figure 4 Northern Ireland's share of physics and al UKRI grant funding, 2020

28 https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2019estimates

Share of Research Councils' Funding in 2010, 2015, and 2020

Region	Year 2010	2015	2020
Northern Ireland	1.16%	0.97%	1.18%
East of England	13.32%	12.84%	10.91%
London	14.32%	15.42%	14.28%
North East (England)	3.70%	2.88%	3.78%
North West (England)	8.21%	8.72%	9.88%
Scotland	13.37%	13.47%	12.30%
Wales	2.91%	3.22%	3.54%
West Midlands (England)	4.83%	5.11%	5.57%
Yorkshire and The Humber	7.55%	7.64%	8.75%
East Midlands (England)	6.98%	5.75%	5.05%
South East (England)	17.78%	17.64%	17.27%
South West (England)	5.86%	6.37%	7.48%
Grand Total	100.00%	100.00%	100.00%

Share of Research Councils' Physics Funding in 2010, 2015, and 2020

Region	Year 2010	2015	2020
Northern Ireland	1.94%	1.15%	1.11%
East of England	10.18%	9.51%	9.77%
London	12.51%	14.17%	11.23%
North East (England)	4.26%	2.89%	4.27%
North West (England)	9.26%	9.58%	11.65%
Scotland	13.42%	12.60%	12.56%
Wales	2.53%	2.75%	3.52%
West Midlands (England)	5.14%	5.74%	5.70%
Yorkshire and The Humber	8.52%	9.45%	9.52%
East Midlands (England)	6.63%	5.40%	4.66%
South East (England)	20.46%	20.60%	19.66%
South West (England)	5.14%	6.15%	6.37%
Grand Total	100.00%	100.00%	100.00%

Table 4– Change in Northern Ireland's share of UKRI Research Council Grant Funding, 2010, 2015 and 2020

Physics Funding development in Northern Ireland

Between 2010 and 2020, research grants for physics fell before recovering to close to 2020 levels (no adjustment for inflation). Overall, physics funding fell by 3% from 2010 and 2020, while non-physics funding rose 109%

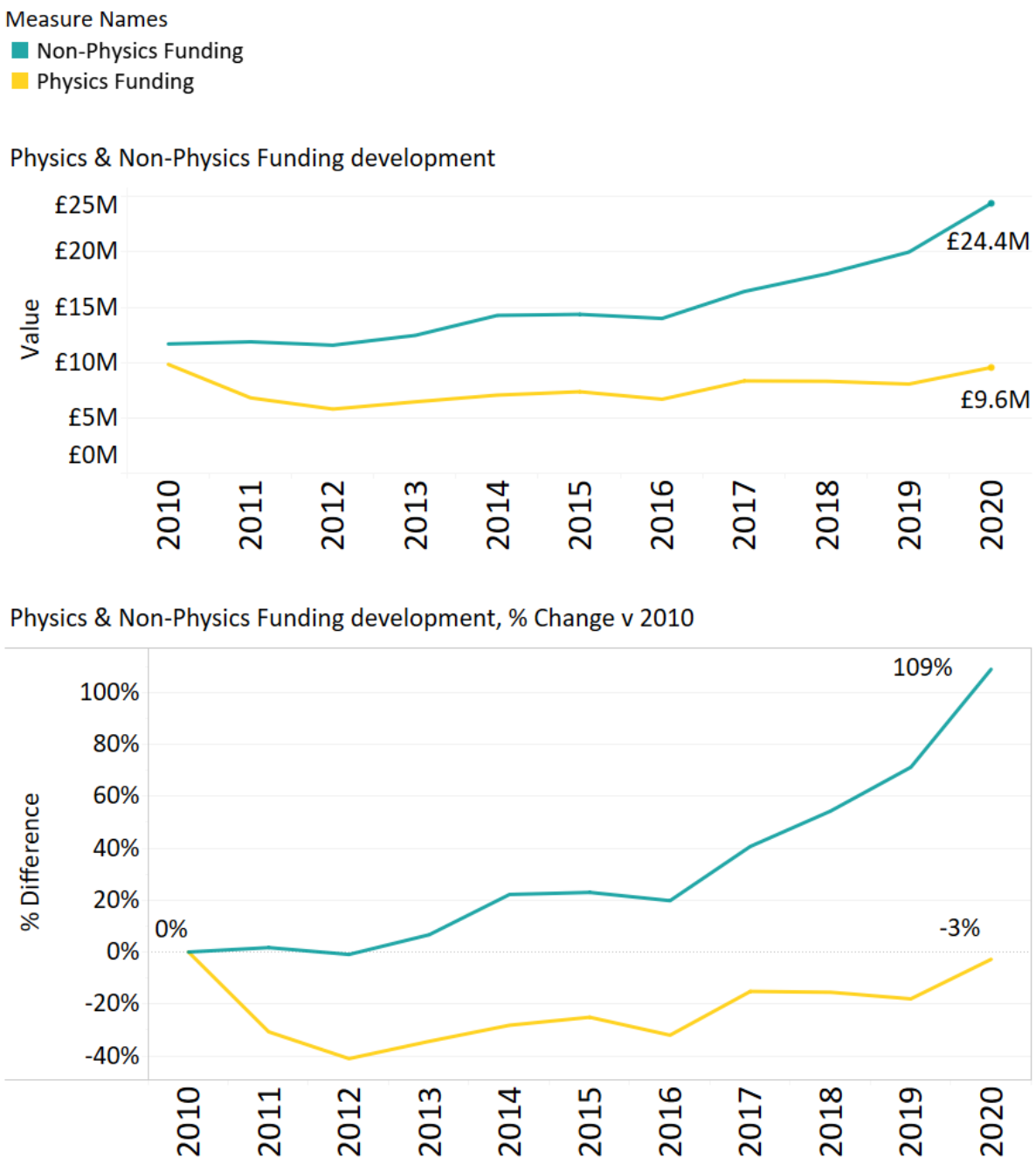


Figure 5- change in Northern Ireland grant funding for physics via UKRI, 2010 to 2020

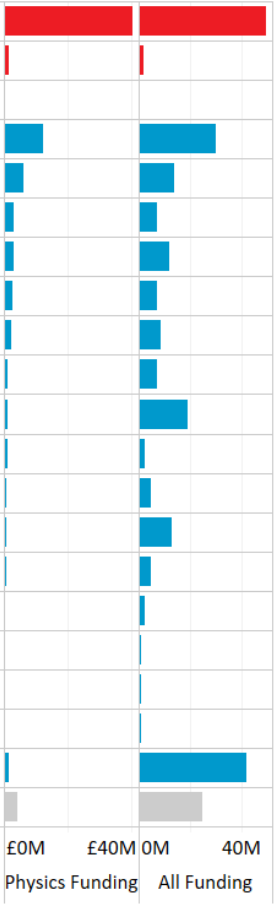
Physics Centres in Northern Ireland

The school of mathematics and physics at Queen's University Belfast is the best-funded department in Northern Ireland – both for physics and overall – with combined grant funding of £49 million between 2010 and 2020.

Other important centres for physics research include electronics and electrical engineering, chemistry, and materials departments and institutes.

Departments and Physics/All funding
2010 to 2020 inclusive

Organisation / Department	Physics Funding	All Funding
queen's university of belfast / sch of mathematics and physics	£40M	£49M
armagh observatory / astronomy	£1M	£2M
armagh planetarium / northern ireland space office	£0M	£0M
queen's university of belfast / electronics electrical eng and comp sci	£12M	£30M
queen's university of belfast / sch of chemistry and chemical eng	£6M	£14M
university of ulster / nanotechnology and adv materials inst	£3M	£7M
queen's university of belfast / centre for experimental medicine	£3M	£12M
queen's university of belfast / sch mechanical and aerospace engineering	£3M	£7M
queen's university of belfast / sch of pharmacy	£2M	£9M
queen's university of belfast / sch of natural and built environment	£1M	£7M
queen's university of belfast / centre for public health	£1M	£19M
university of ulster / sch of built environment	£1M	£2M
queen's university of belfast / centre for cancer res and cell biology	£1M	£5M
queen's university of belfast / sch of biological sciences	£1M	£13M
queen's university of belfast / medicine dentistry and biomedical sci	£1M	£5M
university of ulster / sch of environmental sciences	£0M	£2M
university of ulster / sch of computing & mathematical sci	£0M	£1M
university of ulster / sch of computing & intelligent systems	£0M	£1M
university of ulster / school of engineering	£0M	£1M
Other Departments	£2M	£42M
Unspecified	£4M	£25M



Colour
- Physics / Astronomy
- Other
- Unspecified

Figure 6- Lead departments receiving physics funding and other funding, 2010 to 2020 combined.

Irish Student and Staff Data

Student Data

Republic of Ireland

Table 1 below is a data provided by Higher Education Authority[29] (HEA) about the student demographic in Irish universities in the academic year 2018/19. A total of 1,242 Physics undergraduates and postgraduates were enrolled that year, with 77% of the students being male. 68% of physics students were under the age of 23 years old, and 76% of the student population studying physics being undergraduates.

Subject	Number of Enrolled Students	Female Students [%]	Postgraduates [%]	>23 Years Old [%]	From Outside of ROI [%]
Physics	1242	23	24	32	11
Chemistry	2733	51	14	25	8
Biology	2970	63	6	11	4
Mathematics and Statistics	2524	31	19	22	19
Engineering	4375	12	8	34	8

Table 1: Data from HEA for 2018/19 for each subject. Note the columns with [%] denotes percentage of the total enrolled students

Physics had fewer students enrolled in 2018/19 than its other STEM counterparts but had the highest proportion of postgraduates. Physics also had one of the highest proportion of students over the age of 23 years old (32%), the only subject with a higher proportion of older students was engineering (34%). Physics also attracted one of the highest proportions of students from outside of the ROI (11%), second only to Mathematics and Statistics (19%).

Northern Ireland

Please note that the below data from Higher Education Statistical Agency (HESA) is rounded and Physics has been grouped with Astronomy and Mathematics so that individual institutions cannot be identified.

In the tables below, two fields, Hep Region and Domicile, are used. Hep Region is the region in which the higher education institution is located. Domicile is the country a student treats as their permanent home, which may be different from their country of birth.

For all years shown in table 2, Astronomy, Mathematics, Physics had more students enrolled than Biology and Chemistry. The number of students enrolled in Astronomy, Mathematics and Physics has increased since 2010/11 by more than 25%.

[29] https://hea.ie/

Hep Region	Grouped Subjects	Academic Year 2010/11	2012/13	2014/15	2016/17	2018/19
Northern Ireland	Astronomy, Mathematics, Physics	565	650	730	760	715
	Biology	430	360	435	395	445
	Chemistry	215	225	210	230	235
	Computer sciences	2,435	2,890	3,690	3,750	3,630
	Electronic & electrical engineering	305	395	410	415	350
	All other subjects	34,555	32,905	32,230	31,345	31,685

Table 2: Northern Ireland student data from HESA from 2010/11 to 2018/19

Table 3 shows that the number of Physics students studying in the UK from Northern Ireland has increased by approximately one third from 2010/11 to 2018/19. This increase is larger than the increases seen in Biology, Chemistry and Electronic and Electrical Engineering. Computer sciences saw the largest increase in student numbers in the same period for students from Northern Ireland.

The increase in the number of Physics students was not replicated in students from Ireland. Though the number of students varied each year, overall, the number of Physics students remained largely unchanged. The number of Irish students studying other STEM subjects also showed the same trend.

Domicile	Grouped Subjects	Academic Year 2010/11	2012/13	2014/15	2016/17	2018/19
Ireland	Astronomy, Mathematics, Physics	145	145	155	140	145
	Biology	145	130	130	135	135
	Chemistry	50	55	60	50	65
	Computer sciences	160	170	215	220	215
	Electronic & electrical engineering	110	95	70	65	50
	All other subjects	11,570	9,540	8,375	7,950	7,350
Northern Ireland	Astronomy, Mathematics, Physics	1,040	1,145	1,265	1,340	1,350
	Biology	565	535	610	625	685
	Chemistry	390	390	375	395	365
	Computer sciences	3,010	3,585	4,485	4,805	4,870
	Electronic & electrical engineering	405	505	520	525	445
	All other subjects	47,810	47,270	46,170	46,020	46,945

Table 3: UK Physics student data from HESA from 2010/11 to 2018/19 by domicile

Table 4 shows the breakdown of how many students are studying STEM subjects in Northern Ireland compared to the rest of the UK by domicile (only Ireland and Northern Ireland have been included here) since 2010/11. The number of students from Northern Ireland studying in Northern Ireland and the rest of the UK has increased over this period. For students from Ireland, there has been only a small increase in the number studying in Northern Ireland. The number of students studying Physics in the rest of the UK from Ireland is less stable and no clear pattern is obvious.

Domicile	Hep Region	Grouped Subjects	Academic Year 2010/11	2012/13	2014/15	2016/17	2018/19
Ireland	Northern Ireland	Astronomy, Mathematics, Physics	10	15	15	15	20
		Biology	40	25	30	25	30
		Chemistry	10	5	10	5	5
		Computer sciences	45	50	60	40	45
		Electronic & electrical engineering	10	15	5	10	15
		All other subjects	2,505	1,925	1,685	1,585	1,480
	Rest of UK	Astronomy, Mathematics, Physics	135	130	140	125	125
		Biology	105	105	100	110	105
		Chemistry	45	50	45	45	60
		Computer sciences	115	120	155	180	170
		Electronic & electrical engineering	95	85	65	55	35
		All other subjects	9,060	7,615	6,690	6,365	5,870
Northern Ireland	Northern Ireland	Astronomy, Mathematics, Physics	550	630	715	745	695
		Biology	390	335	405	370	415
		Chemistry	205	220	200	220	225
		Computer sciences	2,395	2,840	3,630	3,710	3,585
		Electronic & electrical engineering	295	380	405	405	340
		All other subjects	32,045	30,975	30,545	29,760	30,205
	Rest of UK	Astronomy, Mathematics, Physics	490	515	550	595	655
		Biology	170	200	205	255	275
		Chemistry	185	170	175	175	140
		Computer sciences	615	745	855	1,095	1,285
		Electronic & electrical engineering	110	125	115	120	105
		All other subjects	15,765	16,295	15,625	16,260	16,735

Table 4: Northern Ireland student data from HESA from 2010/11 to 2018/19 by student domicile

Table 5 shows that there are more male physics students than female physics students in all HEP regions. Approximately one third of students from Northern Ireland, studying Astronomy, Mathematics and Physics in Northern Ireland are female in 2018/19. This figure is similar to 2010/11 where 36% of students studying Physics from Northern Ireland were female.

			Academic Year / gender					
			2010/11		2014/15		2018/19	
Domicile	Hep Region	Grouped Subjects	female	male	female	male	female	male
Ireland	Northern Ireland	Astronomy, Mathematics, Physics	0	10	5	15	5	15
		Biology	20	20	15	15	20	10
		Chemistry	5	5	10	5	5	0
		Computer sciences	5	35	10	50	15	30
		Electronic & electrical engineering		10		5	0	10
		All other subjects	1,495	1,015	1,055	630	1,000	485
	Rest of UK	Astronomy, Mathematics, Physics	35	100	45	90	30	95
		Biology	60	45	70	30	65	45
		Chemistry	25	20	25	25	30	35
		Computer sciences	25	90	35	120	25	145
		Electronic & electrical engineering	10	85	15	55	5	35
		All other subjects	5,175	3,890	4,330	2,355	3,920	1,945
Northern Ireland	Northern Ireland	Astronomy, Mathematics, Physics	220	335	255	460	235	460
		Biology	225	165	215	185	210	200
		Chemistry	100	105	90	110	85	140
		Computer sciences	585	1,805	890	2,740	835	2,755
		Electronic & electrical engineering	35	260	45	355	40	300
		All other subjects	19,420	12,625	18,075	12,470	18,430	11,780
	Rest of UK	Astronomy, Mathematics, Physics	175	310	195	355	225	430
		Biology	90	80	110	95	155	115
		Chemistry	95	90	70	105	65	75
		Computer sciences	85	530	160	695	275	1,010
		Electronic & electrical engineering	20	90	15	100	20	85
		All other subjects	9,075	6,690	9,315	6,310	10,150	6,575

Table 5: Northern Ireland student data by gender from HESA from 2010/11 to 2018/19

Table 6 shows the number of undergraduate and postgraduate students, for each STEM subject, in the region they are studying, and which domicile they are from. Astronomy, Mathematics and Physics students from Ireland are more likely to study in England, Scotland or Wales than they are to

study in Northern Ireland. For those students from Northern Ireland, they stay in Northern Ireland and move to the rest of the UK in order to study in roughly equal numbers.

The number of Physics postgraduate students from Northern Ireland, studying in Northern Ireland and in the rest of the UK, has slightly increased in the period from 2010/11 to 2018/19.

			Academic Year / Postgrad					
			2010/11		2014/15		2018/19	
Domicile	Hep Region	Grouped Subjects	Postgraduate	Undergraduate	Postgraduate	Undergraduate	Postgraduate	Undergraduate
Ireland	Northern Ireland	Astronomy, Mathematics, Physics	5	5	5	10	10	10
		Biology	35	5	25	5	20	5
		Chemistry	5	5	5	5	0	5
		Computer sciences	10	35	15	45	15	30
		Electronic & electrical engineering	0	10	0	5	5	5
		All other subjects	1,350	1,155	770	915	660	820
	Rest of UK	Astronomy, Mathematics, Physics	85	50	80	60	75	50
		Biology	45	60	50	50	55	50
		Chemistry	25	15	30	15	35	25
		Computer sciences	55	60	70	85	80	95
		Electronic & electrical engineering	70	25	40	25	25	15
		All other subjects	3,715	5,345	2,775	3,910	2,320	3,545
Northern Ireland	Northern Ireland	Astronomy, Mathematics, Physics	60	490	85	630	85	610
		Biology	140	250	115	290	125	290
		Chemistry	50	155	50	155	40	185
		Computer sciences	115	2,280	285	3,345	330	3,255
		Electronic & electrical engineering	35	260	30	375	35	305
		All other subjects	4,390	27,660	3,940	26,600	4,235	25,970
	Rest of UK	Astronomy, Mathematics, Physics	50	440	45	505	70	585
		Biology	20	150	25	180	15	255
		Chemistry	25	160	25	150	20	115
		Computer sciences	35	585	40	815	55	1,230
		Electronic & electrical engineering	10	100	10	110	20	90
		All other subjects	1,590	14,175	1,245	14,380	1,495	15,230

Table 6: Northern Ireland student data by undergraduate and postgraduate students from HESA from 2010/11 to 2018/19

Staff Data

Republic of Ireland

From the HEA 2018 report[30], 41% of academic core-funded staff in STEMM subjects were female as of December 2017. Trinity College Dublin had the highest proportion of female STEMM academic core-funded staff (44%). The report provides no further breakdowns for Physics academic staff.

Northern Ireland

From table 7, 25% of Physics staff are female. This is less than all other STEM subjects apart from Electrical, electronic and computer engineering which also has 25% female staff.

		Academic Year / Gender	
		2018/19	
HE Provider	Set Cost Centre Markers	Female	Male
Northern Ireland	(112) Biosciences	170	150
	(113) Chemistry	50	80
	(114) Physics & (122) Mathematics	35	105
	(119) Electrical, electronic & compute..	65	195
	(121) IT, systems sciences & compute..	55	140
	Other	3,330	2,375

Table 7: STEM staff for Northern Ireland from HESA

[30] https://hea.ie/assets/uploads/2018/01/Higher-Education-Institutional-Staff-Profiles-by-Gender-2018.pdf