

Physics following a 'no deal' Brexit

September 2019

1. Introduction

This paper sets out the key issues to affect physics in the event of a 'no deal' Brexit, and the steps being taken by the British Government and European Union to mitigate negative consequences where possible. It is not intended to provide a comprehensive overview of every issue but focuses on the major changes that will have the greatest consequences for the physics community.

2. Brexit and physics - summary and overview

The prospect of leaving without a deal is becoming increasingly likely as the UK and the EU fail to make progress resolving key issues such as the [Irish backstop](#) and delivering support for a deal in parliament.

A 'no deal' Brexit would have a significant impact on the science community. It represents the most disruptive scenario for science, and physics specifically, in the UK.

Direct impacts would include the UK losing access to key funding streams and the immediate cessation of free movement for European scientists, with access to EU countries limited to a 90-day period of visa-free travel. The UK would also immediately leave key frameworks such as Euratom, which regulates the safe movement of nuclear material and provides access to Fusion for Europe, and the European Observatory on the Supply of Medical Radioisotopes.

Issue	Overview	Impact
Horizon 2020	<ul style="list-style-type: none"> UK loses access to key programmes such as the European Research Council, Marie Skłodowska-Curie Actions and Enhanced EIC (formerly SME Instrument) The UK can continue to participate in calls that are open to third countries Disruption to COST Actions payments which are not currently guaranteed by UK government 	
Horizon Europe	<ul style="list-style-type: none"> The UK Government position is that the UK will seek association if possible/acceptable Potential for a UK-only alternative to be established 	
Mobility	<ul style="list-style-type: none"> The UK will no longer benefit from freedom of movement The UK and Ireland will retain the Common Travel Area Visa-free travel will be possible for up to 90 days in any given 180-day period 	
Euratom	<ul style="list-style-type: none"> The UK will no longer be a member of Euratom There are cooperation agreements and measures in place to enable the import of radioisotopes 	
International Thermonuclear Experimental Reactor	<ul style="list-style-type: none"> The UK will no longer be a member of Fusion for Energy 	
ERICs and other infrastructure	<ul style="list-style-type: none"> Ongoing involvement in The European Research Infrastructure Consortium (ERIC) has been guaranteed through a statutory instrument The UK will lose access to key programmes such as Copernicus, Galileo and Space Surveillance and Tracking 	
ESFRI	<ul style="list-style-type: none"> The UK will no longer be a member of The European Strategy Forum on Research Infrastructures (ESFRI), weakening the UK's influence on the development and priorities for research, but will remain a contributor to a number of large facilities 	
Intergovernmental facilities and organisations	<ul style="list-style-type: none"> Largely unaffected although individual projects may be impacted if in receipt of European funding. 	
National facilities	<ul style="list-style-type: none"> Ability to travel and access to facilities for significant periods of time could be impacted 	

3. Horizon 2020 and European funding

The Horizon 2020 research and innovation programme provides about €80 billion in funding, available over seven years (2014 to 2020); UK researchers and businesses have secured €5.1 billion in funding to date (14.3% of the total). The UK is currently a net contributor to the overall EU budget but it has been a net beneficiary of research funding.

While the UK remains a member of the EU, UK researchers and businesses remain eligible to bid for all Horizon 2020 calls. The UK and EU's original intention, agreed as part of the Financial Settlement which was signed-off by both UK and European Commission negotiators in a draft Withdrawal Agreement and welcomed by the other 27 EU countries at the March European Council, was to ensure that UK researchers and businesses would be able to participate in Horizon 2020. However, in the event that the UK leaves the EU without a deal, the UK would only be eligible for the parts of Horizon 2020 that are open to [‘third country participation.’](#)

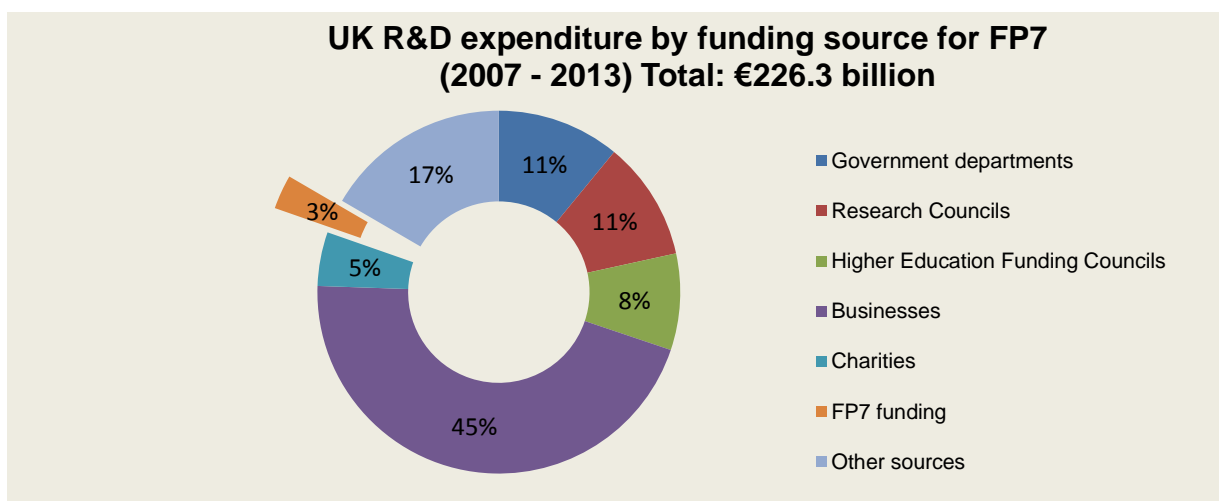
Third country participation does not extend to all Horizon 2020 calls; some that are excluded are European Research Council (ERC) grants, some Marie Skłodowska-Curie Actions (MSCA) and the Enhanced EIC (formerly SME Instrument) (a business innovation support scheme specifically targeting small and medium-sized enterprises).

The Government has created a Horizon 2020 funding guarantee, and a guarantee extension.

- [The funding guarantee](#) would cover all successful competitive UK bids to Horizon 2020 submitted before exit day. The Government has also [announced](#) that there will be funding and processes in place to ensure that bids made to European programmes up to exit day can be assessed by UKRI if not assessed by the EU, ensuring that ‘in-flight’ bids aren’t jeopardised.
- [The guarantee extension](#) would apply to successful UK bids for third country participation projects from exit day and for the lifetime of those projects. However, the UK would still lose access to calls that are not open to third country participation. The Royal Society estimates that the cumulative impact of this will equate to a loss of around €500 million for researchers and businesses.

The guarantee and extension do not cover funding for organisations from other countries in consortia with UK participants. It’s unclear what will happen where a UK participant leads a consortium and is responsible for distributing funding to other non-UK participants. There are also potential issues with the UK’s change in status from a member state to a third country. For example, this may mean that some consortia no longer meet the minimum threshold requirements for member state participants.

In event of a ‘no deal’ scenario, UKRI will deliver the Government’s guarantee. This means that all recipients of grants from the UK Horizon 2020 and the Research Fund for Coal and Steel must register their grants on its portal: <https://apply-for-innovation-funding.service.gov.uk/eu-grant/overview>



European Collaboration in Science and Technology (COST) Association is a non-EU organisation which supports the building of networks across the EU (COST Actions), for example providing support for travel and meetings. UK researchers are one of the major beneficiaries of COST, with more than 2,500 participants per year. COST Actions were thought to be unaffected by Brexit but it is funded through the Horizon 2020 work programme and, as such, significant impacts are now beginning to emerge. Under a 'no deal' Brexit, costs incurred by researchers may no longer be eligible for reimbursement. Multiple organisations are actively lobbying on this issue and BEIS is aware.

4. Horizon Europe

The UK Government is considering association to the next EU research and innovation programme, Horizon Europe. It is also considering alternatives to Horizon Europe, both as part of its responsible planning activities and to enable it to assess the value for money of associating to Horizon Europe. UKRI is playing an advisory role in this process.

The [Government has commissioned Sir Adrian Smith](#) to provide independent advice on the design of future UK funding schemes for international collaboration, innovation and research as part of this process, including:

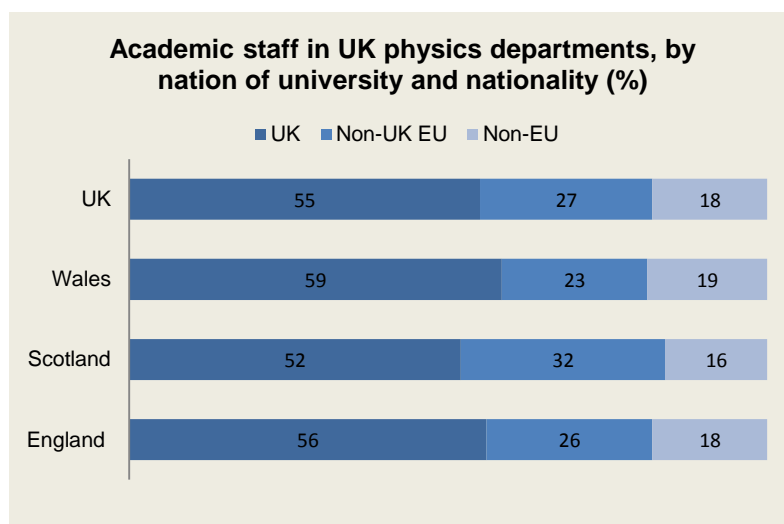
- The design and delivery of elements of potential alternatives to association. This includes the Discovery Fund, which aims to provide a UK alternative to the curiosity-driven and excellence-focused elements of Horizon Europe.
- International collaboration: how funding mechanisms, resources, and international partnerships remain fit-for-purpose and support the UK's Industrial Strategy and its International Research and Innovation Strategy.

A high-level report has been submitted to ministers and a final report will be submitted in September – this advice will also inform future spending settlements. The IOP's submission can be found [here](#).

5. Mobility

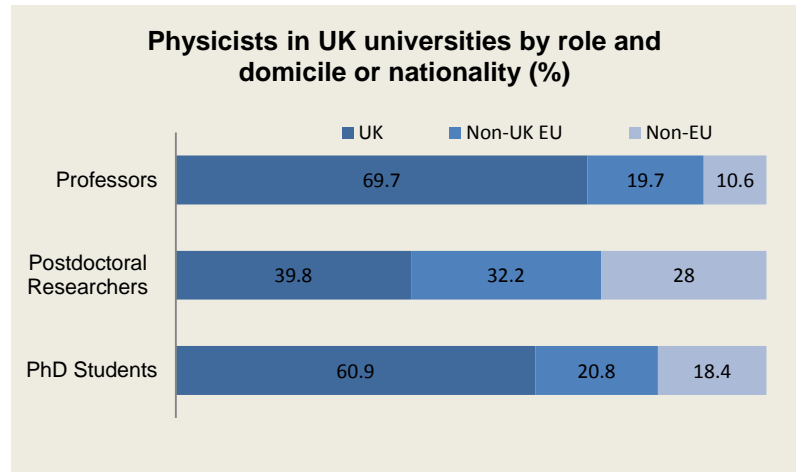
12% of academic researchers in the UK come from outside the EU and must navigate the UK's immigration system. 17% of UK academic researchers come from the EU and are currently able to live and work in the UK under freedom of movement.

For physics these figures are much higher, with 27% of academics in UK physics departments coming from the EU and a further 18% coming from outside of the EU. Some 20.8% of physics PhD students, 32.2% of postdoctoral researchers, and 19.7% of professors are from the EU.



The *Immigration and Social Security Co-ordination (EU Withdrawal) Bill 2017-19* proposes the legislation necessary to end free movement and create the future legal framework to apply to EU and non-EU nationals. But the new system will take several years to develop and implement. As a stop-gap, the Government created the EU Settlement Scheme for non-UK EU nationals living and working

in this country. They will be granted settled or pre-settled status depending on factors such as whether they have five years of continuous residence.¹ In a 'no deal' scenario, the deadline for applying will be 31 December 2020, up to which point EU citizens will be able to rely on their passport or national identity card as evidence of their right to reside in the UK.



In the event of a 'no deal' scenario, EU citizens who arrive after exit day will have to apply for European Temporary Leave to Remain (Euro TLR), which will allow EEA and Swiss citizens to live, work and study in the UK. EU citizens who move to the UK after Brexit and who do not apply for Euro TLR will need to leave the UK by 31 December 2020 unless they have applied for and obtained a UK immigration status under the UK's new points-based immigration system.

EEA and Swiss citizens who are granted European Temporary Leave to Remain may stay in the UK for 36 months but will not have indefinite leave to remain. European Temporary Leave to Remain would be insufficient for students undertaking four-year courses, including medical students, PhD students and almost all students starting courses in Scotland. To stay in the UK for more than 36 months, these citizens will need to apply for an immigration status under the new immigration system, which will come into effect from January 2021. Those who do not qualify will be forced to leave the UK when their European Temporary Leave to Remain expires.

A new "Australian-style points-based immigration system" will be introduced from January 2021. The independent Migration Advisory Committee (MAC) is currently reviewing international comparators. EU citizens who move to the UK after Brexit who do not hold Euro TLR will need to apply under the new immigration system by 31 December 2020, if they wish to remain in the UK beyond that date.

Those who hold Euro TLR and wish to remain in the UK will be required to apply to the new points-based immigration system when their 36 months' Euro TLR leave expires. They may apply for status under the new system earlier if they wish. Where an individual who holds Euro TLR does not meet the requisite criteria under the new immigration system or otherwise have a right to remain in the UK, they will be expected to leave the UK when their Euro TLR expires. Where an EU citizen is granted permission to stay under the new, points-based immigration system in a route that leads to settlement (indefinite leave to remain) in the UK, their 36 months' Euro TLR will count towards the qualifying residence period for settlement.

The IOP is lobbying to ensure the new immigration system is open and fair, and meets the needs of physics. The MAC recommended retaining the minimum salary threshold at £30,000. The scientific and business community have been clear that this is too high and have stressed the need to factor in wider issues such as need and the broader benefit to the economy and society.

Irish citizens will not need to apply for European Temporary Leave to Remain. They will continue to have the right to enter and live in the UK under Common Travel Area² arrangements.

¹ <https://www.gov.uk/settled-status-eu-citizens-families/what-settled-and-presettled-status-means>

² The Common Travel Area (CTA) is an open borders arrangement between the UK, the Crown Dependencies (Bailiwick of Jersey; Bailiwick of Guernsey; Isle of Man) and Ireland.

On exit day, EU regulations will come into force which provide UK citizens with visa-free travel within the Schengen area³ for 90 days in any 180 days, on the principle of reciprocity. These will apply regardless of whether a Brexit deal is reached.

However, it isn't clear what limitations will be placed on the ability of UK nationals to travel and work in non-Schengen EU countries in a 'no deal' scenario. This will be up to each country to decide through its own immigration policy. This could potentially limit the movement of UK nationals, with an immediate impact on UK participation in international collaborations and networks, and on UK access to national research infrastructure based elsewhere in the EU.

From autumn 2019, [PhD-level occupations](#) will be exempt from the Tier 2 (General) visa cap. At the same time, the Government will update the immigration rules on 180-day absences to avoid penalising researchers conducting fieldwork overseas who apply to settle in the UK.

In early August, the [Prime Minister announced](#) that the Government will design a fast-track immigration route to attract elite researchers and specialists in science, engineering and technology, for individuals at all stages in their career. Little concrete detail has emerged as yet but options to be considered include:

- abolishing the cap on Tier 1 Exceptional Talent Visas;
- expanding the pool of UK research institutes and universities able to endorse candidates;
- creating criteria that confer automatic endorsement, subject to immigration checks;
- ensuring dependents have full access to the labour market;
- removing the need to hold an offer of employment before arriving; and,
- providing an accelerated path to settlement.

6. Euratom

The UK is also a member of the European Atomic Energy Community (Euratom), which facilitates cooperation between EU countries in the civil nuclear sector. This includes participation in the Euratom Research and Training programme.

Through this programme, UK organisations and scientists collaborate internationally on a range of nuclear research projects and facilities, including:

- [Joint European Torus \(JET\) \(Culham\)](#);
- [International Thermonuclear Experimental Reactor](#) (ITER);
- [Joint Research Centre](#); and,
- indirect actions (such as a competitive call for proposals on fission research and the JET Operating Contract).

The current Euratom Research and Training programme will run for five years, with scope for a two-year extension to align it with the EU Multiannual Financial Framework.

In a 'no deal' scenario, the UK will:

- no longer be a member of the Euratom Research and Training programme;
- no longer be a member of Fusion for Energy; and,

³ A zone where 26 European countries (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, and Switzerland) have abolished internal borders for the free and unrestricted movement of people.

- no longer be able to collaborate on the ITER project through the EU (see below)

In addition, the UK will no longer receive future funding for projects under EU programmes, such as Euratom Research and Training. Continued funding will therefore be provided via the guarantee which ensures funding for UK organisations that successfully bid directly to the EU for eligible competitive grants under the Euratom Research and Training programme, until the end of 2020. Current UK recipients of Euratom R&T funding should submit their details on the UK Research and Innovation (UKRI) portal.

The Government has confirmed that it will fulfil its stated commitment to continue to provide funding for its share of JET costs until the end of 2020. When the JET operating contract ends, the Government has expressed its willingness to discuss options to keep JET operational until the end of its useful life.

7. International Thermonuclear Experimental Reactor (ITER)

The UK will no longer be a member of Fusion for Energy. This means that UK businesses will not be able to bid for ITER contracts through Fusion for Energy. The Government is exploring alternative options to maintain UK participation in ITER.

In November 2018 the ITER Council confirmed that:

- the contracts of current UK nationals directly employed by the ITER organisation will be considered valid until their contractually agreed end date; and,
- signed contracts/agreements with UK operators (including private companies, institutes and universities) will be considered valid until their contractually agreed end date.

8. European Research Infrastructure Consortium (ERIC) and other research infrastructure

There are 19 ERICs in existence; the UK is a member of 12 and an observer of one. The UK has received around £30 million in ERIC funding from grants and membership fees; by the end of 2017, it had contributed around £64 million to ERICs.

BEIS ministers make the final decision on whether the UK joins a particular ERIC, usually following an approach from a research interest, and advice from UKRI. Funds are provided using Section 5 of the *Science and Technology Act 1965*. BEIS and UKRI officials usually participate in ERIC councils.

The *Political Declaration setting out the framework for the future relationship between the European Union and the United Kingdom* states that the UK and EU “will also explore the participation of the United Kingdom to the European Research Infrastructure Consortiums (ERICs), subject to the conditions of the Union legal instruments and individual ERIC statutes, and taking into account the level of participation of the United Kingdom in Union programmes on science and innovation”.

A statutory instrument (SI) has been laid to ensure ongoing involvement in ERICs in a ‘no deal’ scenario. The SI removes provisions that relate to European Commission actions, such as the production of annual activity reports by the ERIC. It ensures that ERICs continue to have the same attributes, such as legal personality, as they had under the ERIC regulation as it applied before exit day.

There will be an ongoing role for the Court of Justice of the European Union (CJEU) in ERICs. Membership of ERICs requires recognition that the CJEU has a limited role in ERICs. Specifically, if a dispute arises between ERIC members, or between an ERIC itself and a member, the CJEU could be asked to determine whether an ERIC member is fulfilling its obligations under the ERIC statutes. The

Government contends that this is different from the CJEU's role in ruling on compliance by EU member states treaties and that it isn't an area where penalties could be imposed for non-compliance. Remedies are applied by the individual ERIC in line with its own rules, which are agreed to by consortium members.

However, Baroness Norbiton (Government Whip) has stated that "obviously, if a ruling went against us, we would have to consider our position, but we must be realistic: not a single case has ever been taken to the CJEU."

BEIS ministers will be able to join new ERICs using the Royal Prerogative.

The EU does not directly fund the construction of these research facilities but can support the associated planning and coordination. The UK hosts the headquarters of several pan-European research facilities, with facilities distributed across multiple participating countries. These include:

- High Power Laser Energy research facility (HiPER): Harwell, Oxfordshire (Central Laser Facility);
- Square Kilometre Array (SKA): Manchester (Jodrell Bank);
- European Life-science Infrastructure for Biological Information (ELIXIR): Hinxton;
- Integrated Structural Biology Infrastructure (INSTRUCT): Oxford;
- European Centre for Medium Range Weather Forecasts (ECMWF): Reading;
- Infrastructure for Systems Biology-Europe (ISBE): London (Imperial College); and,
- European Social Survey (ESS ERIC): London (City University).

The UK hosts 10 facilities that are part of pan-European research facilities headquartered in other European countries. The UK is also a member of pan-European research facilities entirely based beyond its borders, such as the European Hard X-Ray Free Electron Laser (European XFEL), which is based in Germany. Researchers may be affected by freedom of movement issues.

If the UK leaves the EU without a deal it will no longer be able to participate in the Copernicus programme as an EU member state and will have no role in how it is run. UK-based businesses, academics and researchers will be unable to bid for future Copernicus contracts tendered through the EU, or through any other process using EU procurement rules, such as European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). It is currently unclear what this means for UK-based businesses, academics and researchers holding Copernicus contracts with delivery dates that run past the date of the UK's exit from the EU.

UK entities will continue to be able to bid for Copernicus contracts tendered by the European Centre for Medium-Range Weather Forecasts (ECMWF) and Mercator Ocean due to different procurement rules. Similarly, the UK will continue to remain a member of the European Space Agency and, as such, UK entities will continue to be able to bid for contracts tendered as part of the Copernicus Space Component Programme 4 or under other programmes such as Earth Observation Envelope Programme 5.

EU-based users of Copernicus data and services will be unaffected in a 'no deal' scenario. EU-based businesses, academics and researchers will remain eligible to participate in all aspects of the design, build and operation of the Copernicus programme. The Government is seeking to clarify with the European Commission whether EU businesses, academics and researchers involved in partnering arrangements with the UK will be affected in any way.

The UK's memberships of European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), European Centre for Medium-Range Weather Forecasts (ECMWF) and Mercator Ocean are unaffected; therefore those organisations will retain access to high-bandwidth data that supports the Land, Marine Environment, Climate Change and Atmosphere services.

In the event of the UK leaving the EU without a deal, the majority of position, navigation and timing services provided by Galileo and European Geostationary Navigation Overlay will continue to be freely available to all UK-based users. However, the UK will no longer play any part in the development of Galileo or European Geostationary Navigation Overlay programmes. This means that UK-based businesses, academics and researchers will be unable to bid for future EU Global Navigation Satellite System contracts and may face difficulty carrying out and completing existing contracts. At the September Spending Round, the Chancellor announced £191 million of funding to support delivery of Brexit-related activities, including the development of a UK Global Navigation Satellite System.⁴

If the UK leaves the EU without a deal, it will not be eligible to participate in the EU Space Surveillance and Tracking programme. UK organisations will not therefore be able to contribute to providing services to the EU Space Surveillance and Tracking, to participate in the scientific and technical groups to develop the programme further or be able to receive grant funding to pay for UK involvement.

9. European Strategy Forum on Research Infrastructures

The formation of the European Strategy Forum on Research Infrastructures (ESFRI) has stimulated planning for new multinational facilities, along with the provision of funding to enable collaborations for the selected projects and create strong single proposals for consideration by national governments.

The ESFRI membership consists of two delegates from each EU member state, as well as a number of additional associate countries, and a representative of the European Commission. The ESFRI does not allocate funding nor does it give direct recommendations for funding. However, it plays a major role in decision-making processes for the strategy and implementation of new research infrastructure development and improvements.

Currently, only EU member states and countries associated to Horizon 2020 are members of ESFRI. In the case of a 'no deal' Brexit, the UK would therefore lose its membership and its ability to influence the EU formally. However, the UK may be able to exert influence informally through cooperation and the UK's review of facilities and roadmap.

10. Intergovernmental facilities and organisations

Organisations such as The European Organization for Nuclear Research (CERN), the European Space Agency and the European Southern Observatory are intergovernmental organisations and as such the UK's membership is unaffected as are the rights of the employees working within these organisations and at the facilities. Individual researchers may be affected if they are not employed by the organisation but are carrying out European funded research at these facilities.

11. National research facilities

According to the Royal Society, "the EU supported 3,539 UK-based researchers to access 1,055 European research facilities between 2007 and 2013. In addition, 107 UK national research facilities received support from the EU to grant access to international researchers, fostering collaborations and exchange of ideas." Mobility issues will be determined by the visa/immigration regime put in place post-Brexit.

About the Institute of Physics

The Institute of Physics is the professional body and learned society for physics in the UK and Ireland.

We seek to raise public awareness and understanding of physics and support the development of a diverse and inclusive physics community. As a charity, we are here to ensure that physics delivers on

⁴ <https://www.gov.uk/government/publications/spending-round-2019-document/spending-round-2019>

its exceptional potential to benefit society. Alongside professional support for our members, we engage with policymakers and the public to increase awareness and understanding of the value that physics holds for all of us. Our subsidiary company, IOP Publishing, is a world leader in scientific communications, publishing journals, ebooks, magazines and websites globally.

For more information, please contact policy@iop.org