

## The White Heat of Recovery

### Unlocking the potential of physics to respond to COVID-19 and build back better

Physics is fundamental to our health, wealth, security and social advancement. It has played a crucial role in the awe-inspiring scientific response to the COVID-19 pandemic – from X-ray imaging of the virus, leading to the astonishing vaccination programme, and GPS technology enabling the tracing of exposure, to the semiconductors powering the systems to let us work from home, keep in touch with family, and deliver essential services remotely.

Physics can also help us overcome the global climate crisis, by improving net zero technologies to revolutionise renewable generation, emissions capture, efficient energy storage and clean transport and heating. Physics creates tomorrow's problem solvers and innovators, and has a vital role to play in helping make Scotland fit for a new industrial era of science, technology and engineering.

Decisions taken by the Scottish Parliament in the next five years will shape our society for decades. We call on all parties to commit to the following priorities to support and grow our physics community, and so put Scotland in the strongest position to boost economic growth, create skilled jobs, and improve our quality of life.

## Developing the next generation of discovery

We will need to develop a whole new generation of discoverers equipped with STEM knowledge and skills. We must:

### 1. Ensure schools have enough specialist teachers and equipment to deliver quality physics education



There are 9% fewer physics teachers now than a decade ago. We can arrest and reverse this decline by helping those with other science degrees, HNDs or extensive industry experience become teachers or school science technicians. Practical experimentation and assessment have also suffered because of lockdowns and remote learning, but pupils need hands-on experience to embed essential skills, and learning by doing must be preserved using smart purchasing and maximising the use of kit.

### 2. Equip teachers and academics with the learning and skills they need



Learning shouldn't stop for adults when they first step into the classroom, lab or lecture theatre. Educators at all levels should benefit from structured support to develop both subject knowledge and enhanced teaching skills. There should be tailored career-long subject-specific professional learning, with direct support through from evening workshop sessions to Masters-level, and a Scottish academy promoting and incentivising excellence in tertiary science education.

### 3. Mobilise a concerted collective effort to improve diversity and inclusion



All young people should believe that anyone who wants to can become a scientist, build a high-powered, rewarding career and make a positive difference. There must be a whole-school approach to creating an equitable and inclusive learning environment and tackling unhelpful stereotypes about STEM. We should complete the embedding of learning from the Improving Gender Balance and Equalities programme in every school and develop similar targeted support for other equality characteristics. We need a renewed focus on supporting those from poorer socio-economic backgrounds, and can start by capturing and acting upon good data.

# Readying ourselves for the fourth industrial revolution

The world of tomorrow hasn't been built yet, and has barely been imagined. The same skills that sent a rover 300 million miles to the surface of Mars can also help make Scotland a world-leader in robotics, miniaturisation and artificial intelligence. We must:



## 4. Maintain the vital international exchange of students, researchers and workers

Physics depends upon strong collaboration across borders. To ensure Scotland isn't left behind, we need a renewed Fresh Talent initiative to attract the brightest minds and develop the talents and aspirations of domestic students.



## 5. Improve the supply of skills needed for physics-based businesses

With 199,000 people in Scotland working for physics-related businesses, generating high productivity and real growth, and a further third of a million supplying and relying on them, it is already fundamental to our health, wealth, security and progress. We can bolster this by ensuring a sufficient number of physics-related apprenticeships and an integrated STEM work experience programme.



## 6. Support Scottish-based research to reach its potential

Participating in the Horizon Europe programme was essential following Brexit. Now the Scottish Government should help ensure maximum participation and fewest barriers to success from all available funding routes, including the forthcoming Advanced Research and Invention Agency, and work to generate better business support for commercialising innovation.

### About us

The Institute of Physics (IOP) is the professional body and learned society for physics in the UK and Ireland. Our mission is to inspire people to develop their knowledge, understanding and enjoyment of physics, support the development of a diverse and inclusive physics community, and raise public awareness and understanding of physics. We seek to ensure that physics delivers on its exceptional potential to benefit society. Find out more at [www.iop.org](http://www.iop.org)