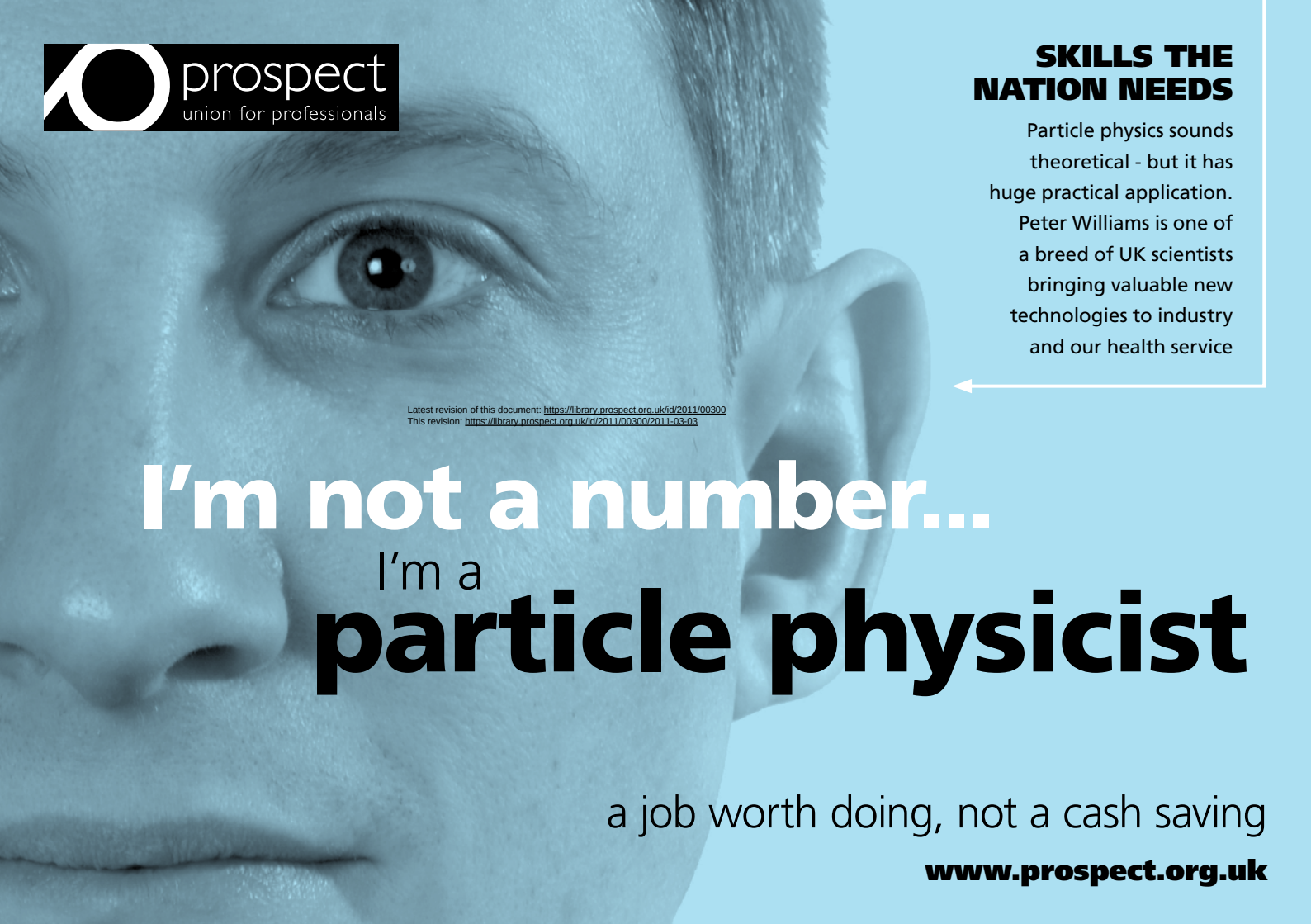
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SKILLS THE NATION NEEDS
Particle physics sounds theoretical - but it has huge practical application. Peter Williams is one of a breed of UK scientists bringing valuable new technologies to industry and our health service
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I'm not a number...
I'm a
particle physicist
a job worth doing, not a cash saving
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Innovation – creating markets for industry

PETER WILLIAMS is an accelerator physicist at the Daresbury Laboratory, Cheshire, part of the Science and Technology Facilities Council. Daresbury is a world leader in developing the next generation of particle accelerators. One of its prototypes – ALICE – promises a step change in scientific understanding at molecular scales.

Scientists are already using extremely bright X-rays on machines such as the Diamond Light Source to image molecular structure in exquisite detail.

This is vital not just for academic research, but also for UK industry in sectors as diverse as pharmaceuticals, petrochemicals, aircraft engineering and food manufacturing. For example, aircraft engines are safer and more reliable because of studies into the physics of how cracks propagate in metals, performed in particle accelerators.

ALICE will make it possible to image not just the structure, but also the dynamics – in effect to be a video camera for this micro-world. The ability to watch how chemical reactions occur has almost limitless possibilities – for instance, more efficient solar cells for electricity generation.

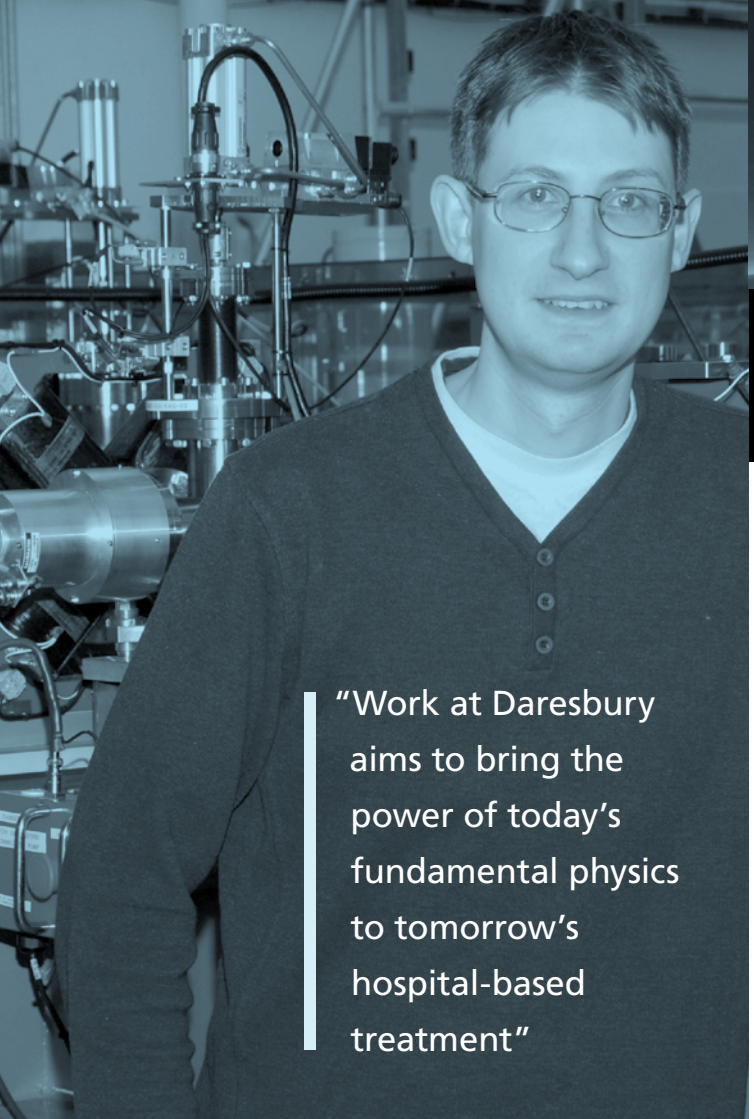
The most well-known accelerator today is probably the Large Hadron Collider at CERN, but most accelerators are actually found in hospitals, generating X-rays for diagnostics and treating cancers.

Work at Daresbury aims to bring the power of today's fundamental physics to tomorrow's hospital-based treatment. Charged particle therapy is known to be more effective than standard radiotherapy and with far fewer side-effects.

But accelerating charged particles requires expensive equipment. The EMMA prototype at Daresbury promises a cheaper way forward – ideal for hospital sources.

It is vital that this type of research, the embodiment of the 'knowledge economy', is done in the UK. For example, to construct ALICE and EMMA, Daresbury staff had to demand new skills and capabilities from UK companies.

Those companies can now reap the benefits of this innovation as they compete in the global marketplace.



"Work at Daresbury aims to bring the power of today's fundamental physics to tomorrow's hospital-based treatment"

In the UK, it's back to the bad old days of stop-start science

PUBLIC INVESTMENT in science and scientists is proven to be one of the best ways of promoting long-term economic growth. Yet the UK continues to languish in international comparisons.

As the Royal Society has warned, the US, China, India, France and Germany have all ramped up science spending to boost economic growth. Further, British companies spend 1.14% of GDP on R&D compared with 1.9% in the US and 1.8% in Germany.

Now the government's allocation of science funding for 2011-12 to 2014-15 has raised fears of a return to the 1980s when thousands of researchers had to work in dilapidated and outdated facilities.

Cuts of up to half (46%) in capital budgets for the

- UK science base were announced in December 2010 – contradicting the government's pledge to protect investment in science. Combined with an extended programme of efficiency savings across the research councils and higher education institutes, these decisions spell a renewed round of cutbacks and closures in R&D right across the public sector.

At the Science and Technology Facilities Council, even though it received a nearly flat-cash settlement in the 2010 comprehensive spending review, inflation is fast eroding its purchasing power.

The STFC is responsible for 'big science' in the UK. On behalf of the taxpayer it runs facilities like the Diamond Light Source and ISIS Neutron Source. It also funds space, particle and nuclear physics in UK universities.

But in the STFC's own laboratories a redundancy exercise is under way. State-of-the-art facilities have been mothballed for up to a third of the year – eg 120 scheduled days at the ISIS super-microscope in 2011 – due to rising electricity prices. In the universities, the shrinkage of grant income has been made worse by the government's cuts to the teaching budget.

Not only does this create instability and drive UK researchers overseas. But it wastes past investment and denies industry the benefits of research which could create new markets for our companies.

Worst of all, it creates a negative image of science and technology which will deter many of the next generation of graduates from pursuing science as a career.

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February 2011 Published by Prospect
Main pics: Laura Roe

Printed by College Hill Press