Fuelling industry and economy

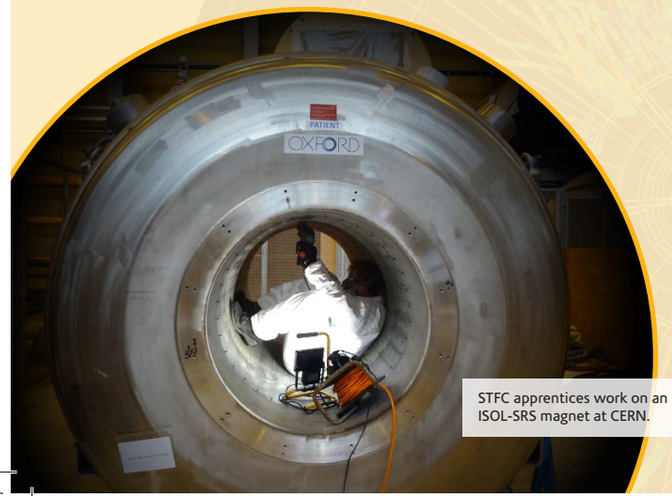
STFC funds the UK membership to CERN, which gives UK scientists and engineers access to the vast amount of data and research that takes place.

Since the LHC became operational, UK industry has won valuable contracts at CERN worth £102 million (2010-2015). Of these, £15 million were awarded in 2015.

Engineering success

Many engineering disciplines were involved in the design, construction and maintenance of the LHC. More than 1,600 superconducting magnets were installed, with most weighing in excess of 27 tonnes, in a collaborative effort involving more than 10,000 scientists and engineers from over 100 countries.

Universities across the UK helped build the highly sensitive detectors at the heart of the LHC's experiments, such as the 7,000 tonne, 25-metre-diameter ATLAS experiment.



STFC apprentices work on an ISOL-SRS magnet at CERN.

Building new technologies

Particle accelerators, like those at the heart of the LHC, are now being adopted for cancer therapies using protons which, unlike current therapies, deposit all their energy in the same place, making them ideal for treating tumours near to delicate organs.

New technology and systems are still being developed around the LHC, allowing us to ask new questions and make exciting discoveries and progress in a range of different fields.

Inspiring the next generation

This exciting science is prompting more young people to consider careers in physics and engineering, fields that are highly prized throughout the UK economy (during the academic year that the Higgs boson was discovered, British universities received 2,000 more applications for physics degrees than in previous years).

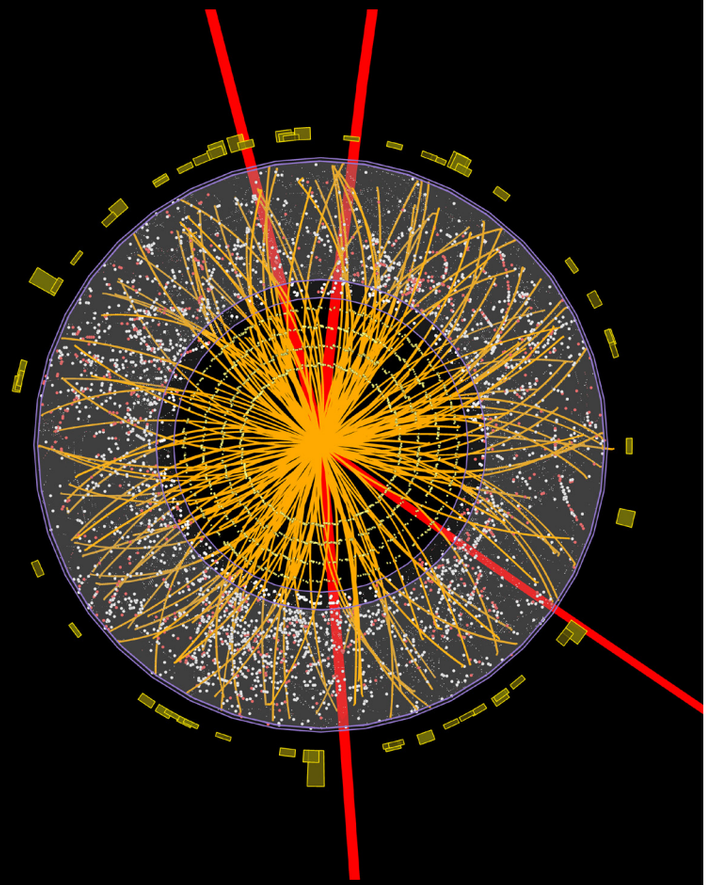
CERN provides opportunities for both apprentices and graduates to visit and work at the site, so more young people have the chance to build the career that they want.

If you're interested in a career in physics or engineering, take a look at the following links:

Institute of Physics - www.iop.org/education/index.html
Jobs at CERN - facebook.netnatives.com/v1/cern/
The Royal Academy of Engineering - www.raeng.org.uk/
Careers with STFC - http://www.stfccareers.co.uk/

Credits: ESO, CERN and STFC

WHAT IS NEXT FOR THE LHC?



Science & Technology Facilities Council

The Large Hadron Collider: a discovery machine

The Large Hadron Collider (or the LHC, as it's more commonly known) is the world's largest and most powerful particle accelerator, built 100m beneath the Franco-Swiss border to solve the mysteries of how the Universe works.

The LHC uses thousands of superconducting magnets arranged in a 27km ring to accelerate two beams of tiny particles faster and faster, until they almost reach the speed of light. Then the two beams of particles are collided to recreate the conditions that existed a trillionth of a second after the Big Bang.

One of the great achievements of the LHC so far is the discovery a new particle: the long-sought after Higgs boson. When a new particle consistent with the Higgs boson was identified in 2012, it rapidly became a global news story as it represented a significant breakthrough in our understanding of the Universe and the laws that govern it.

But the Higgs boson is just one of the many things that the LHC is looking to understand.

Physics has many questions to answer

In two months in 2016, the accelerator produced five times as much data as in the whole of 2015, breaking its own record.

This additional data gives scientists a better idea of what is happening in the accelerator during their experiments.

Now, scientists and engineers are working hard to keep the accelerator performing, and have upgrades planned to allow the LHC to fuel more scientific discoveries in the future...

What's next for the LHC?

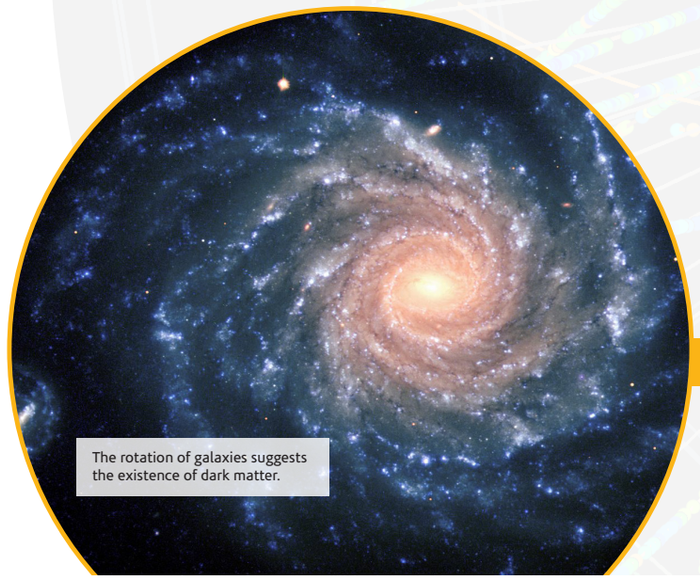
Where has all the antimatter gone?

In the Big Bang, almost exactly equal amounts of matter and antimatter were created. However, in our Universe now there is a lot of matter, and not a lot of antimatter – but why?

Scientists at CERN want to understand the differences that meant matter survived but antimatter didn't.

What makes up 96% of the Universe?

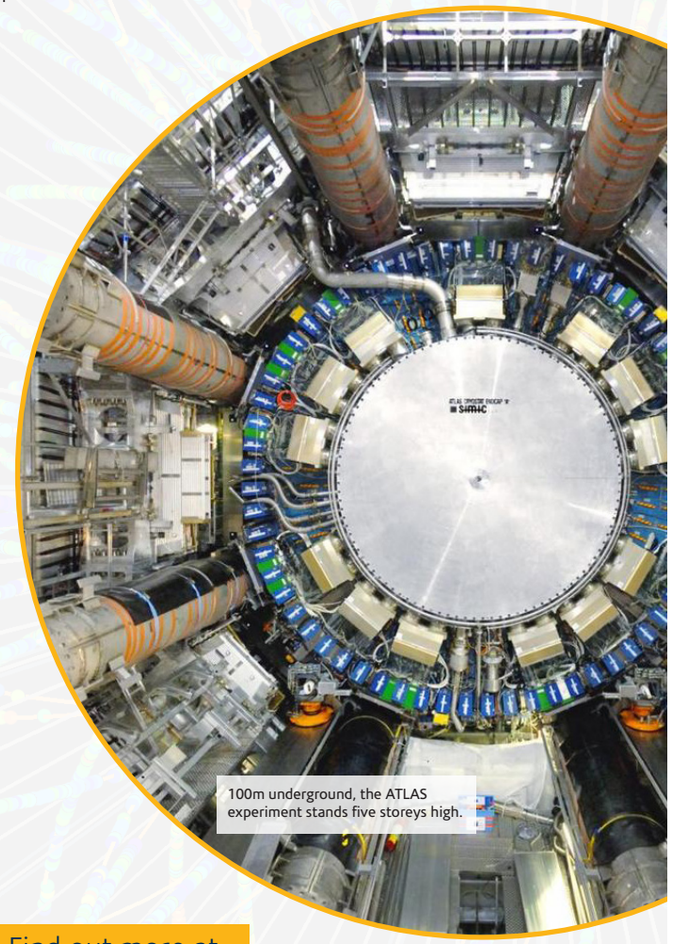
Everything we see in the Universe is made up of ordinary particles which are collectively known as matter, but scientists think this is only a fraction (less than 5%) of what exists. We can't see what makes up the rest, but scientists believe that it's made of dark matter and dark energy. However, although we can tell something is there, it is incredibly difficult to detect – at CERN, scientists can look for clues about the existence of dark matter.



The rotation of galaxies suggests the existence of dark matter.

What happened after the Big Bang?

Everything in the Universe is believed to have originated from a dense and hot cocktail of particles which went on to shape our Universe into what it is today. Many of the particles created in the earliest moments of the universe rapidly decayed and it is only with machines like the LHC that scientists are able to create them at will in experiments.



100m underground, the ATLAS experiment stands five storeys high.

Find out more at

The official LHC website: www.lhc.web.cern.ch/

STFC's official website: www.lhc.ac.uk/