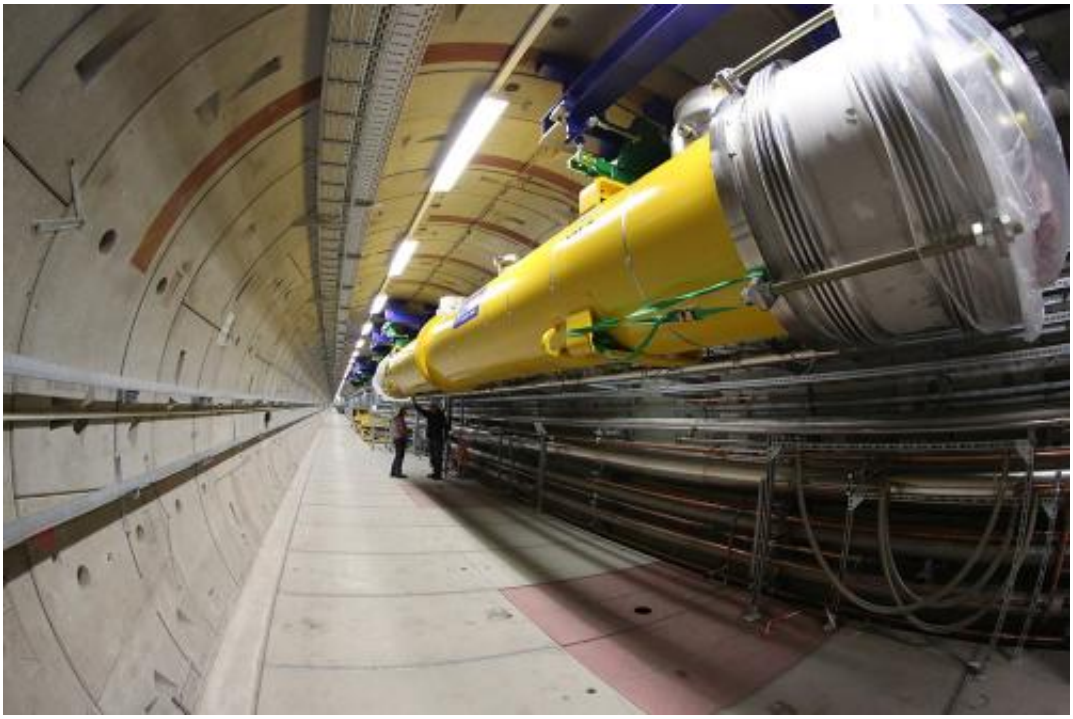
Using the power of a trillion light bulbs to map the nano-world

December 18 2014, by Jake Gilmore



Installation of Test Module XM-2 in the tunnel of the European XFEL. Credit: DESY 2014

Generating the equivalent of a trillion light bulbs – more power than the whole national grid, but delivered in incredibly short flashes, a new international science facility will give British researchers unprecedented access to the inner working of cells, atoms and chemical processes.

Minister for Universities and Science Greg Clark MP today announced the United Kingdom will invest up to £30 million to become a full member of the European XFEL facility, now under construction near Hamburg, Germany.

Mr Clark said: "This funding will generate intensely bright and short duration X-ray flashes when operational in 2018. It will open areas of research for British scientists at the atomic, molecular and nano-scale level that are currently inaccessible."

"Today's announcement shows our determination to ensure UK science remains at the very forefront of global research. Whether it be the development of new medical treatment or industrial materials, our new inventions are creating jobs and economic growth."

Access to the new science areas made possible by the new technology has been identified as a priority for UK science. X-ray free electron lasers are a new class of light sources based on particle physics accelerator technology. They offer two transformative capabilities: much higher brightness beams and extremely short pulses of light. These complement the physical and life science discovery strengths of high throughput synchrotron sources (such as the UK's world-class Diamond Light Source at Harwell).

These capabilities open up entirely new scientific opportunities – for example deriving the structures of some the very large number of important biological molecules that cannot easily be crystallised, such as membrane proteins; and observing fast moving chemical reactions as they occur, such as catalysis and photosynthesis.

The UK will become the 12th member of the European XFEL project, joining Denmark, France, Germany, Hungary, Italy, Poland, Russia, Slovakia, Spain, Sweden, and Switzerland. Overall construction costs are

expected to be around £1.2 billion (in 2005 prices).

Professor John Womersley is the Chief Executive of the Science and Technology Facilities Council, which will manage the UK's membership of the European XFEL.

"We will now work to negotiate formal UK membership of this exciting new facility, building on our own national capabilities and facilities and allow the UK to develop entirely new scientific opportunities," Professor Womersley said.

UK scientists funded by the Medical Research Council, Biotechnology and Biological Sciences Research Council and the Wellcome Trust, have already been working to develop new scientific instruments and processes for use at the European XFEL. In addition, a training facility is being developed at the Diamond Light Source at the Harwell campus in Oxfordshire for British scientists.

In addition, STFC's Central Laser Facility, with funding from the Engineering and Physical Sciences Research Council, is providing new "Dipole" laser technologies under contract to enable the European XFEL's unique capabilities.

Provided by Science and Technology Facilities Council