NEWSLETTER

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A new strategic neutron source consortium established

Representatives of eight European research infrastructures, including the European Spallation Source (ESS), signed the charter of the *League of advanced European Neutron Sources*, or LENS. The signing marks the establishment of a new strategic consortium of European neutron source facilities with the aim, according to the charter, to "facilitate any form of discussion and decision-making process that has the potential to strengthen European neutron science via enhanced collaboration among the facilities".

The founding members of the consortium include both European and national facilities in France, Germany, Sweden, Hungary, the United Kingdom, Norway and Switzerland. Other qualifying facilities are invited to join at any time.

"The LENS declaration demonstrates the strong desire and commitment of the neutron facilities to jointly maintain Europe's leadership in this important research area," said ESS Director General John Womersley.

The establishment of LENS comes at a key moment of transition and optimism in European neutron science, and places particular emphasis on the interaction between the neutron science user communities and funding organizations. Neutron-based analytical facilities are used in numerous disciplines across the entire range of science and technology development, and generate a high socio-economic impact. Europe has achieved global leadership in this field, serving a very broad scientific community of more than 5,000 researchers by providing them with more than 32,000 instrument days at neutron scattering facilities. More information

Signing of the LENS charter in Vienna, September 12, 2018. (Photo: ESS)

At the edge of a breakthrough in how antibiotics treat bacteria

Scientists from the STFC's ISIS Neutron and Muon research facility and Newcastle University have worked together on a new project that is increasing our understanding of how antibiotics treat bacteria.

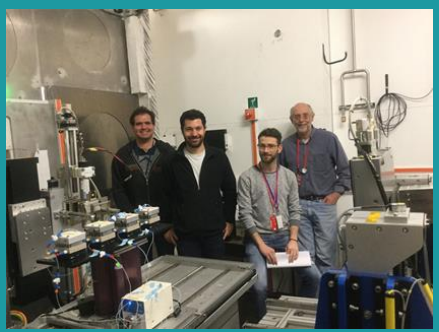
With the number of antibiotic resistant bacteria increasing in recent years, the ability to develop a way to combat this resistance could be essential for our future health.

The team used a technique known as neutron reflectometry at STFC's ISIS facility in Oxfordshire to examine how Polymyxin B, a last resort antibiotic, interacts with the outer membrane of Gram-negative bacteria. These hardy bacteria are responsible for life-threatening diseases like pneumonia and meningitis, making them key targets for clinical research.

In a world-first, the team were able to use an artificial model of the outer membrane to not only explain the temperature dependence of Polymyxin B function but also support the notion that bacteria actively control the viscosity of their outer membrane as growth temperatures vary. Using this model, the team were able to mimic both the initial insertion and subsequent process by which the antibiotic disrupts the structure of the outer membrane and increases membrane permeability, leading to cell death.

The team now plan to investigate how bacteria develop resistance mechanisms against Polymyxin which will help in the design of second generation molecules, to use when Polymyxin itself becomes less effective.

More information



The team of researchers (Credit: STFC).

Nuclear physics reveals a hidden lady in a painting

Hidden in a painting for almost four centuries and visible for the first time in an image obtained with a special mobile scanner called LANDIS-X created by researchers of the Italian National Institute for Nuclear Physics (INFN) and National Council for Research (CNR). This is a female figure painted and then covered - probably a member of the family depicted in the painting “The Paston Treasure”, an important painting of English art history commissioned by Sir William Paston to an itinerant Flemish painter in the seventeenth century.

The discovery was made by a team of researchers from the INFN National Laboratories of the South and from IBAM CNR who flew to Norwich to study the work in preparation for its restoration.

The researchers photographed "The Paston Treasure" with the innovative LANDIS-X scanner designed and developed in the Laboratory of Non Destructive Analysis in situ (Landis) INFN National Laboratories of the South. The laboratory is part of the INFN network for cultural heritage CHNET. LANDIS-X is the only ultra-rapid mobile X-ray fluorescence scanning system based on real-time technology (called real-time macro XRF imaging) able to provide restorers and art historians with live images of the distribution of pigments on the pictorial surface at very high resolution (up to 30 microns). The pictorial details (face, hairstyle and clothing) of a female figure, probably another member of the Paston family – previously painted, but not visible in the final pictorial composition, were highlighted.

The hidden lady was painted under the diamond shaped clock in the upper right hand of the painting.

The woman could have been the portrait of a real person, an allegorical figure, or a mixture of both. If she was meant to be, or was based upon, a real person, the most probable candidate is Lady Margaret Paston, (d. 1669), William Paston’s second wife, whom he married in 1640. The hidden face of a woman is not the only important detail that emerged from studying the painting. The X-ray images (corresponding to 6 million measurements taken on the painting in 16 hours) made it possible to identify the pigment palette typical of the Flemish period, based on the use of cobalt enamel, copper resin, vermilion red, tin yellow, orpiment and ochre. The painting, commissioned by Sir William Paston to an itinerant Flemish painter, is one of the first examples in the history of English art to represent the opulence and wealth accumulated by the noble families of the time, allegorically describing their transience and fleetingness.

The images provided by the researchers made it possible to completely reconstruct all the pictorial layers and to restore the work to its original composition.

More information

(Photo INFN)

High performance computing at STFC delivers huge economic benefits

Working with high performance computing experts is boosting sales income and international competitiveness for British companies, a new study has found.

It examines the benefits a Government computing centre has delivered to its industry partners in its first years. It has estimated that the STFC's Hartree Centre, based in the Liverpool City Region, is making a difference by contributing tens of millions of pounds of economic impact for the UK by helping companies to thrive. The Hartree Centre is part of the STFC's Daresbury Laboratory. It was established by Government to allow UK businesses, ranging from large corporate organisations to start-ups and small businesses, to benefit from the specialist expertise and access to supercomputers that would normally only be available to academic researchers. The facility specialises in high performance computing, data analytics and cognitive computing.

After just four years of operation, it is estimated that the Centre has generated a net commercial benefit to users of up to £27.5 million, as well as £7.1 million from its operational expenditure.

It has assisted some of the largest and best-known UK companies, including Rolls Royce, as well as small-and-medium sized firms across sectors from fast-moving consumer goods and high-value manufacturing, to transport, energy and healthcare. Rolls-Royce has updated its in-house engineering design software with the support of the Hartree Centre, accelerating run times and bringing it a step closer to virtual 'whole-engine design'.

The study also shows that the Centre has supported many of its clients to develop innovative products and services, and bring these to market earlier – ranging from healthcare applications and consumer products, to monitoring systems for road and rail bridges.

More information

INFN sets up the Research to Innovation Network in Italy

INFN has signed agreements with the first Business Innovation Centres (BIC), which are the business incubators and accelerators that applied to participate and were selected to take part in the Network R2I, Research to Innovation. Thus, the Research to Innovation Network has been set up in Italy.

The R2I Network is an idea proposed by INFN and CERN with the aim of supporting initiatives in technology transfer in Italy, by promoting development of innovative products and services, starting from frontier technology developed in the field of basic research in particle physics.

Making use of technology developed by INFN and CERN is now a concrete opportunity for many hi-tech Italian companies, spin-offs and small businesses, that are willing to back on and invest in innovation.

The BIC network managed by INFN itself is the hub of the project, which has already taken in the incubators of I3P, of the Politecnico di Torino, the BioIndustry Park of Colleretto Giacosa (Turin), and Cubact of the Università di Sassari. They will have to run a process of assessment and selection to identify the start-ups interested in INFN and CERN technologies and commit to providing support, by financing infrastructures and consultancy for 40,000 euros. In the following months the Technology Transfer websites of INFN and of the BICs belonging to the network will publish the first call for tenders open to companies interested in joining the project.

(Photo: INFN)

IN FOCUS

Acknowledging the STFC's contribution to society and economy

Recently, the STFC published its Impact Report 2017 , which reviews STFC's impact on the UK's science and innovation landscape in the 10 years since its establishment, and celebrates the 10th anniversary of the Diamond Light Source, the 40th anniversary of the Central Laser facility, and the 50th anniversary of STFC's Chilbolton Observatory. It also reports on recent evaluations of the Hartree Centre and the Square Kilometre Array.

The report shows that STFC has many reasons to be proud of its achievements. Using the powerful X-rays produced at the Diamond Light Source, a team of scientists from the University of Oxford has successfully mapped the structure of the deadly Ebola virus molecule, and is now exploring new drugs to prevent the disease.

Following the announcement of the discovery of the Higgs Boson in 2012, five new particles have been discovered in the past year, thanks to the incredibly sensitive LHCb experiment at CERN. The LHCb confirmed their existence, which has been theorised but never before proven, thereby helping physicists to gain greater understanding of the 'strong force' which glues nucleons together, as well as opening up entirely new avenues in particle physics.

Harwell and Sci-Tech Daresbury Campuses currently host more than 300 enterprises and support more than 6,700 jobs, creating the conditions needed for high-tech SMEs to grow.

The Harwell Campus is due to host two new, Government-funded research organisations: the £100 million Rosalind Franklin Institute, a multi-disciplinary science and technology research centre which aims to help transform understanding of disease and speed up the development of new treatments; and the £65 million Faraday Institution, a major initiative to support research into energy storage.

STFC continues to facilitate the growth of the world-class scientific and technical skills needed to ensure that the UK maintains its international status as a destination of choice for collaborative, interdisciplinary science, technology and innovation. In support of the Government's Industrial Strategy, STFC is providing funding to nearly 100 additional students through Centres for Doctoral Training (CDTs), bringing the total number currently supported to more than 850. CDT students will be trained to analyse data from astrophysics, accelerator science, nuclear or particle physics research.

For more information about STFC's achievements and impacts, including case studies and impact evaluations, visit the Impacts and Achievements page.

(Photo: STFC)

HEPTech upcoming events

- Steering Committee, 21st November 2018, at CERN, with VideoConference
- Board Meeting, 7th December 2018, at CERN, with VideoConference