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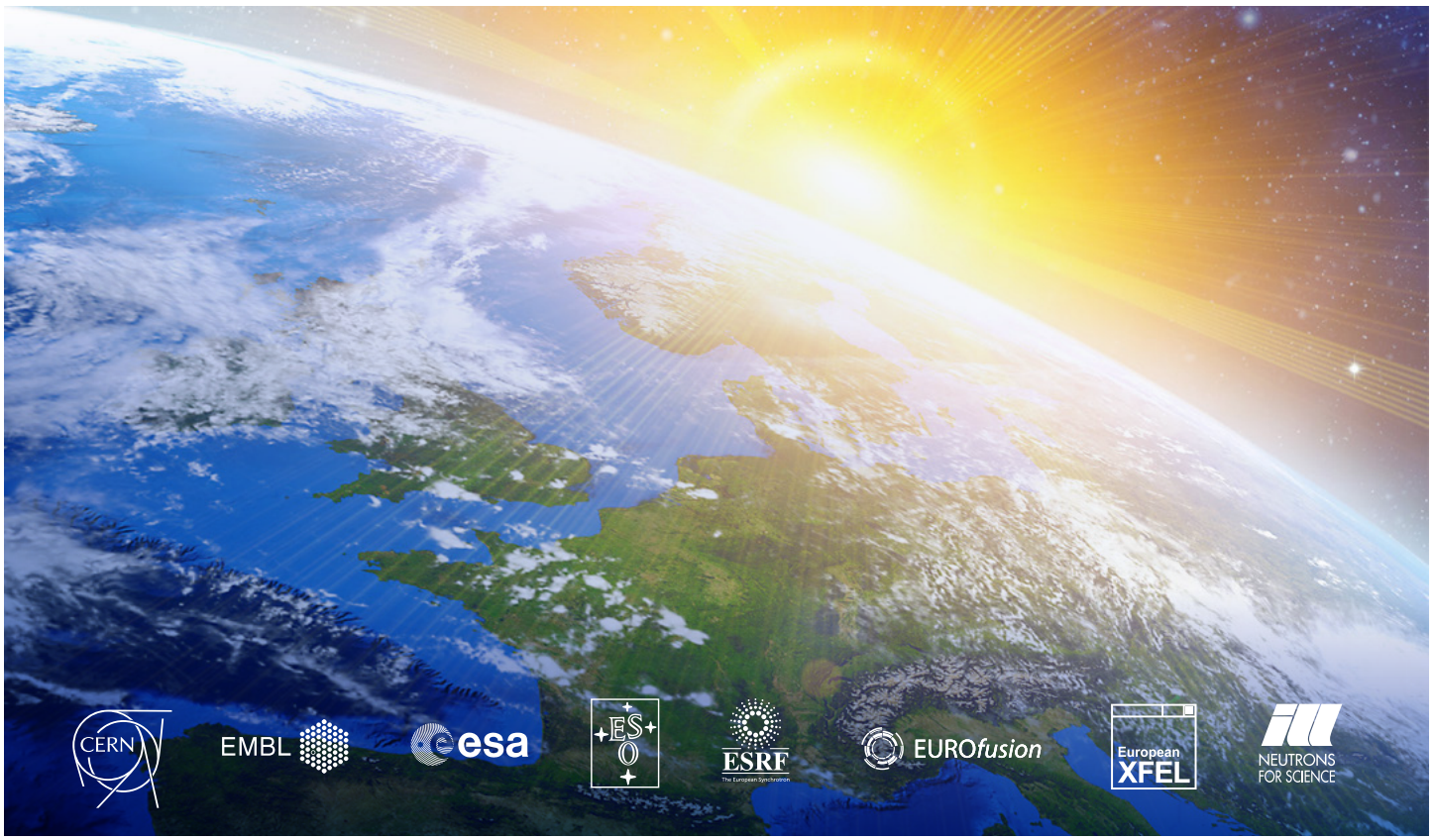

Meet the EIROs

You may know that Science in School is published by EIROforum, but who are the EIROs and what can they offer teachers?

Science in School is funded and published by EIROforum, which brings together eight European intergovernmental research organisations (EIROs): CERN, EMBL, ESA, ESO, ESRF, EUROfusion, European XFEL, and ILL. It is the mission of EIROforum to combine the resources, facilities and expertise of its member organisations to support European science in reaching its full potential, and this includes working with science teachers, students, and journalists to communicate the importance and fascination of science to a wide audience. This article introduces each of the eight EIROs, with the aim of outlining the scope of the exciting cutting-edge research supported by these organisations, as well as providing an overview of the individual EIROs' outreach and education material. In many cases, this includes content that is of particular relevance to teachers, such as teacher training and student workshops or competitions.

CERN

CERN is the world's leading laboratory for particle physics. Founded in 1954, the CERN laboratory sits astride the Franco-Swiss border near Geneva. It was one of Europe's first joint ventures and now has 23 member states. At CERN, physicists and engineers use purpose-built particle accelerators and detectors to study the fundamental structure of the particles that make up everything around us. CERN is home to the Large Hadron Collider (LHC), the world's largest and most powerful particle accelerator, with a circumference of 27 km and a capacity to accelerate particles to 99.999999% the speed of light. The LHC first started up in 2008, and in 2012 physicists from two of the main LHC experiments presented evidence for the Higgs boson – the missing piece in the theory that best explains the fundamental particles and forces that govern their interactions.

CERN's education and outreach programmes are aimed at students aged 14-plus and their teachers. For students, CERN offers the tailor-made High-School Students Internship Programme and the Beamline for Schools Competition, challenging high-school students from around the world to propose an experiment to carry out at a real research laboratory. Of the more than 100 000 visitors who visit CERN each year, the majority are high-school students, several of whom participate in hands-on workshops in CERN's S'Cool LAB. Over 10 000 teachers, from around the world, have benefitted from CERN's residential teacher programmes.

EMBL

European Molecular Biology Laboratory (EMBL) is Europe's leading laboratory for the life sciences. We are an intergovernmental organisation supported by over 20 member states and operating across six sites in Europe. EMBL performs fundamental research in molecular biology, studying the story of life. Our research drives the development of new technology and methods in the life sciences, and we work to transfer this knowledge for the benefit of society.

The European Learning Laboratory for the Life Sciences (ELLS) is EMBL's science education department. We share the scientific discoveries of EMBL through inspiring learning and outreach materials and experiences, including teaching modules, events, lectures, and school visits. Our activities are open to European school science teachers, and to young people of all backgrounds aged between 10 and 19 years. The ELLS programmes convey complex, cutting-edge topics in life science research in an exciting and insightful way, fostering the discovery of current research trends, the scientific method, and scientific career paths. Our activities are developed and run in close collaboration with EMBL scientists.

ESA

The European Space Agency (ESA) is Europe's gateway to space. Its mission is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world. ESA is the only space agency that covers the whole range of space activities, from exploring the Solar System and unlocking the secrets of the Universe, to monitoring the Earth and protecting the environment.

From an educator's point of view, space has it all: it sparks pupils' natural curiosity about the world and intersects with many scientific and technical topics. It also provides a powerful model for the application of science to developing sustainable technologies and meeting future challenges, which can help students to develop the critical thinking they need to master their own future and that of our planet.

ESA's primary and secondary school education programme uses space as an inspirational teaching and learning context for STEM subjects. It builds on the latest STEM pedagogical research, guiding pupils through an active learning process that leads them to higher engagement and attainment. The ESA school education programme supports teachers by providing physical and online teacher training, curricular classroom resources and engaging interdisciplinary school projects. It also delivers education activities and materials at a national level through the European Space Education Resource Office (ESERO) network.

ESO

The European Southern Observatory (ESO) provides state-of-the-art research facilities to astronomers and is supported by 16 member states. It operates telescopes at three sites in Chile: La Silla, Paranal, and Chajnantor. ESO's Very Large Telescope is the world's most advanced visible-light astronomical observatory. ESO is also a major partner in the revolutionary radio telescope ALMA and is building a 39-metre Extremely Large Telescope (ELT).

The ESO Headquarters are in Garching near Munich, Germany, which is also the location of the ESO Supernova Planetarium & Visitor Centre, a cutting-edge astronomy centre for the public. With its immersive planetarium and interactive exhibition, ESO Supernova provides school classes and families with unforgettable learning experiences. The on-site education programme consists of guided tours, planetarium shows, and interactive workshops for children of all ages (K–13), as well as teacher training. All activities are offered in English and German, but as an international organisation with staff from over 40 different countries, some can also be offered in other languages. ESO also supports external education initiatives, such as competitions and astronomy camps for high school students, and produces outreach material (videos, illustrations) that is ideal for use in educational institutions. To stay up to date with ESO's education activities, we encourage you to subscribe to our newsletter.

ESRF

The European Synchrotron Radiation Facility (ESRF) hosts the world's brightest X-ray source, running a brand-new generation of high-energy synchrotron since August 2020. This international facility is funded by 22 partner countries. It is a centre of excellence for fundamental and innovation-driven research. The ESRF synchrotron is a particle accelerator with a storage ring that measures almost 1km in circumference. Inside, electrons are accelerated to almost the speed of light and then forced to change direction, resulting in the emission of synchrotron light. In the 44 experimental stations, which are high-tech laboratories situated around the storage ring, scientists use this light to study the structure of living matter and materials. Every year, around 10 000 scientists from all over the world come to the ESRF to carry out experiments in materials science, biology, medicine, physics, chemistry, environmental science, earth and planetary sciences, and even palaeontology and cultural heritage. The ESRF additionally runs an educational programme for high-school students, synchrotron@school. This consists of a one-day on-site programme for a hands-on immersion into the life of a researcher. Students visit the facility, carry out experiments, meet the scientists and staff, and present their work in the form of a poster and oral presentation. Our website also provides some resources and activities for children.

EUROfusion

The energy released from the fusion of hydrogen powers the Sun and stars, and there is a world-wide research programme dedicated to bringing fusion down to Earth to generate low-carbon electricity. EUROfusion is a consortium of 30 fusion research units in 28 countries and is responsible for coordinating the European fusion scientific programme.
EUROfusion runs the world's largest fusion experiment, the Joint European Torus (JET), which is based at the Culham Science Centre in the UK. Over 350 European scientists and engineers contribute to the JET programme; vital preparation for JET's international successor, ITER, which is under construction in Cadarache, France. EUROfusion is also developing the DEMO fusion power plant design with the aim of producing electricity on the grid in the early 2050s.

EUROfusion supports the FuseNet programme, which stimulates fusion education through workshops, internships, and teacher days. The EUROfusion members also offer national education outreach activities, with particularly strong programmes in the UK, Belgium, the Netherlands, and Denmark. For example, the UK Atomic Energy Authority offers school visit days (face to face and virtual) for upper secondary students and a bespoke primary school activity called the Sun Dome, with the intention of opening students' eyes to fusion and more broadly the wonder of scientific research. Email contact@euro-fusion.org for further information on education and outreach activities in your country.

European XFEL

The European X-ray Free-Electron Laser Facility (European XFEL) in the Hamburg area of Germany is an international research facility of superlatives: 27 000 X-ray flashes per second and a brilliance that is a billion times higher than that of the best conventional X-ray sources open up completely new opportunities for science. The facility is financed by 12 partner countries. Research groups from around the world do experiments to map the atomic details of viruses, investigate the motions in magnetic materials, take three-dimensional "photos" of the nanoworld, "film" chemical reactions, and study processes such as those occurring deep inside planets. The education and outreach programme includes special events and guided tours, which are available in English or German. It will be expanded when the visitor centre with school laboratories opens in 2023.

ILL

The Institut Laue-Langevin is an international research centre at the leading edge of neutron science and technology. Neutrons produced by the ILL nuclear reactor are a powerful probe to study small samples of materials, as they have specific properties that enable them to yield information that is often impossible to obtain using other techniques. As the world's flagship centre for neutron science, the ILL provides scientists with unique facilities and cutting-edge expertise. As a service institute, the ILL makes its facilities and expertise available to visiting scientists. Every year, about 1400 researchers from over 40 countries visit the ILL and 640 experiments selected by a scientific review committee are performed. Research focuses primarily on fundamental science in a variety of fields: materials science, biology, medicine, physics, chemistry and environmental science.