

Current events

1. SESAME light source officially opened

The SESAME light source was officially opened on 16 May 2017 by His Majesty King Abdullah II. SESAME, an intergovernmental organization, is the first regional laboratory for the Middle East and neighbouring regions. The laboratory's official opening ushers in a new era of research covering fields ranging from medicine and biology, through materials science, physics and chemistry to healthcare, the environment, agriculture and archaeology.

Speaking at the opening ceremony, the President of the SESAME Council, Professor Sir Chris Llewellyn Smith said: "Today sees the fulfilment of many hopes and dreams. The hope that a group of initially inexperienced young people could build SESAME and make it work – they have: three weeks ago SESAME reached its full design energy. The hope that, nurtured by SESAME's training programme, large numbers of scientists in the region would become interested in using SESAME – they have: 55 proposals to use the first two beamlines have already been submitted. And the hope that the diverse Members could work together harmoniously. As well as being a day for celebration, the opening is an occasion to look forward to the science that SESAME will produce, using photons provided by what will soon be the world's first accelerator powered solely by renewable energy".

SESAME, standing for Synchrotron-light for Experimental Science and Applications in the Middle East, is a particle accelerator-based facility that uses electromagnetic radiation emitted by circulating electron beams to study a range of properties of matter. Its initial research programme is about to get underway: three beamlines will be operational this year, and a fourth in 2019. Among the subjects likely to be studied in early experiments are pollution in the Jordan River valley with a view to improving public health in the area, as well as studies aimed at identifying new drugs for cancer therapy, and cultural heritage studies ranging from bioarchaeology – the study of our ancestors – to investigations of ancient manuscripts.

Professor Khaled Toukan, Director of SESAME, said "In building SESAME we had to overcome major financial, technological and political challenges, but, with the help and encouragement of many supporters in Jordan and around the world, the staff, the Directors and the Council did a superb job. Today we are at the end of the beginning. Many challenges lie ahead, including building up the user community, and constructing additional beamlines and supporting facilities. However, I am confident that, with the



help of all of you here today, including especially Rolf Heuer, who will take over from Chris Llewellyn Smith as President of the Council tomorrow (and like Chris and his predecessor Herwig Schopper is a former Director General of CERN), these challenges will be met.”

The opening ceremony was an occasion for representatives of SESAME’s Members and Observers to come together to celebrate the establishment of a competitive regional facility, building regional capacity in science and technology.

2. New beamlines for ESRF

On 27 June 2017, the ESRF Council, which represents the 22 partner nations of the ESRF, the European Synchrotron, gave the go ahead to build four new beamlines. The beamlines are designed to exploit the enhanced performance of the first of a new generation of synchrotron, the Extremely Brilliant Source (EBS), which is being built at the ESRF.

The four proposed ESRF–EBS beamlines are briefly described below.

With serial crystallography emerging as a unique technique for solving structures of proteins available only in sub-micrometre crystals whilst managing radiation damage, the *Serial Macromolecular Crystallography* beamline will provide new perspectives for life sciences by providing a unique facility worldwide for its flux-density and stability.

The *Hard X-ray Diffraction Microscopy* beamline will help provide a deeper understanding of material properties in nano-structured and non-homogeneous materials.

Coherent X-rays are ideal for studying materials and living matter in 3D space and in time under operando conditions, and the *Coherent X-rays Dynamics and Imaging Applications*

beamline will provide new ways for observing dynamic processes under real conditions and detecting characteristic correlations determining reversible processes down to the single atom by exploiting the unrivalled X-ray coherent flux.

With very high energy and X-ray coherence, high-throughput tomography is ideal for studying large objects with a sub-micrometre resolution in a non-destructive way, and the *High Throughput Large Field Phase-Contrast* beamline will be used for research in palaeontology and archaeology, and also for materials in industry, providing the largest high-energy and high-coherence synchrotron beam worldwide for hierarchical imaging and high-throughput tomography.

The construction and commissioning of the new beamlines will take place from 2018 to 2022.



The European Synchrotron, ESRF.