

## **SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East) continues to make good progress towards operation in 2015**

The SESAME Council met in Ankara on 7 and 8 December 2011. Welcoming delegates, Dr Zafer Alper, President of the Turkish Atomic Energy Authority, stated: *“We sincerely believe that SESAME offers a remarkable opportunity for international and regional scientific cooperation. It also promises to be an outstanding example of science in the service of peace.”*

The Council was impressed by progress in the construction of SESAME which was presented by the Director of SESAME, Professor Khaled Toukan (who is also Director of the Jordan Atomic Energy Commission), and the Technical Director, Dr Amor Nadji. In late November the microtron accelerated an electron beam to the full energy of 22.5 MeV. The booster synchrotron – which will accelerate the beam to 800 MeV – is on course for operation before the end of 2012. The call for tender for the magnets for the new 2.5 GeV main storage ring is expected to go out in the spring of 2012.

The Scientific Director, Professor Hafeez Hoorani, reported on good progress with the seven phase-one beamlines. Thanks to notable advancements in designing the powder diffraction beamline made by a group from Turkey in collaboration with SESAME staff, a beamline to be used mainly for materials science, it is now expected that four (rather than three) of these seven beamlines will be available on day-one. Good progress was also reported with the other three day-one beamlines (protein crystallography beamline, for structural molecular biology; X-ray absorption fine structure and X-ray fluorescence spectroscopy beamline, for applications in basic materials science and environmental science; and infra-red beamline, for molecular biology, environmental studies, materials, and archaeological sciences).

As noted in earlier Council meetings, in addition to the manpower costs which will be provided by the SESAME members, \$35 million is required for procurement in order to complete the construction of SESAME and the day-one beamlines. Most will be provided by voluntary contributions from the Members of the Centre; the remainder is being sought from outside sources, including the EU (which has already contributed \$4.5 million), the USA (which has recognised SESAME as ‘an initiative that supports the diplomatic interests of the USA’), and major charitable foundations. At a meeting in March 2011 Iran, Israel, Jordan and Turkey agreed in principle to provide \$1 million each in 2011, and to do the same in the subsequent four years provided a fifth country joins the initiative (if not, these four countries will reconsider the situation). Egypt was preparing to join, and is still expressing great interest, but this has so far proved impossible due to changes in the government. Iran, Israel and Jordan put their commitments in writing in March, subject to Turkey doing the same, which turned out to require parliamentary approval. The Council was very pleased to hear from Dr Alper that, despite a delay due to the general election and a subsequent parliamentary recess, the relevant Bill is making good progress through the Parliament. It is possible that it will be approved in time to allow four countries to make contributions of \$1 million in respect of 2011, which could be followed by four or five contributions of \$1 million later in 2012.

During the meeting, the Palestinian Authority and Pakistan re-confirmed their earlier offers to make in-kind contributions with values up to \$2 million and \$5 million respectively.

Training of the young engineers and accelerator physicists who are building SESAME, and the development of a wider user community, are central elements of SESAME’s activities. To date over

1000 scientists from the region have benefited from SESAME training activities. The Council was pleased to hear a report which highlighted the success of the recent Users' Meeting in Amman and the introduction of new initiatives in addition to on-going collaborations with light sources worldwide. These included the inauguration of Lounsbery Foundation Fellowships ([http://www.sesame.org.jo/sesame/images/News/Press\\_Release\\_Final.pdf](http://www.sesame.org.jo/sesame/images/News/Press_Release_Final.pdf)) and of new Fellowships at the Shanghai Synchrotron Radiation Facility. The SESAME training programme is supported by a growing number of organisations around the world and currently has a value of some \$1 million a year (<http://www.sesame.org.jo/sesame/training-and-scholarships.html>).

The International Atomic Energy Agency (IAEA) has provided essential support for training for SESAME from the outset. A very helpful \$926,800 project aimed at strengthening international cooperation among SESAME Members, which began in 2007, ends this month. The Council was very pleased to hear from Mr Dazhu Yang (Department of Technical Cooperation, IAEA) that a new four-year project, aimed at supporting human capacity development for the installation, commissioning, safe operation and utilization of SESAME which will start in 2012, has been approved with a budget of €757,460.

The Secretary of the Council, Professor Maciej Nalecz (Director, Executive Secretary of the International Basic Sciences Programme, UNESCO), reported that at the recent UNESCO General Conference, Iran proposed that one of the Organization's programmes be amended so that SESAME be specifically mentioned as one of the Centres that is to strengthen higher education, as well as human and institutional capacity building in science, particularly as regards molecular and medical applications of synchrotron radiation and entrepreneurship education. The Iranian Government offered \$1 million in support of this proposal, which was unanimously approved by UNESCO's Member States. The Council warmly welcomed the Government of Iran's very generous action.

The Council was pleased to learn that the recent General Assembly of the International Union of Pure and Applied Physics (IUPAP) passed a new resolution which states that: i) IUPAP continues to express very strong support for the establishment of SESAME as a critically-important regional scientific facility, noting the progress to date; ii) As a matter of urgency, IUPAP calls upon the relevant bodies to come up with the necessary funding to enable the project's objectives to be achieved; and iii) IUPAP commits, within its own resource limits, to provide financial support to SESAME. The Council was also pleased to learn that the Executive Committee of the International Union of Pure and Applied Chemistry (IUPAC) recently issued a statement enthusiastically supporting the establishment and operation of SESAME and urging its relevant National Adhering Organisations to become involved with SESAME and to support its collaborative objectives. The statement goes on to say that not only is the science to be carried out at SESAME of fundamental importance, but the location of this world-class facility will provide an enormous boost to the scientific standing of the region and will also provide a stimulus for local and regional industry.

During the summer the Council learned that Dr Amor Nadji, the SESAME Technical Director, had resigned in order to take up the position of Technical Director at the French synchrotron light source Soleil. While expressing great regret at his departure, the Council congratulated Dr Nadji and expressed its enormous appreciation for the outstanding job that he has done for SESAME. A new Technical

Director will be appointed early in 2012, and it is hoped that he or she will be able to take up the post by the middle of the year. In the meantime, Dr Nadji will bridge the gap.

The Council reappointed the Administrative Director, Professor Yasser Khalil, for a second four-year term, and thanked him for the excellent job that he is doing.

The Council elected Professor Seyed Mahmoud Reza Aghamiri, Shahid Beheshti University, Iran, to a vacant post as Vice President of the Council (the other Vice President is Professor Tarek Hussein, Cairo University), and agreed on a procedure for future nominations for the posts of Vice President that will ensure that they move regularly between all the Members, with the next nominations coming from Israel and then Cyprus – Members whose nationals have never occupied senior positions at SESAME.

The Council elected Professor Sir Chris Llewellyn Smith FRS (Director of Energy Research, Oxford University) for an exceptional third two-year term from November 2012.

The Council appointed Professor Mahmoud Tabrizchi, Isfahan University of Technology, to serve on the Scientific Advisory Committee and Professor Uri Raviv, Hebrew University, to serve on the Beamlines Advisory Committee, and thanked Professors Irit Sagi and Joel Sussman, both from the Weizmann Institute, who are stepping down from these Committees after nine years.

The Council expressed its thanks to Professor Said Assaf, Director-General, Arab Scientific Institute for Research and Transfer of Technology, Ramallah, who has been replaced as a delegate of the Palestinian Authority since the last Council meeting, for his many contributions to SESAME since the late 1990s, including proposing the name SESAME.

Closing the meeting, the President of the Council said: “*SESAME remains on track for commissioning in 2015. Despite turbulence in the region, progress during the year has shown once again that – although it is not always easy – it is possible to work together across political divides in pursuit of a common goal*”.

## Notes

SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East) is a major science facility under construction near Amman (Jordan), modelled institutionally on CERN. SESAME will both:

- Foster scientific and technological excellence in the Middle East and neighbouring countries (and prevent or reverse the brain drain) by enabling world-class research in subjects ranging from biology and medical sciences through materials science, physics and chemistry to archaeology, and
- Build scientific and cultural bridges between neighbouring countries and foster mutual understanding and tolerance through international cooperation.

The Members of SESAME are currently Bahrain, Cyprus, Egypt, Iran, Israel, Jordan, Pakistan, the Palestinian Authority and Turkey. SESAME, with the help of UNESCO, is actively seeking additional Members from across the Middle East and neighbouring countries. France, Germany, Greece, Italy, Japan, Kuwait, Portugal, Russia, Sweden, Switzerland, the UK and the USA are Observers. SESAME was created under the auspices of UNESCO, which is the depository of the Statutes of the Centre and is

represented on the Council of SESAME. The IAEA (International Atomic Energy Agency) also sends a representative to Council meetings.

The heart of SESAME is a 2.5 GeV electron storage ring (133m in circumference), which can accommodate up to 12 wigglers and undulators, making SESAME a third generation light source. There are some 60 synchrotron light sources in the world, including a few in developing countries, but none in the Middle East, although a need for this was recognized by the Nobel Laureate Professor Abdus Salam (Pakistan), founder of the Abdus Salam International Centre for Theoretical Physics in Trieste (which fosters advanced studies and research, especially in developing countries), and other eminent scientists more than 25 years ago.

Jordan has provided the land and building that will house the accelerator complex and associated infrastructure (e.g. the dedicated new power line). The Members, which have always covered the annual recurrent budget, are committed to providing the operating cost, which will rise to some \$(6-8) million pa when SESAME comes into operation. Germany generously donated components of a decommissioned light source (BESSY1), which are being upgraded to form the booster that will inject electrons into a completely new 133m main storage ring. Components that have become surplus to requirements have been donated by various synchrotron laboratories in the USA and Europe, including in particular the UK, which has donated five 'beamlines'. The value of the investments made so far (by Jordan, the other Members, and the European Union), plus the donated equipment that will be used from the beginning of operation is some \$55 million.

The users of SESAME will be based in universities and research institutes in the region. They will visit the laboratory periodically to carry out experiments, generally in collaboration, where they will be exposed to the highest scientific standards. The potential user community, which already numbers some 300, has been fostered by a series of Users' Meetings and by excellent training opportunities supported by the IAEA, national agencies (such as the US Department of Energy) and many of the world's synchrotron laboratories in Europe, North America, Asia and Latin America, which have created special training fellowships for SESAME. The training programme (whose monetary value is currently some \$1M pa) is already bringing significant benefits to the Members of SESAME (e.g. through capacity building, the creation of collaborations both within the region and with countries beyond it, etc.), and will ensure that SESAME will be fully exploited by scientists from across the region.

Resolutions/endorsements in support of SESAME have been issued by the Executive Board of UNESCO, IUPAP (International Union for Pure and Applied Physics), IUBMB (International Union of Biochemistry and Molecular Biology), IUPAC (International Union of Pure and Applied Chemistry), the US National Commission for UNESCO and 45 Nobel laureates in a joint statement.

**Further information** about SESAME and potential SESAME Users can be found at

<http://mag.digitalpc.co.uk/fvx/iop/esrf/sesamebrochure/>

and

<http://mag.digitalpc.co.uk/fvx/iop/esrf/sesamepeople/>

**Contact:** [c.formosa-gauci@unesco.org](mailto:c.formosa-gauci@unesco.org)

