SESAME* - A 3rd Generation Synchrotron Light Source for the Middle East

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Developed under the auspices of UNESCO, SESAME (*S*ynchrotron-light for *E*xperimental *S*cience and *A*pplications in the *M*iddle *E*ast) will be a major international research centre in the Middle East / Mediterranean region, promoting peace and understanding through scientific cooperation. It will have as its centrepiece a synchrotron light source originating from BESSY I, given as a gift by Germany. The upgraded machine, a 2.5 GeV 3rd Generation Light Source with an emittance of 26 nm.rad and 12 places for insertion devices, will provide light from the far infra-red to hard X-rays for a wide range of studies, including those addressing environmental and biomedical issues of relevance to the region. SESAME will offer excellent opportunities for the training of Middle East scientists and attract those working abroad to consider returning. As of August 2005, Members of the SESAME Council are Bahrain, Egypt, Iran, Israel, Jordan, Pakistan, Palestinian Authority, and Turkey. More are expected to join. Members provide the annual operating budget. The facility is located in Allaan, Jordan, 30 km North-West of Amman. Jordan has provided the site & funds for the new building whose construction, started in July 2003, will be completed in 2006. Plans for initial beam lines include MAD Protein Crystallography, SAXS & WAXS for Polymers and Proteins, Powder Diffraction for Material science, UV/VUV/SXR Photoelectron Spectroscopy and Photoabsporption Spectroscopy and IR Spectroscopy & EXAFS.

User interest in clinical medical applications is growing . Some beamlines will be built by Member countries. Additional funds to purchase components of the new ring and beamlines are being sought from the EU, the US, and other sources. A Director, Scientific Director, Technical Director, and Administrative Director are on board and an accelerator group, made up of Middle East scientists and engineers, is finalizing the design of the facility. Four committees advise the Council and assist in developing the technical design, beam lines, user community, and scientific Program.

For more details see:
www.sesame.org.jo

Science with SESAME

Several hundred scientists from the Middle East have participated in five scientific workshops and three Users' Meetings (see reports on the web site). Based on input on these meetings, 70 proposals received, and joint meetings of the Scientific and Beam Lines Advisory Committees, the following first phase beam lines are planned:

	Beamline	Energy	Source
1	MAD Protein Crystallography	5 ÷ 15 keV	PM Wiggler (In vacuum undul. in Phase2)
2	PES & Photoabsorption Spectroscopy	.005 ÷ 1 keV	Undulator
3	SAX/WAXS	10 keV	Undulator
4	XAFS/XRF	3 ÷ 30 keV	PM Wiggler
5	Powder diffraction	3 ÷ 25 keV	PM Wiggler
6	IR Spectromicroscopy	0.01 ÷ 1 eV	Bending mag.

The SESAME Building

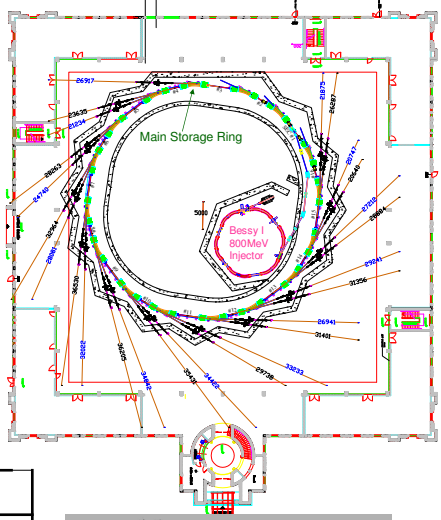
The SESAME building, designed by Rafiq Sarraf and the Engineering Department of the Al-Balqa' Applied University in Salt, Jordan together with engineers from the Karlsruhe Research Center and funded by Jordan, will be completed in 2006. The ground floor contains the ring, injector and up to 27 beam lines. The experimental area is 60m x 60m with extensions of 7.5m x 30m on each side. Space for 12 laboratories and 3 workshops are in the corners. The 1st floor, with 2100m^2, provides space for 20m^2 offices for staff and users plus the control room.

Building construction progress

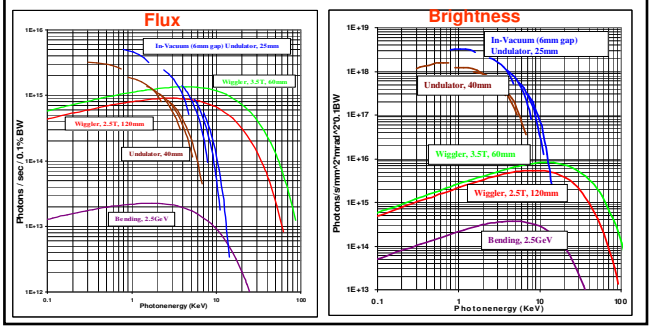
The Main Storage Ring

For the new lattice the so-called "TME-Optic" has been adopted, which gives the smallest emittance and the highest percentage of the circumference for insertion devices. The storage ring has 8 Super Periods with 2 x 22.5 degree bending magnets. The basic elements of the lattice are combined function bending magnets, with a set of quadrupoles and sextupoles on each side of the bending magnet, in order to provide the proper focusing and the chromatic correction for the beam. 12 straight sections are available for insertion devices with lengths up to 3.9 meters.

Experimental Floor Layout



Radiation from Bending Magnets, Wigglers and Undulators



SESAME Storage Ring Main Parameters

Energy (GeV)	2.5
Maximum Beam Curr. (mA)	400
Bending Flux Density (T)	1.455
Circumference (m)	133.1
Emittance (nm.rad)	26
Max Insertion Device Length (m)	3.9
Long Straights Beam Cross Section ($\sigma_x\sigma_z$) (μm)	828 x 21
Available Straight Sections for Insertion Devices	12