

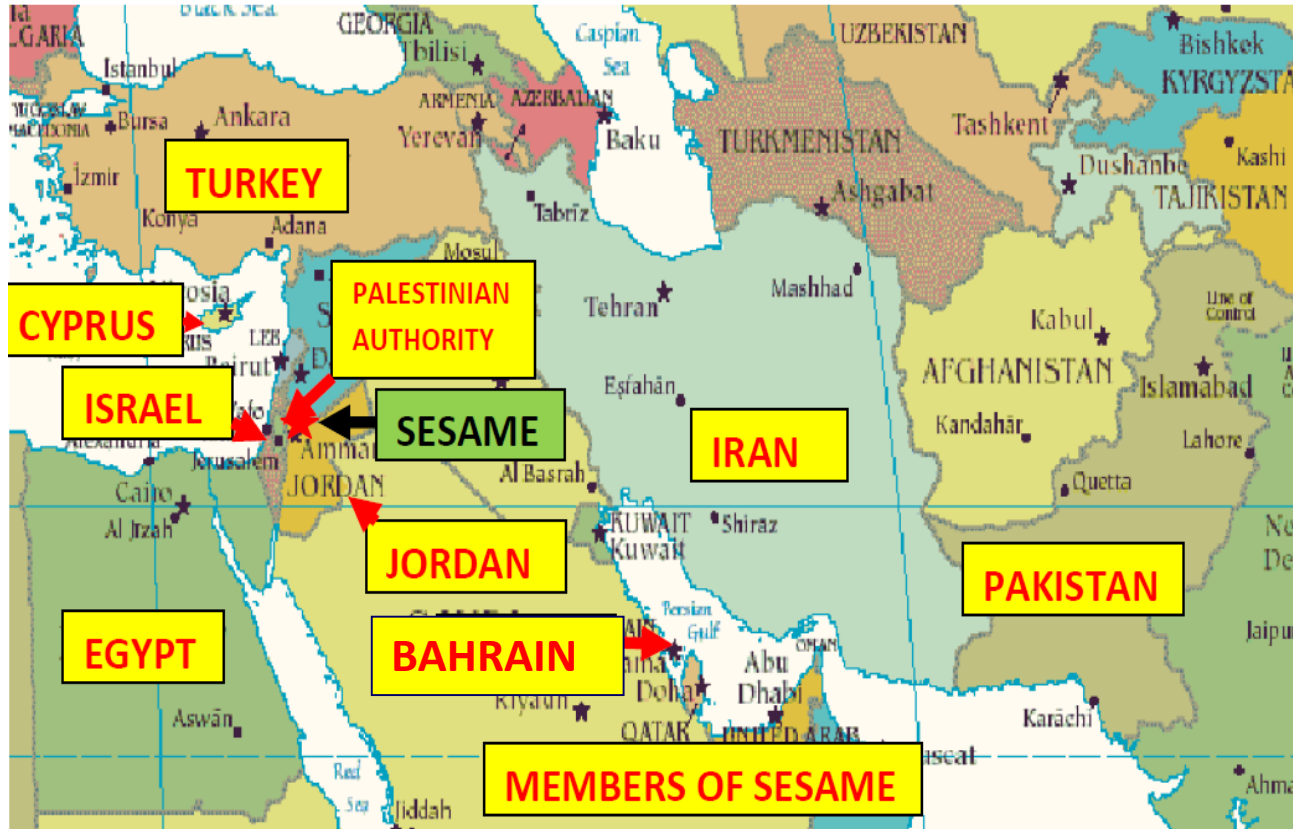
The SESAME Project

Synchrotron-light for Experimental Science and Applications in the Middle East (www.sesame.org.jo)

Zehra Sayers

**Director Foundations Development Program, Sabanci University,
Chair SESAME Scientific Advisory Committee**

SESAME is a 3rd generation light-source ('extremely bright flash lamp → very powerful microscope') under construction near Amman. Commissioning will begin this month



Observers: Brazil, China, EU, France, Germany, Greece, Italy, Japan, Kuwait, Portugal, Russian Federation, Spain, Sweden, Switzerland, UK, USA

SESAME will foster

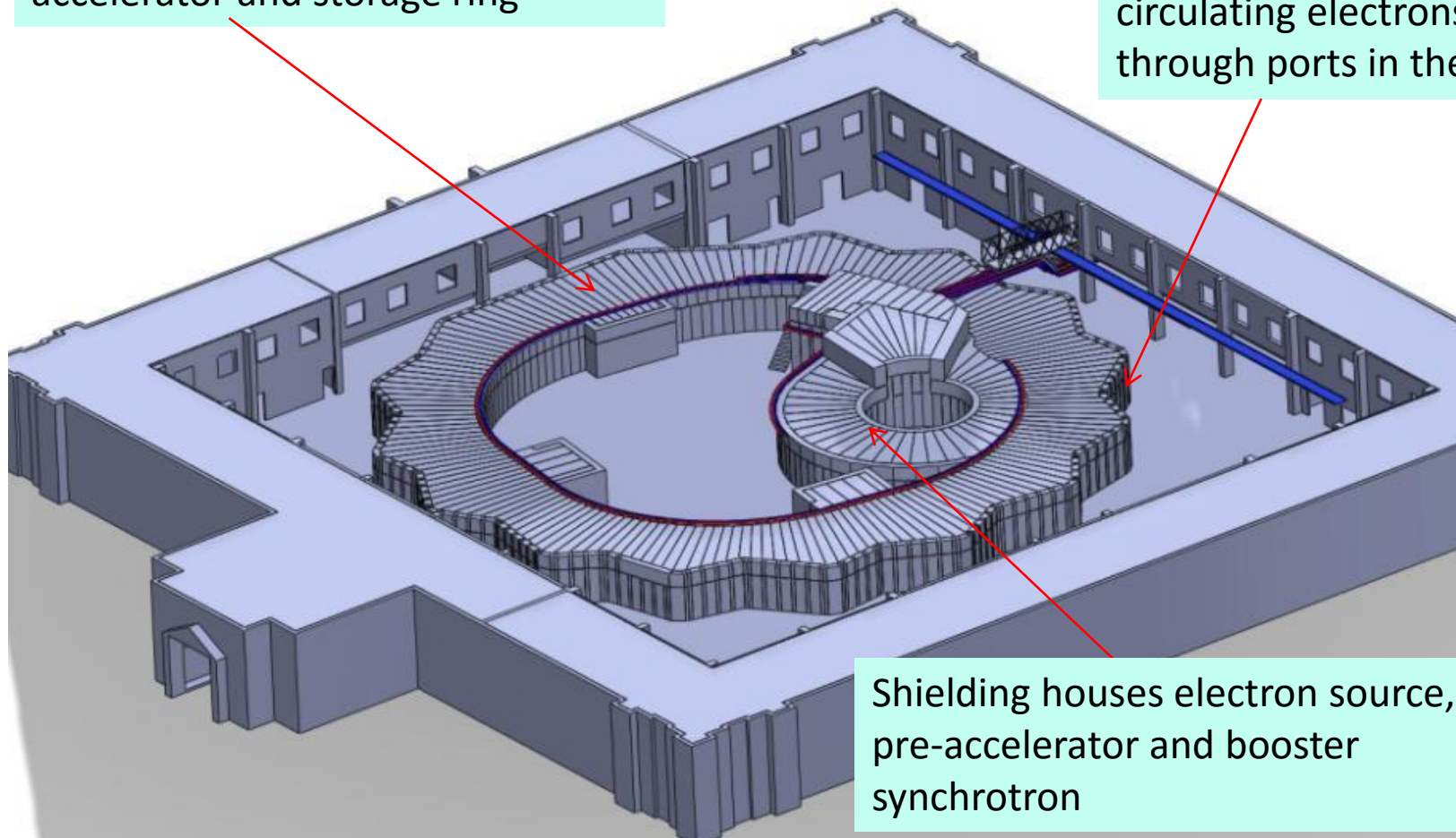
- science and technology in the Middle East and neighbouring countries (from biology and medical sciences through materials science, chemistry, and physics to archaeology)
- cooperation across political divides

- **Convergence of two ideas** – build a light source in the Middle East (Abdus Salam – early 1980s) + foster projects that cross divides
- **Original proposal (1997)** - rebuild old 0.8 GeV Berlin Synchrotron (BESSY 1) in the Middle East, as basis for a new international organisation, modelled on CERN
- **1999 - (Interim) Council established:** followed by international advisory committees
- **2002 - decision to build a new 2.5 GeV ring** (still using BESSY booster) *competitive 3rd generation facility*
- Ground breaking (2003); **completion of building (2008)**
- **Vigorous training programme and growing potential user community**
- **Commissioning – start November 2016. Opening by HM King Abdullah II in May.**

INSIDE SESAME EXPERIMENTAL HALL

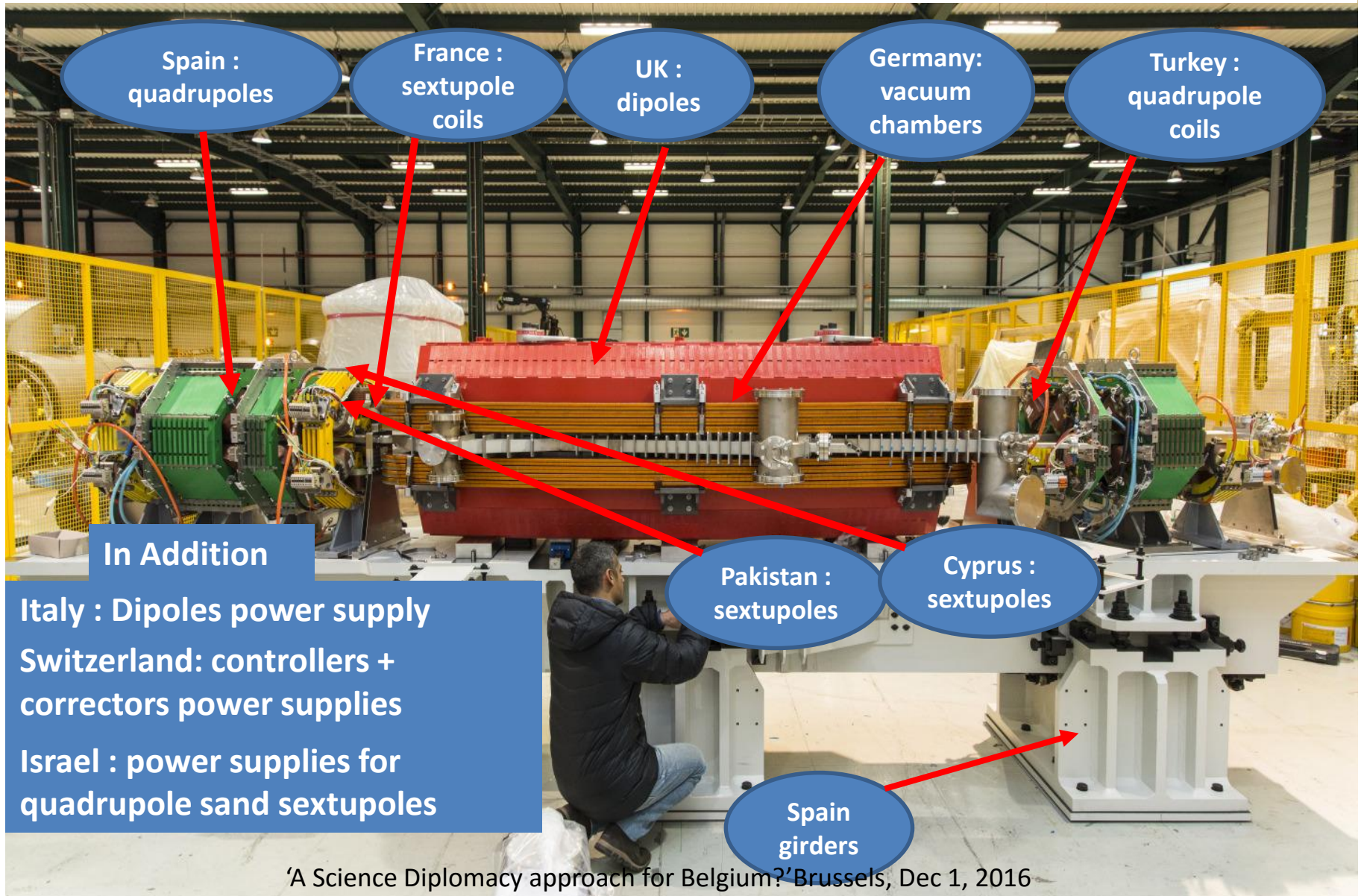
Shielding houses electron
accelerator and storage ring

Intense beams of light (infra-
red to X-rays) generated by
circulating electrons exit
through ports in the shielding

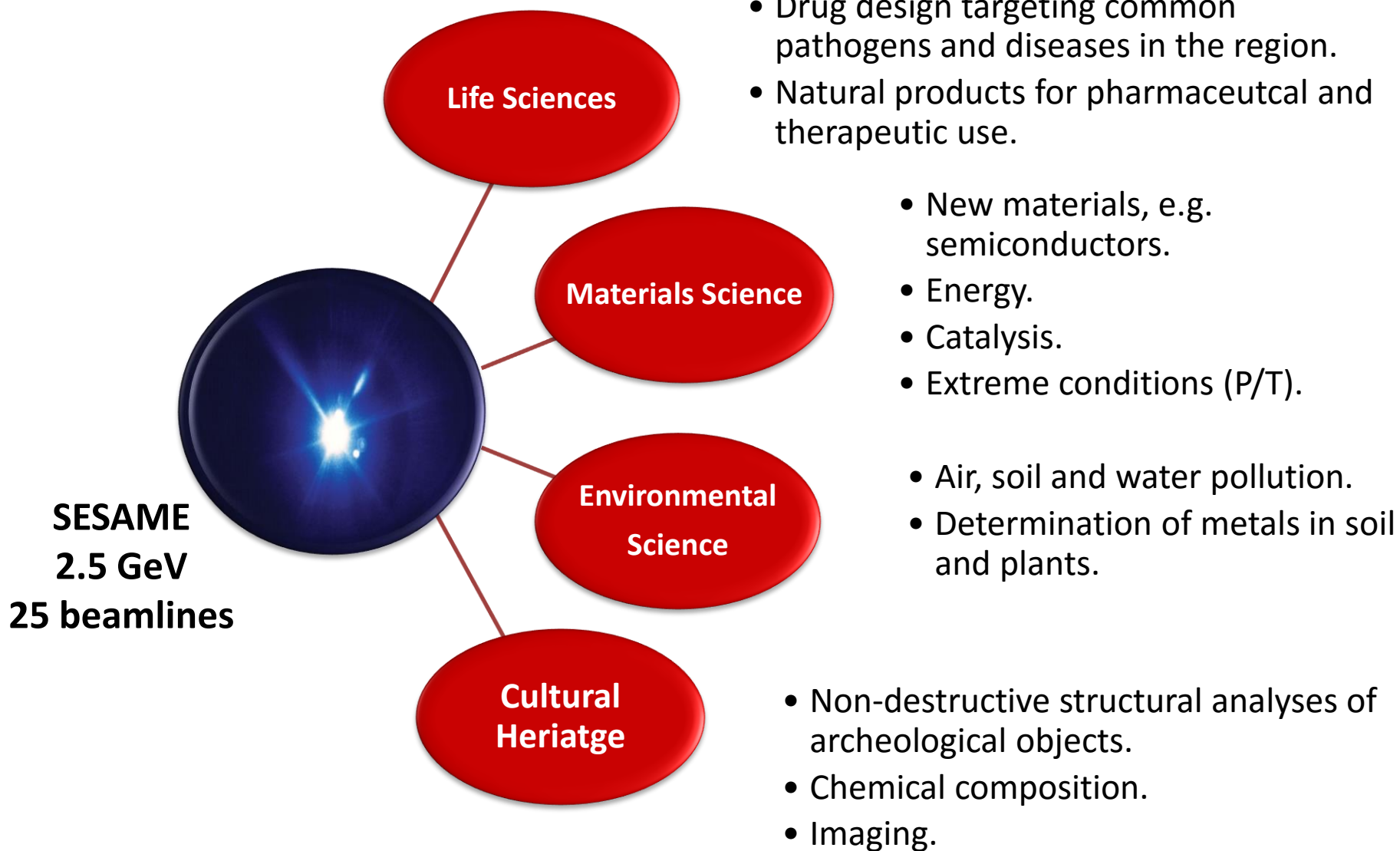


Shielding houses electron source,
pre-accelerator and booster
synchrotron

Collaboration between CERN, SESAME Members and Observers – funded by EU



SESAME's SCIENCE: Regional Relevance



Regional Relevance

Adsorption and mobility of heavy metals in soils in the vicinity of Jordan and Yarmouk rivers (SESAME and Jordan)



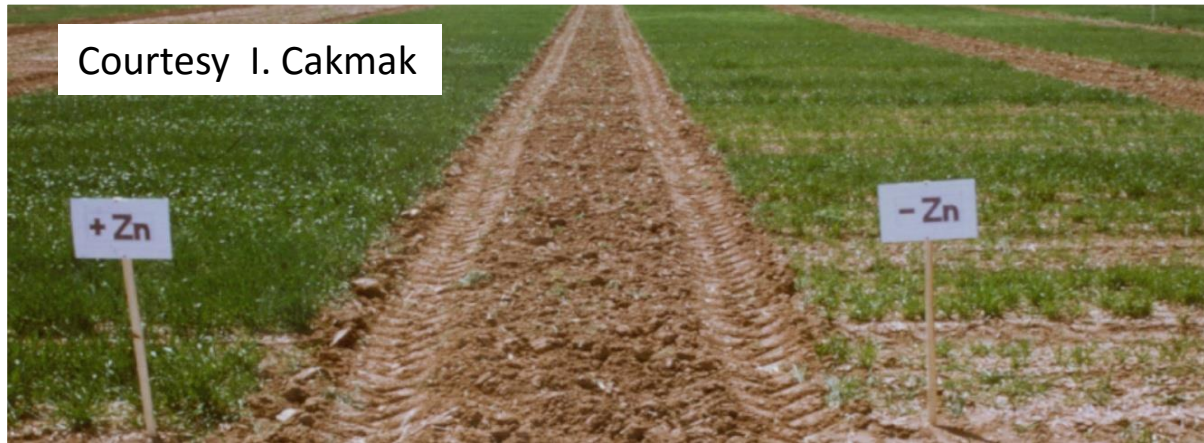
Jordan river sample collection sites

Samples are collected from Jordan and Yarmouk Rivers at different depths for XAFS analyses to monitor levels of all heavy metals. XAFS data collected at Elettra (Italy) and BESSYII (Germany).

Synchrotron Based XRF-XAFS Techniques in Tracking Pollution (Air/Soil) in Some Arab Regions (SESAME, Egypt, Jordan)

Coordinated Research Projects supported by IAEA

Courtesy I. Cakmak

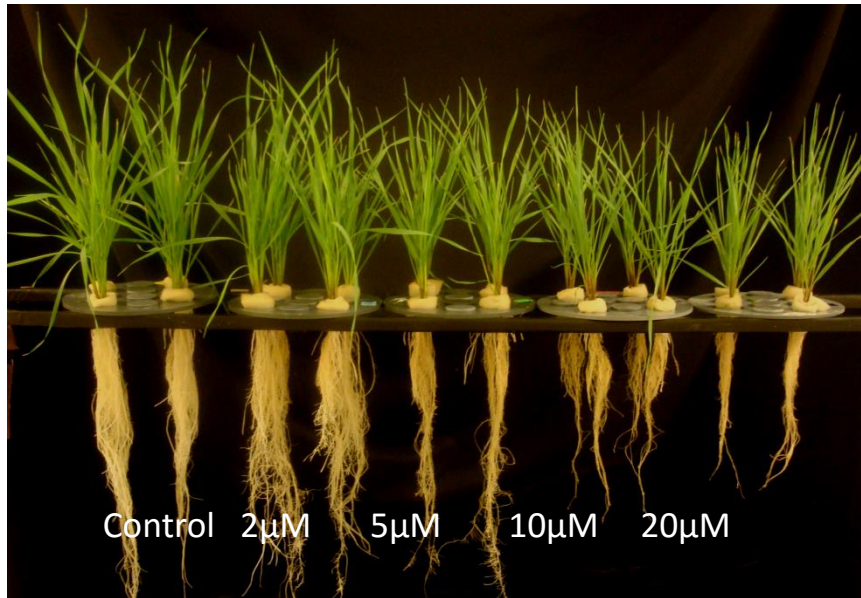


Zn

Wheat has proteins readily binding metals.

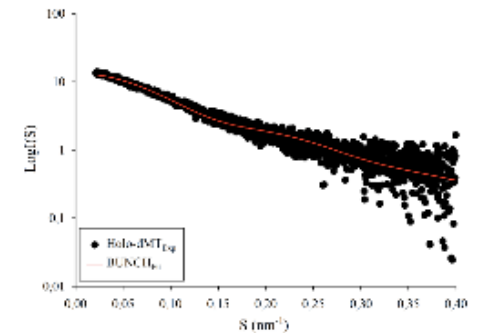
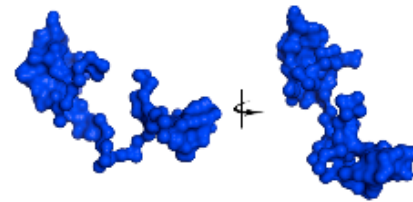
Zn fertilizers increase yield and enhance Zn content of wheat seeds.

XRF: Mapping and quantifying Zn content in seeds.



Wheat seeds exposed to increasing Cd concentrations.

Cd



SAXS analysis of metallothioneins involved in Cd tolerance

Aydin M. 2011, Bilecen et al., 2005, Dede et al., 2007, Yesilirmak et al., 2009

SCIENCE BEGAN IN 2012: IR MICROSCOPE

11 Proposals aproved

e.g. Study of breast cancer by
Fatemeh Elmi, Assistant Professor,
University of Mazandaran, North Iran
+ Randa Mansour and Nisreen
Dahshan, PhD students in the Faculty
of Pharmacy, University of Jordan



Programme with synchrotron-radiation will begin in 2017

Users' Meetings, Schools, Workshops, Fellowships, visits to operating light-sources,... are building technical and scientific capacity in the region

1st Users' Meeting Amman 2002



10th Users' Meeting Amman 2012



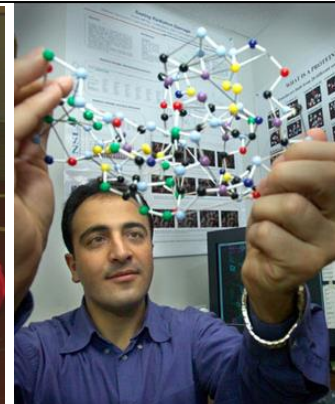
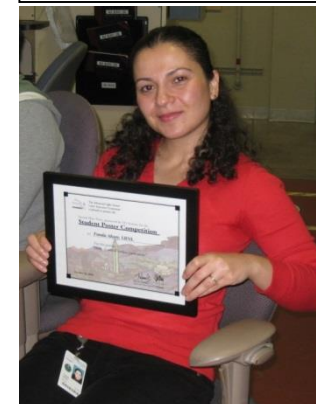
SESAME-JSPS School Cairo 2008



Began training accelerator experts who returned to the Middle East



Now Training Scientists
Left @ Advanced Light Source
Users' Meeting, Right @ NSLS



Members of SESAME Accelerator Group, 2007

A Science Diplomacy approach for Belgium? Brussels, Dec 1, 2016



Mohammad Yous



Sumera Javeed



Zehra Sayers



Maher Attia



Irit Sagi



Vasilis Promponas



Mukhles Sowwan



THANK YOU
www.sesame.org.jo