The SESAME Project

Amor NADJI

On Behalf of SESAME Team

What is SESAME?

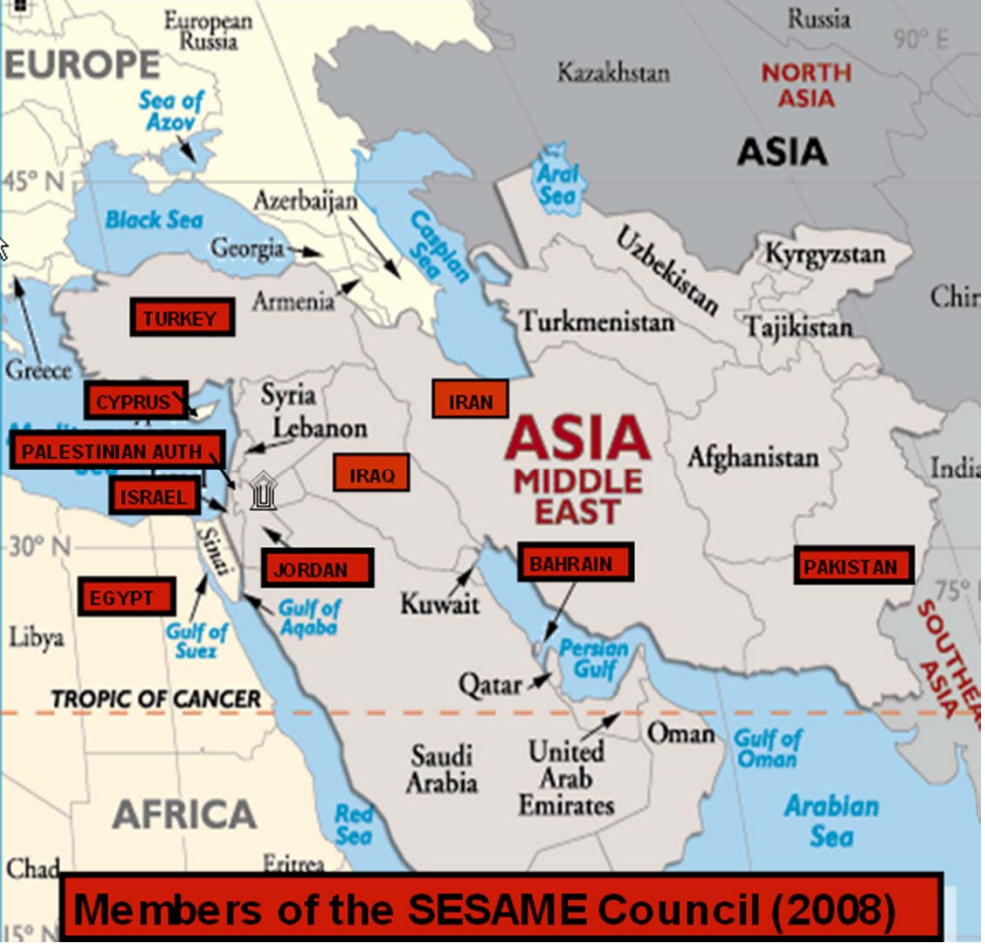
SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East)

First international 3rd generation Synchrotron Light Source

in the Middle East region.

Under construction near Amman (Jordan)

Expected to become operational in 2015



Members:
Bahrain, Cyprus, Egypt, Israel, Iran, Jordan, Pakistan, Palestinian Authority, Turkey.
Pending (?): Iraq

Observers: **France, Greece, Germany, Italy, Japan, Kuwait, Portugal, Russian Federation, Sweden, UK and USA**

Purpose: **Foster excellent science and technology in the Middle East (and prevent or reverse the brain drain).**

+ Build bridges between diverse societies, and contribute to a culture of peace through international collaboration in science.

Very Brief History of SESAME

- **1997: proposal by Prof Herman Winick (SLAC) and Prof G.-A. Voss (DESY):**

➔ *rebuild old 0.8 GeV BESSY I in the Middle East, as basis for a new international organization, modeled on CERN, under umbrella of* ***UNESCO.***

- **2002: Shipment of BESSY I (Germany) to Jordan**

- **2002: decision to build a new 2.5 GeV ring** (BESSY I as injector)

➔ *world* ***competitive*** *device*

- **2003: Ground breaking Ceremony**

➔ *foundation of* ***SESAME***

- **2008: Completion of the building**

Gus Voss (DESY) looking to the boat leaving the harbor of Hamburg and going to Akaba (Jordan) with BESSY I on shipboard, 7 June 2002.

SESAME

SESAME GROUND BREAKING CEREMONY – 6 JANUARY 2003

SESAME building

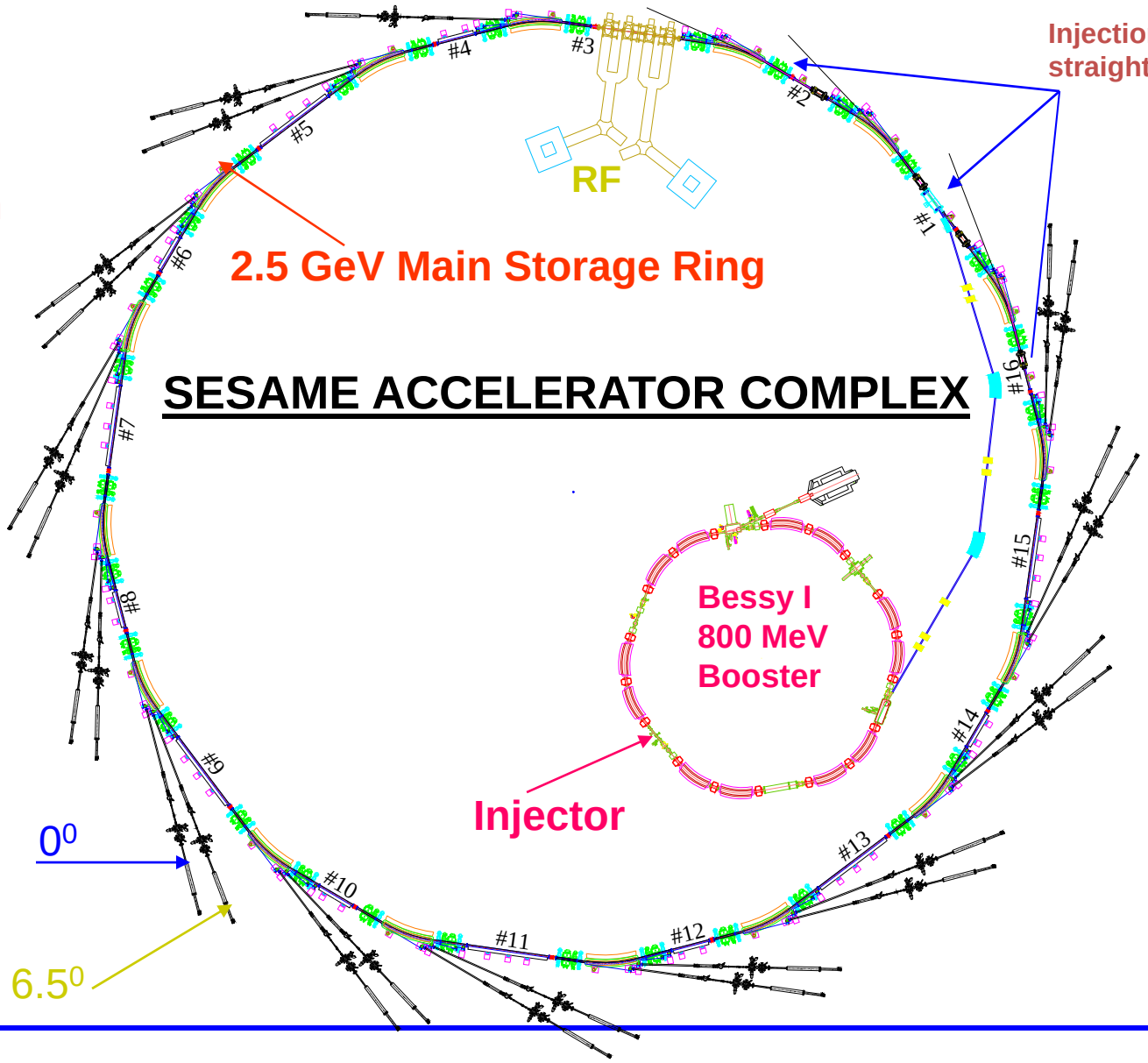
Opening of the SESAME building 3 November 2008

SESAME FACILITY

Main Ring Parameters:

Energy = 2.5 GeV
Circumference = 133.2 m
Emitt. = 26.0 nm.rad
16 Straights sections
{8 x 4.44 m + 8 x 2.38 m}
Up to 28 Beamlines:
12 Insertion Devices
16 Dipole ports with

Beamlines length range from 21 m – 36.7 m

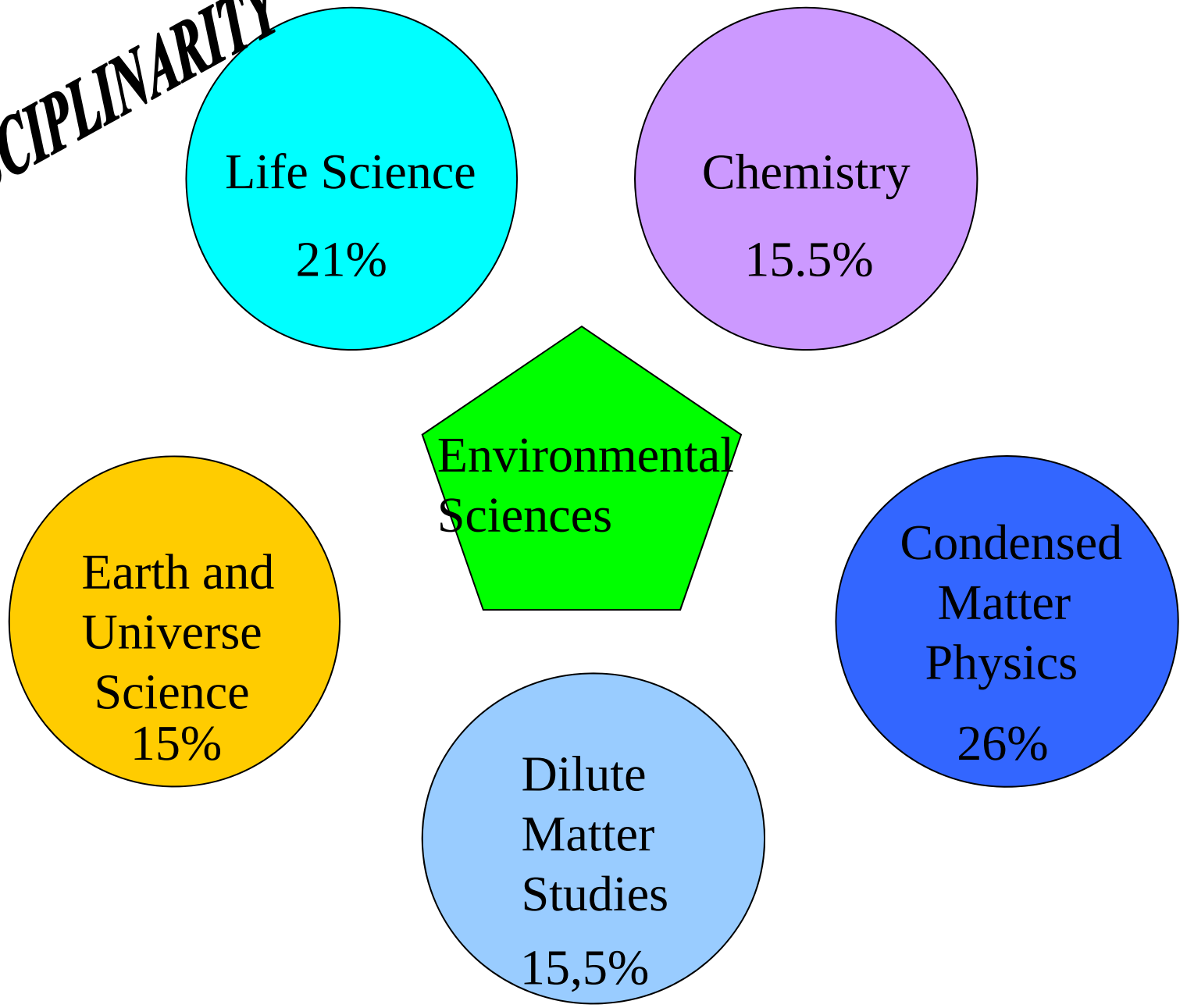


PHASE 1 BEAMLINES

No.	Beamline	Energy Range	Source Type
1.	**Protein Crystallography**	**4 – 14 keV**	**In vacuum undulator**
2.	**XAFS/XRF**	**3 – 30 keV**	**Bending Magnet**
3.	**Infra-red Spectro-microscopy**	**0.01 – 1 eV**	**Bending Magnet**
4.	Soft X-ray, Vacuum Ultra Violet (VUV)	0.05 – 2 keV	Elliptically Polarizing Undulator
5.	Small and Wide Angle X-ray Scattering (SAXS/WAXS)	8 – 12 keV	Bending Magnet
6.	Powder Diffraction	3 – 25 keV	Multi-pole Wiggler
7.	Extreme Ultraviolet (EUV)	10 – 200 eV	Bending Magnet

Synchrotron Radiation in the World

PLURIDISCIPLINARITY



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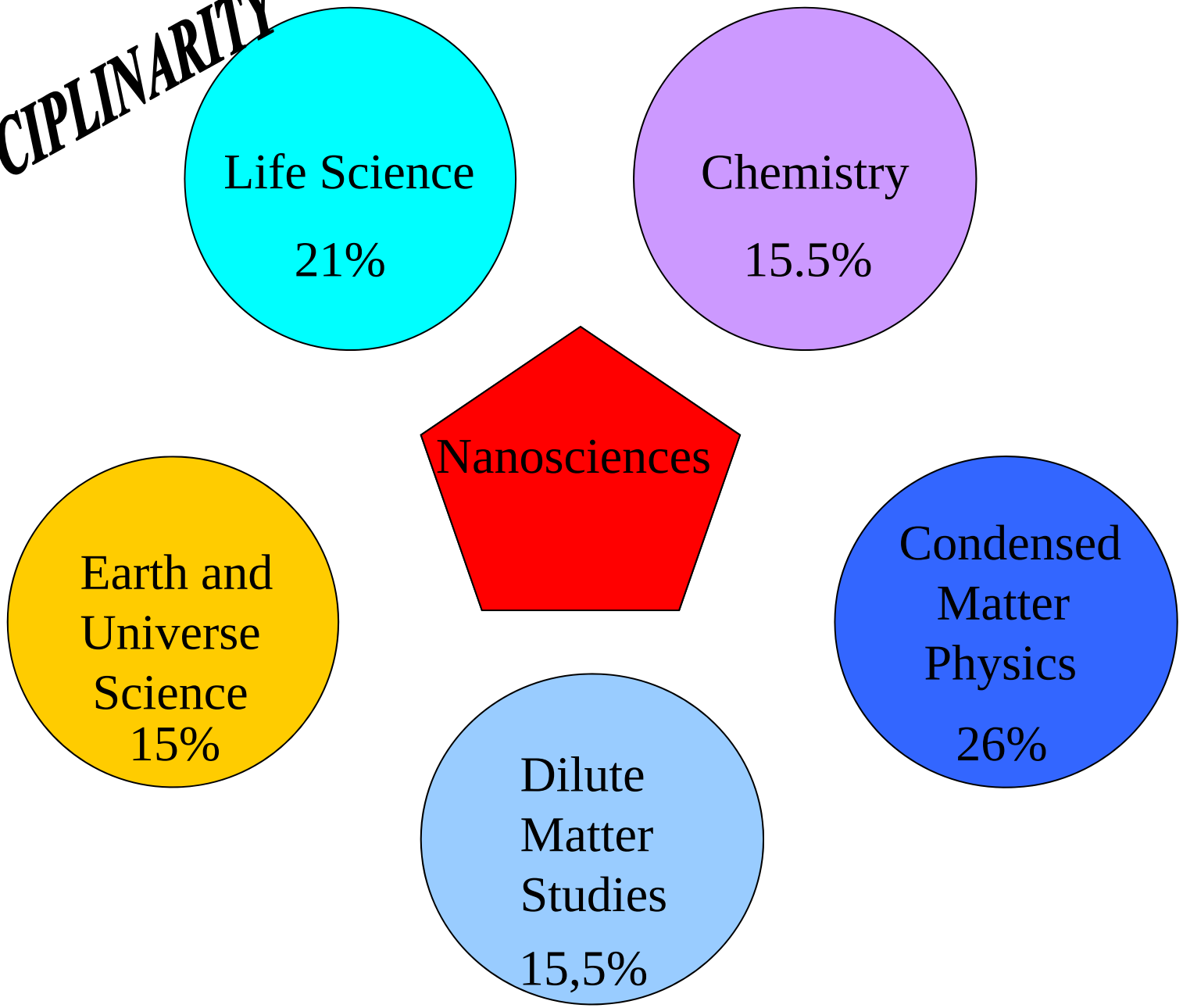

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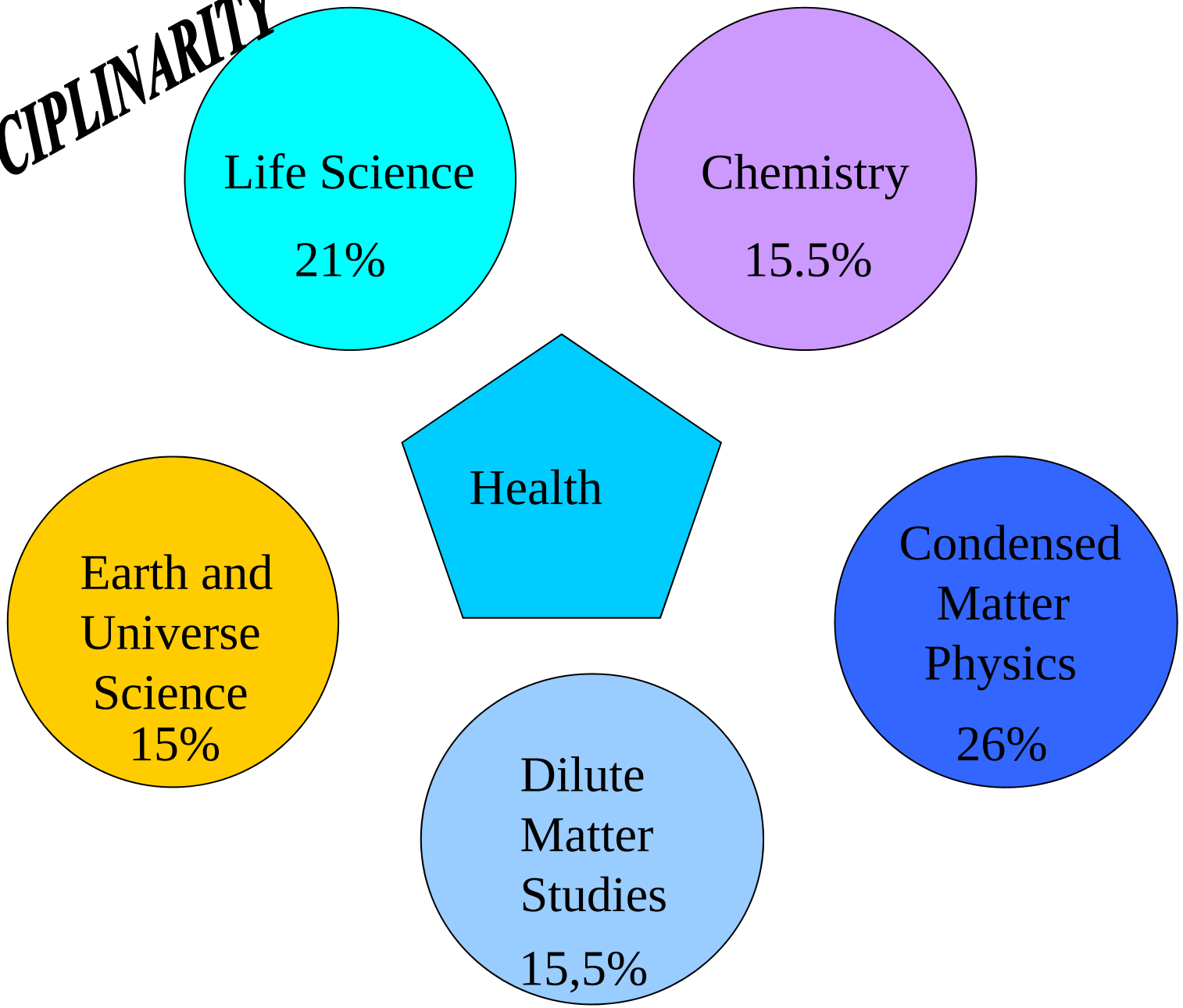

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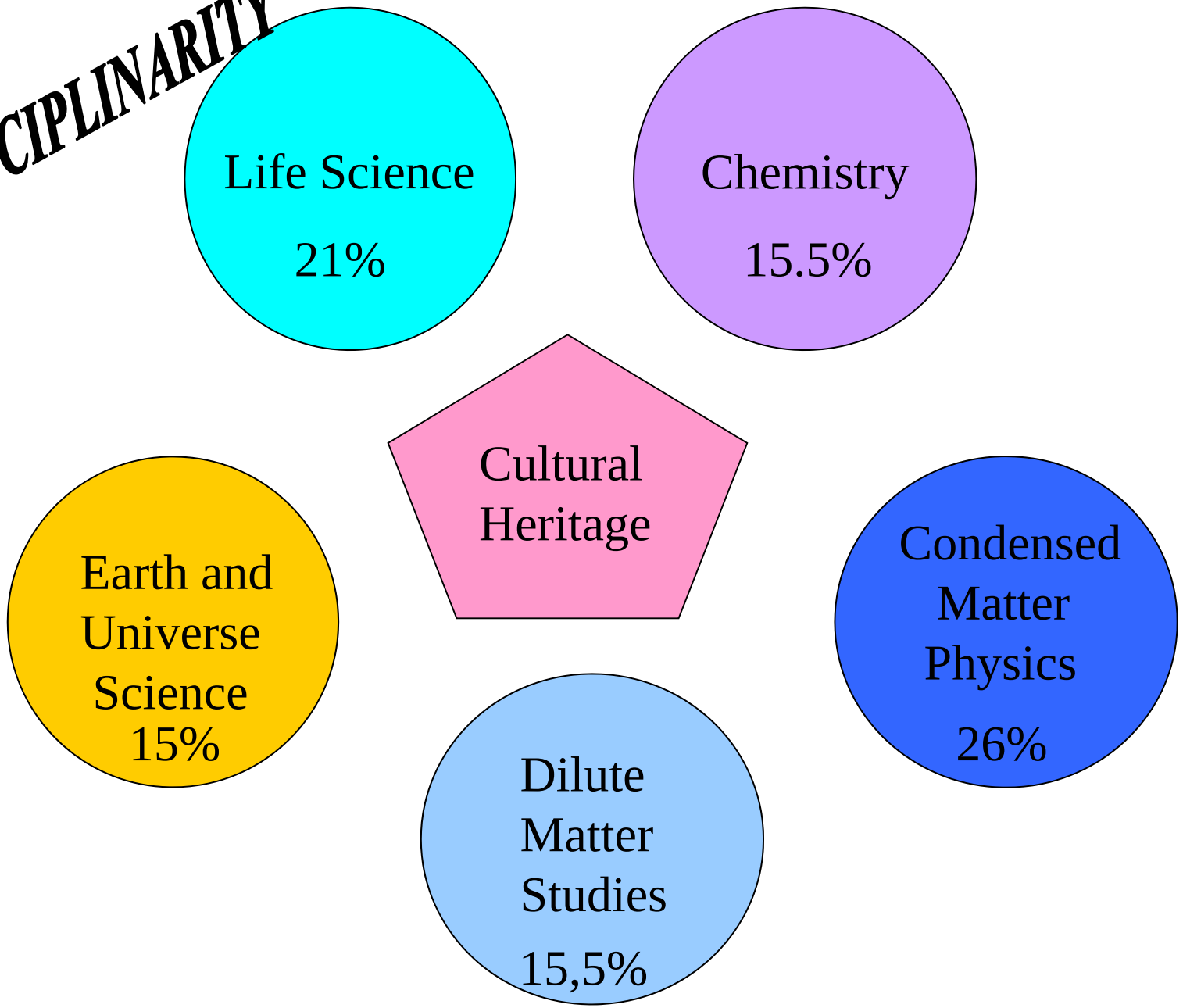

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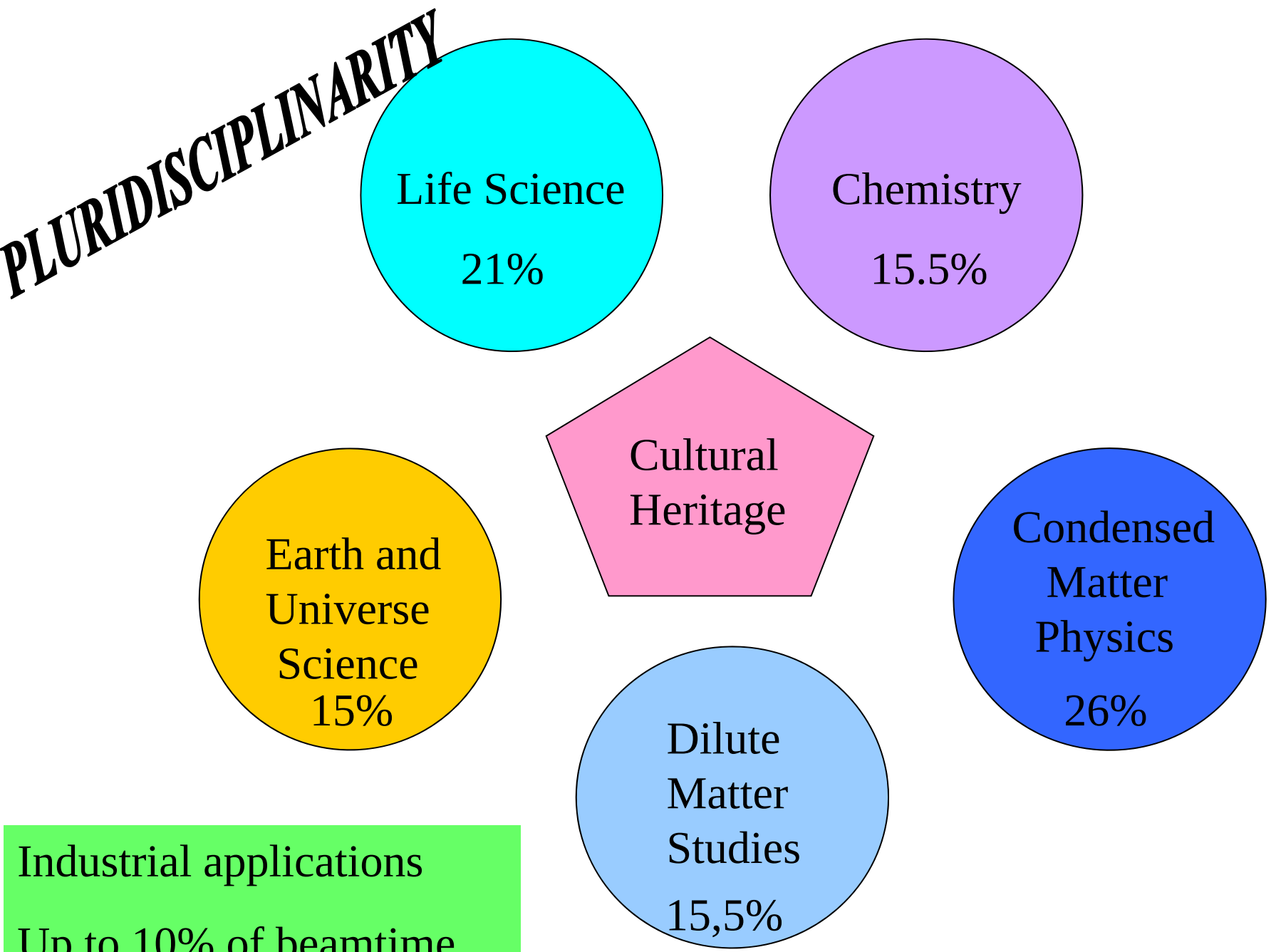


Industrial applications

Up to 10% of beamtime

SESAME: A SPECIAL PROJECT

SESAME is a wonderful project for the idea it conveys, but is very challenging because of :

- A certain skepticism.
- The budget is not secured in its entirety and arrives in small portions.
- The technical team is young and inexperienced in accelerator design and construction.
- The difficulty to attract senior engineers or scientists for full time job.

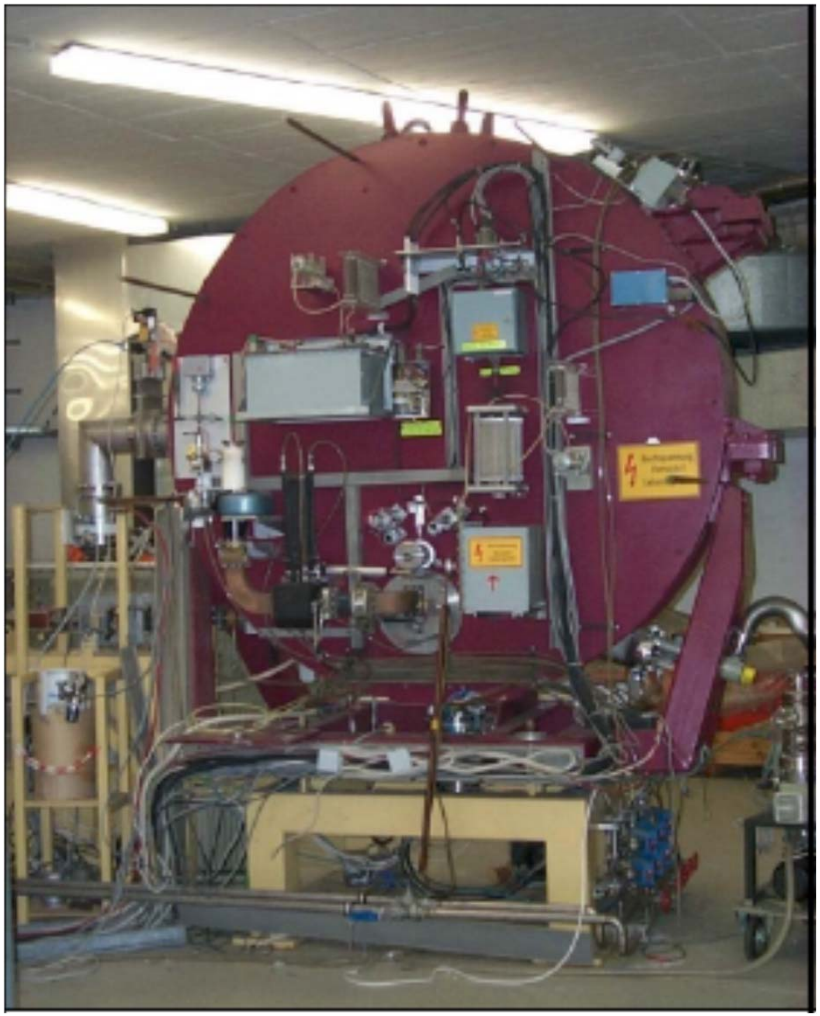
MICROTRON Subsystems Tests in the Hanger

(April – June 2008)

MICROTRON Installation in the SESAME Experimental Hall

25/08/2008

The MICROTRON System installed and tested



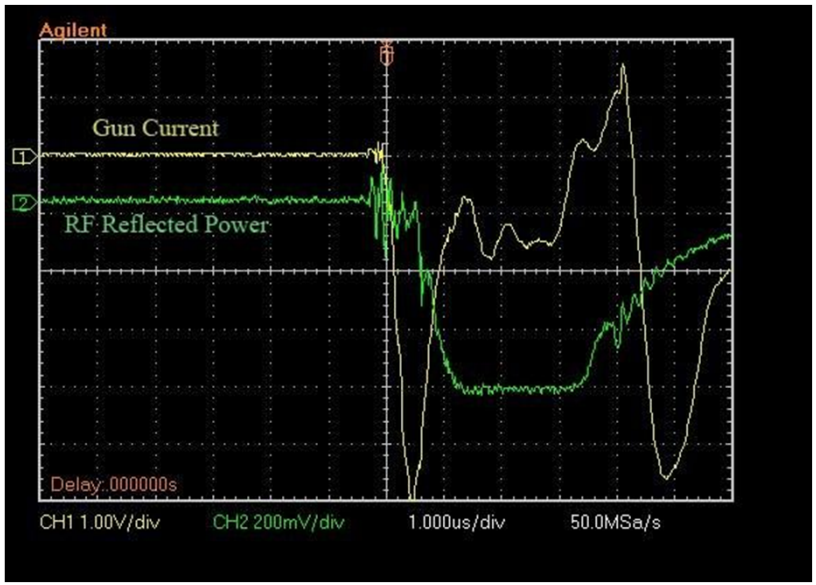
at BESSY (1998)

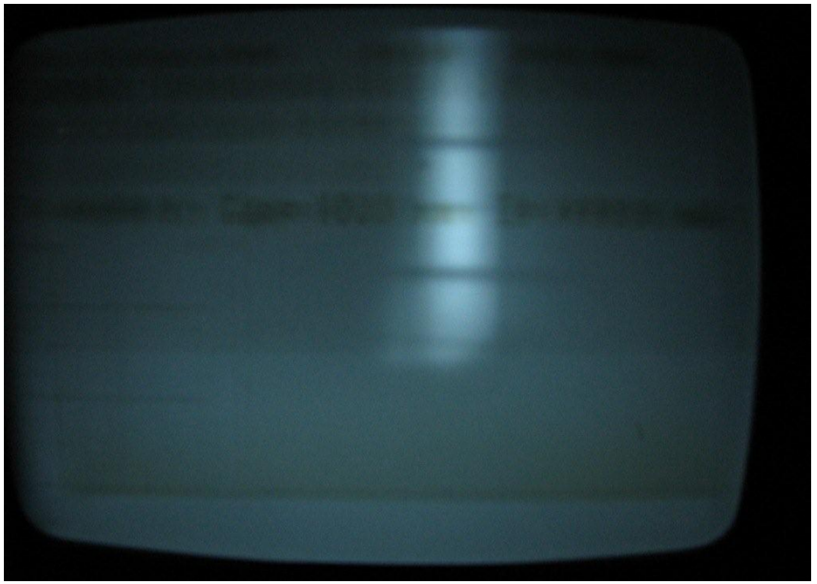
at SESAME (end 2008)

Temporary Shielding for MICROTRON Operation

FIRST SESAME MICROTRON BEAM

JULY, 14th, 2009 (00:35)



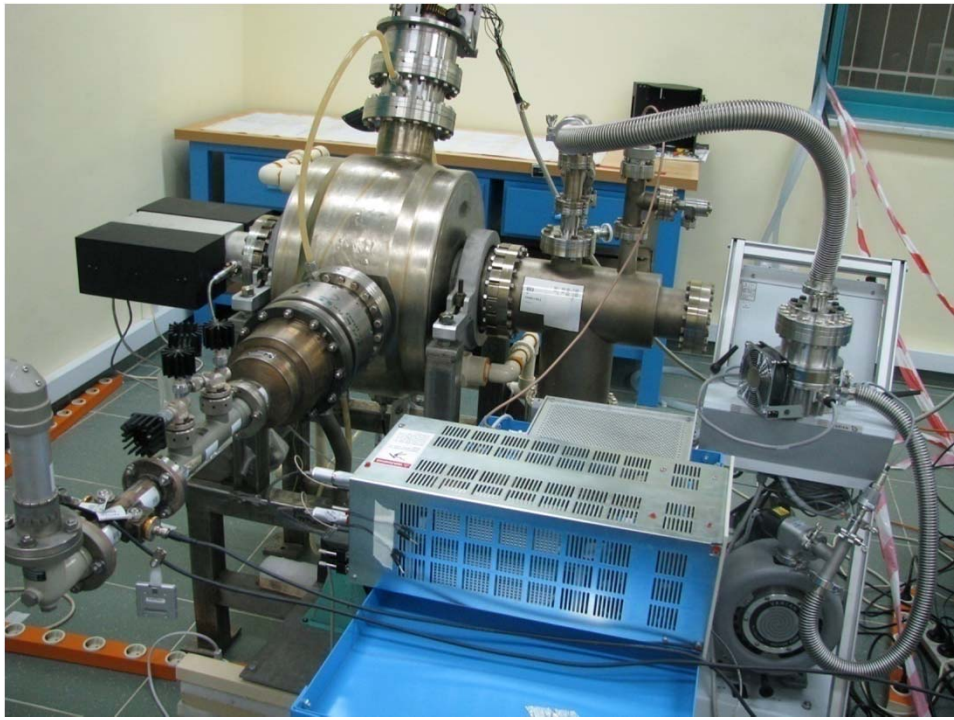


Booster RF System

- The Booster RF system **is complete** and ready to be installed in the Booster tunnel.

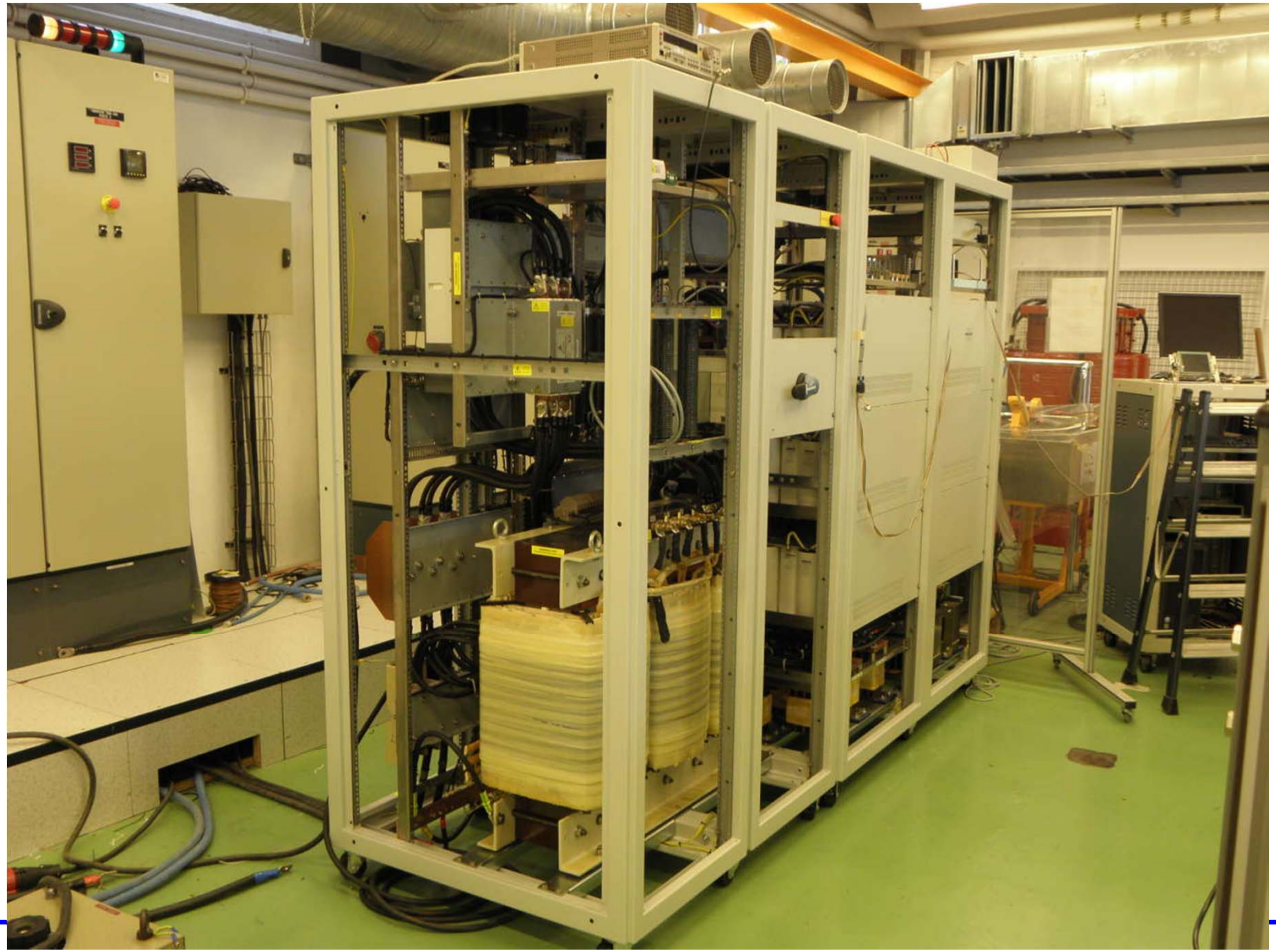
- All the subsystems have been tested and connected, including Cavity, LLRF, solid-state transmitter, interlocks and RF control system.

Booster RF system



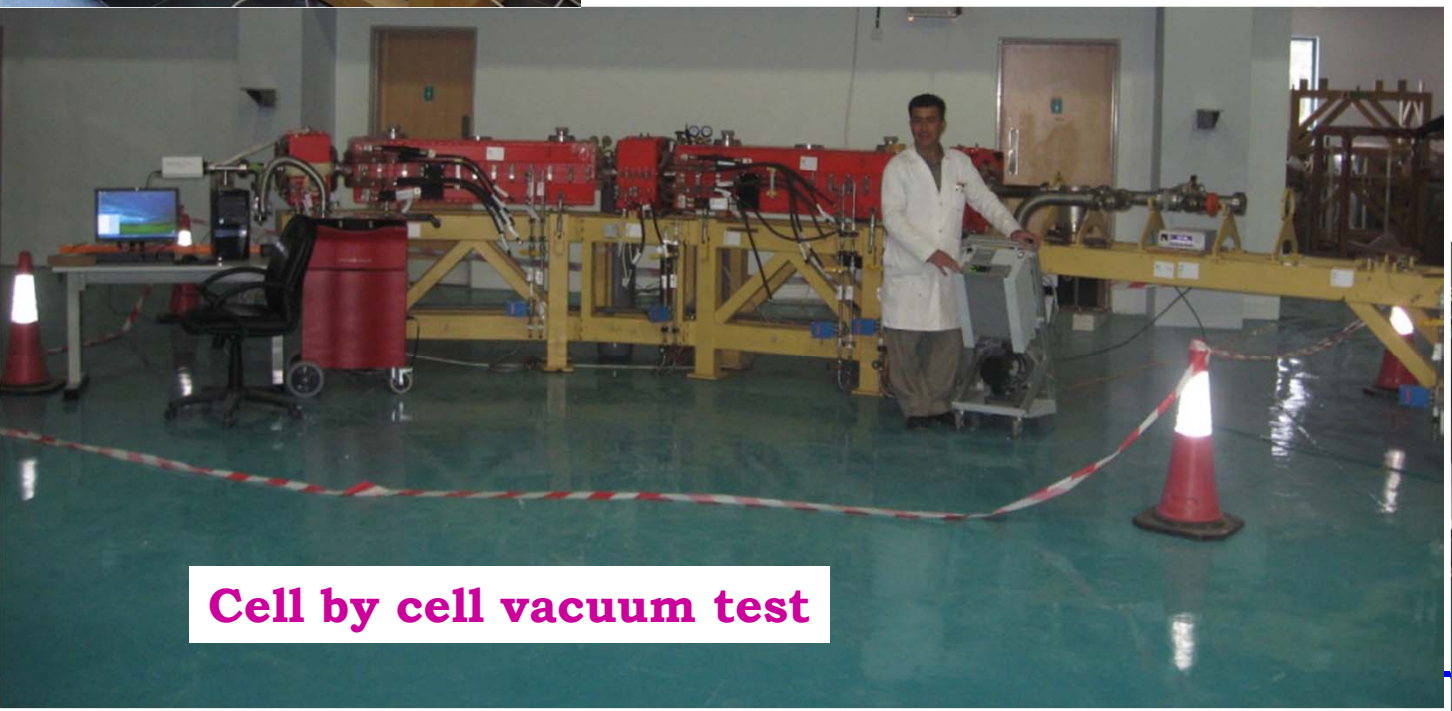
Booster RF Cavity during commissioning

A New Booster Dipole Magnet Power Supply



Booster Vacuum Tests

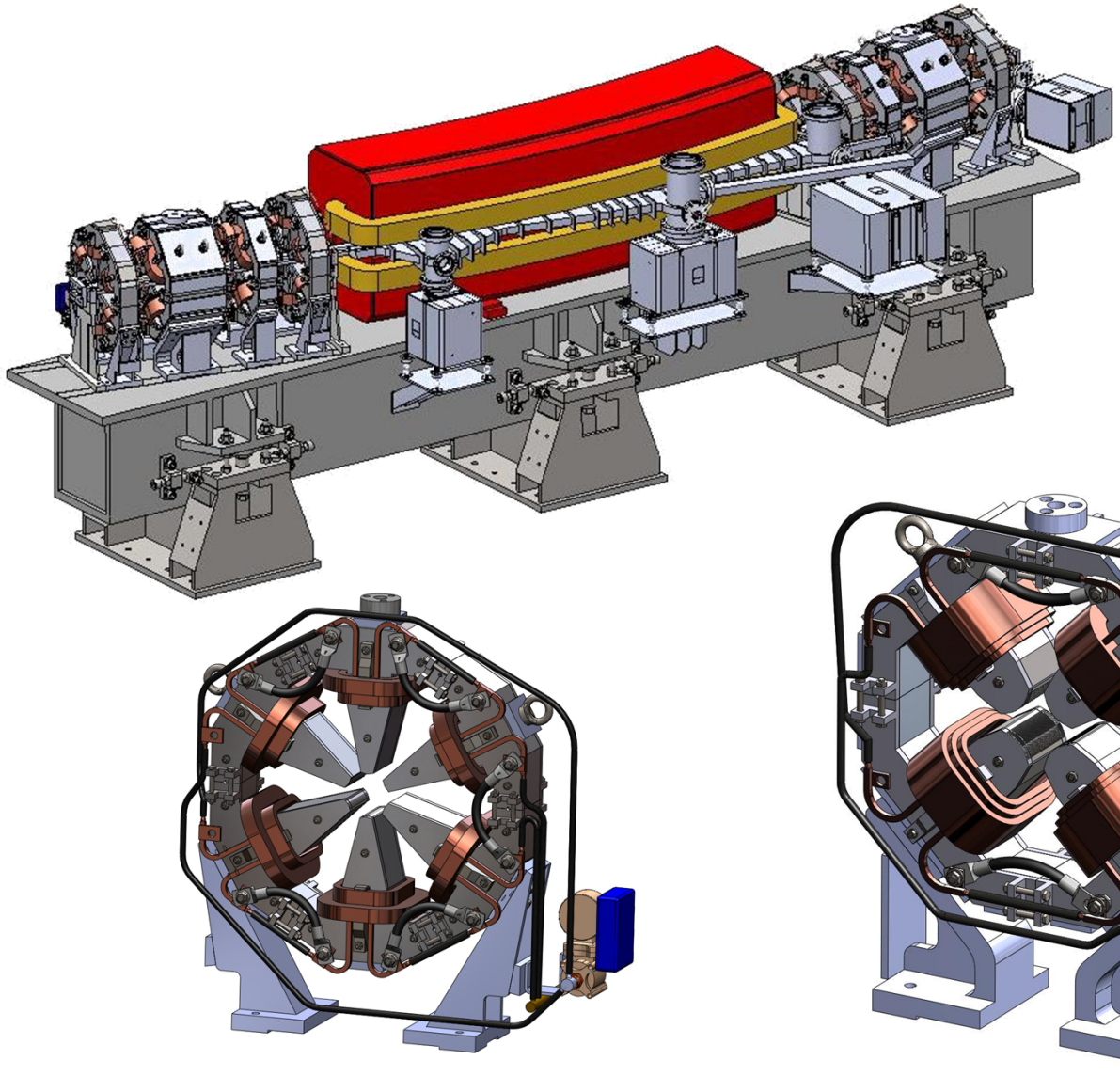
In-vacuum injection Septum has been tested inside the lab

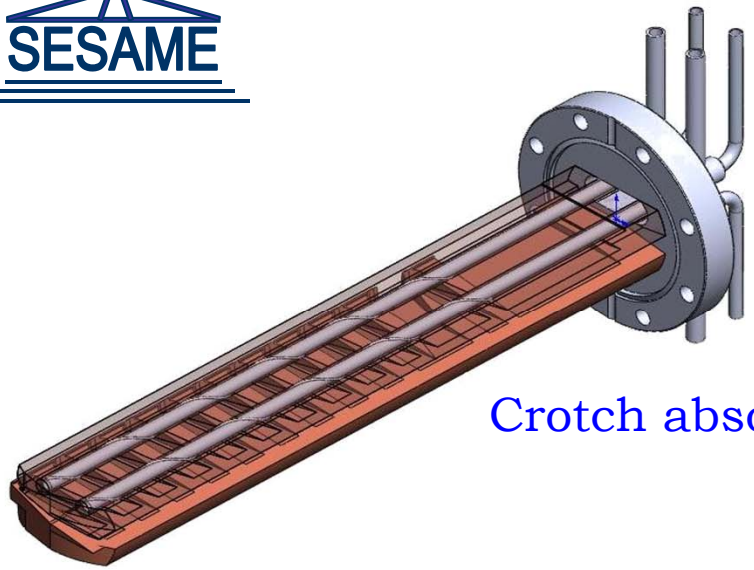


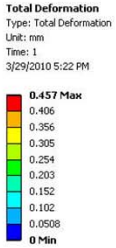
Cell by cell vacuum test

The whole Booster's Vacuum Tests

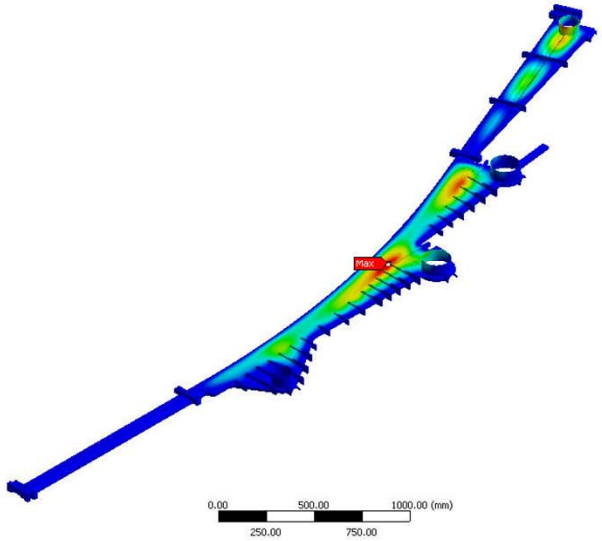
Storage Ring: 3D Mechanical Engineering Design

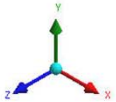


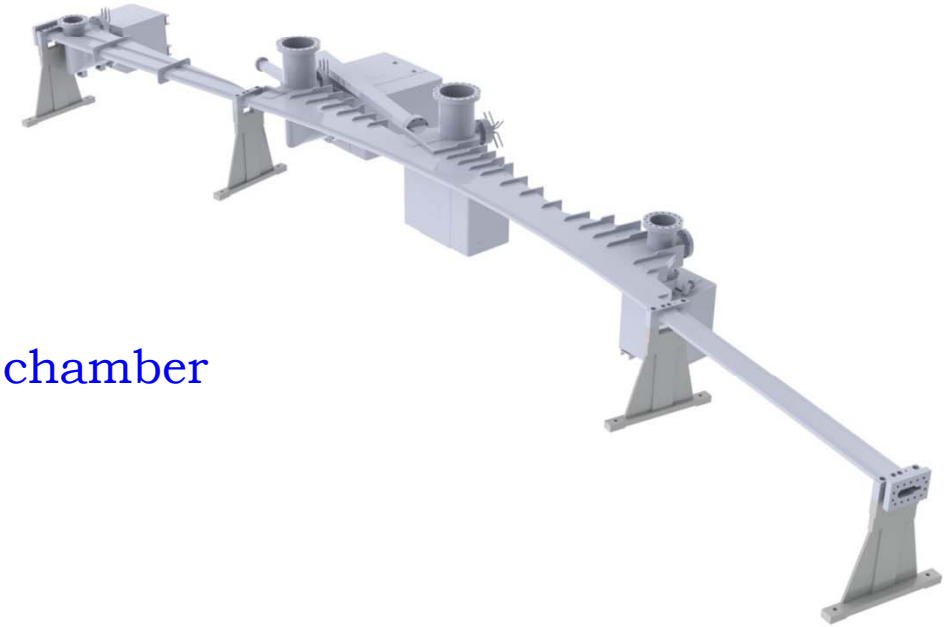




Crotch absorber





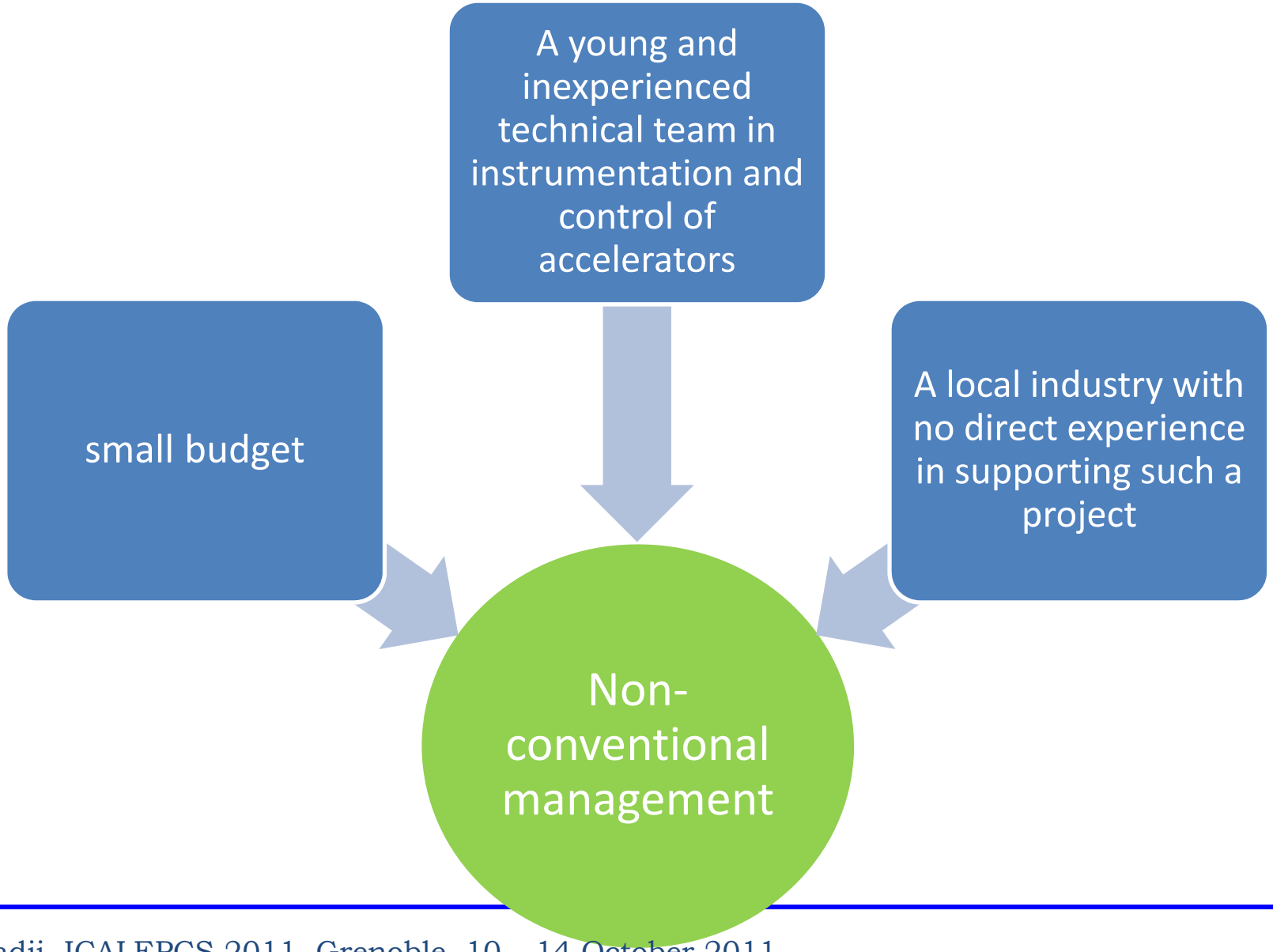


Arc vacuum chamber

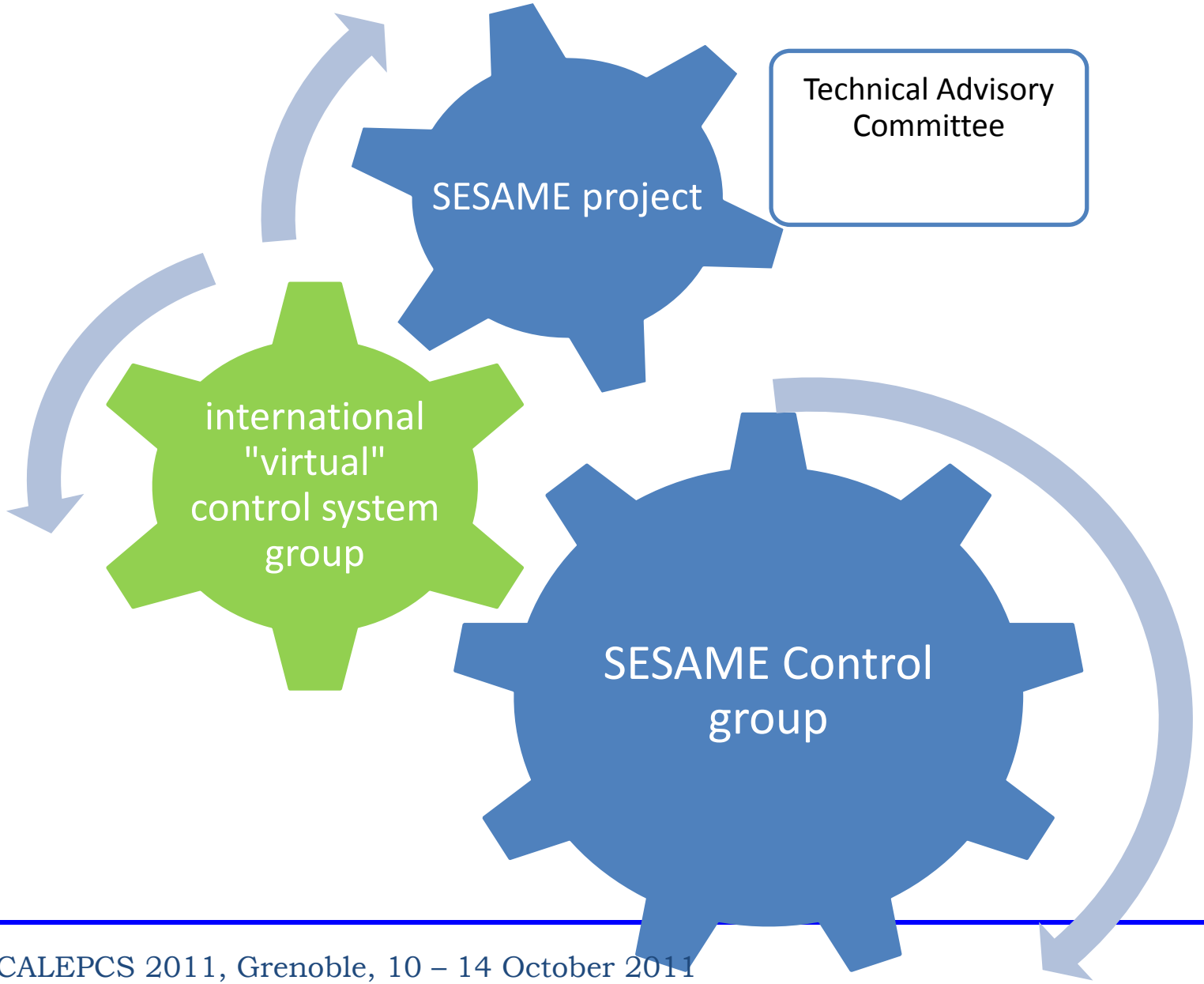
The Radiation Shielding Wall is complete!

SESAME CONTROL SYSTEM

An equation to solve



Management organization



SESAME Control group

Saed Abu Ghannam
from Palestine

Zia-ul-Haque Qazi
from Pakistan

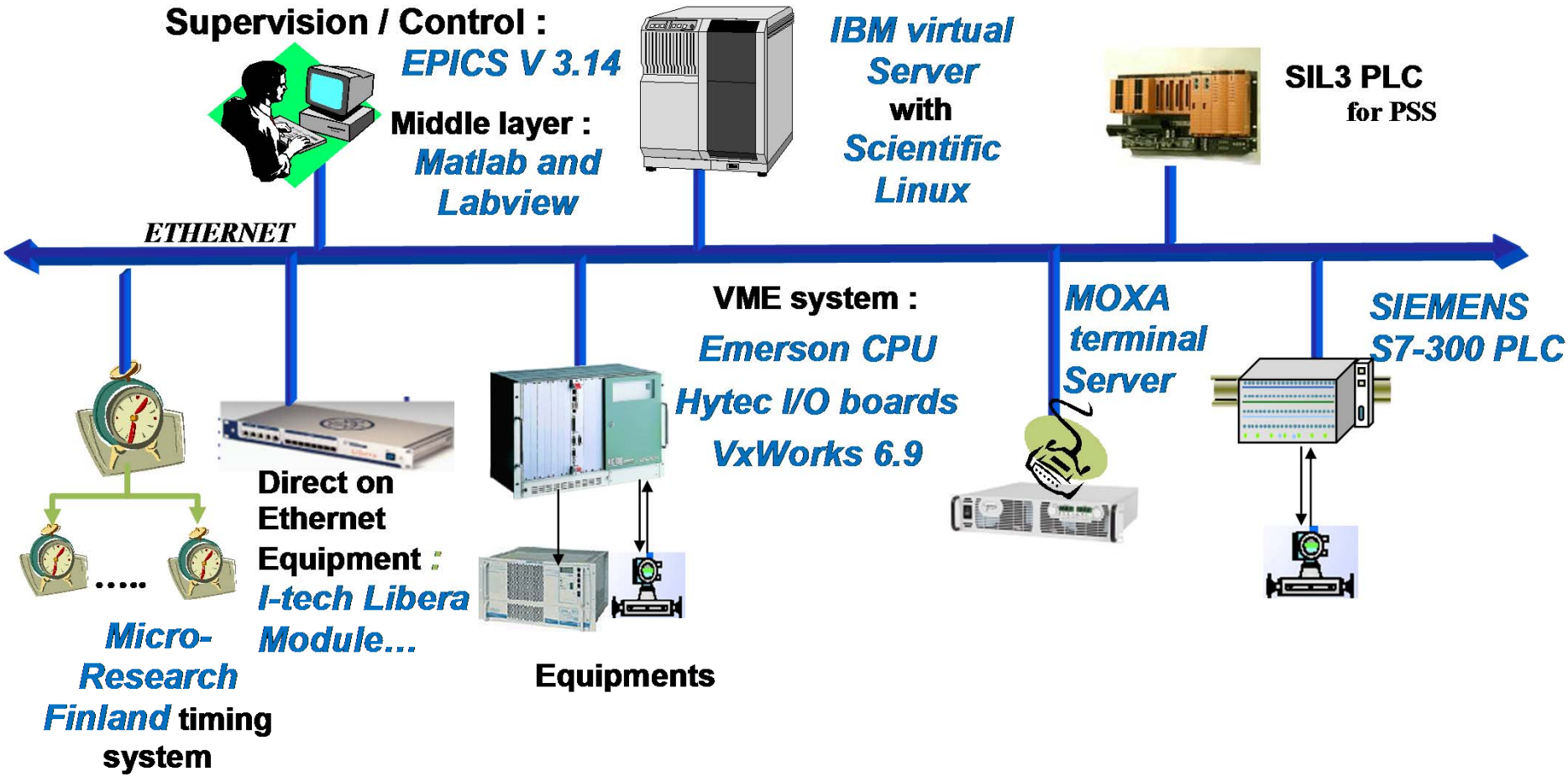
Ibrahim Saleh
from Jordan

The international "virtual" control system group

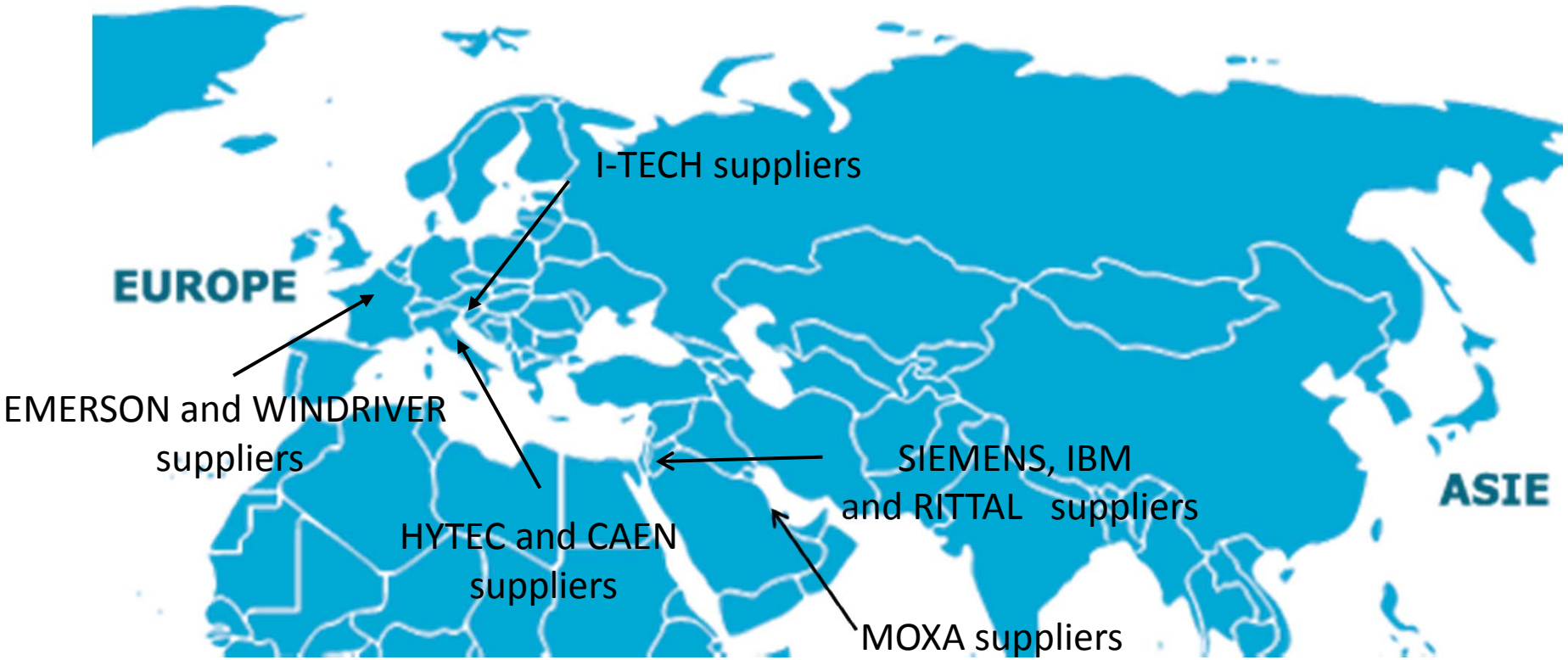
Mission of the international "virtual" control system group

- **guiding SESAME's leaders by finding the right technical skills in the CVs.**
- **training the control group to the basics of accelerator's instrumentation and control.**
- **coaching the control group in the development process.**
- **validating architecture and technical choices.**
- **helping to setup the relationship with manufacturer and suppliers.**

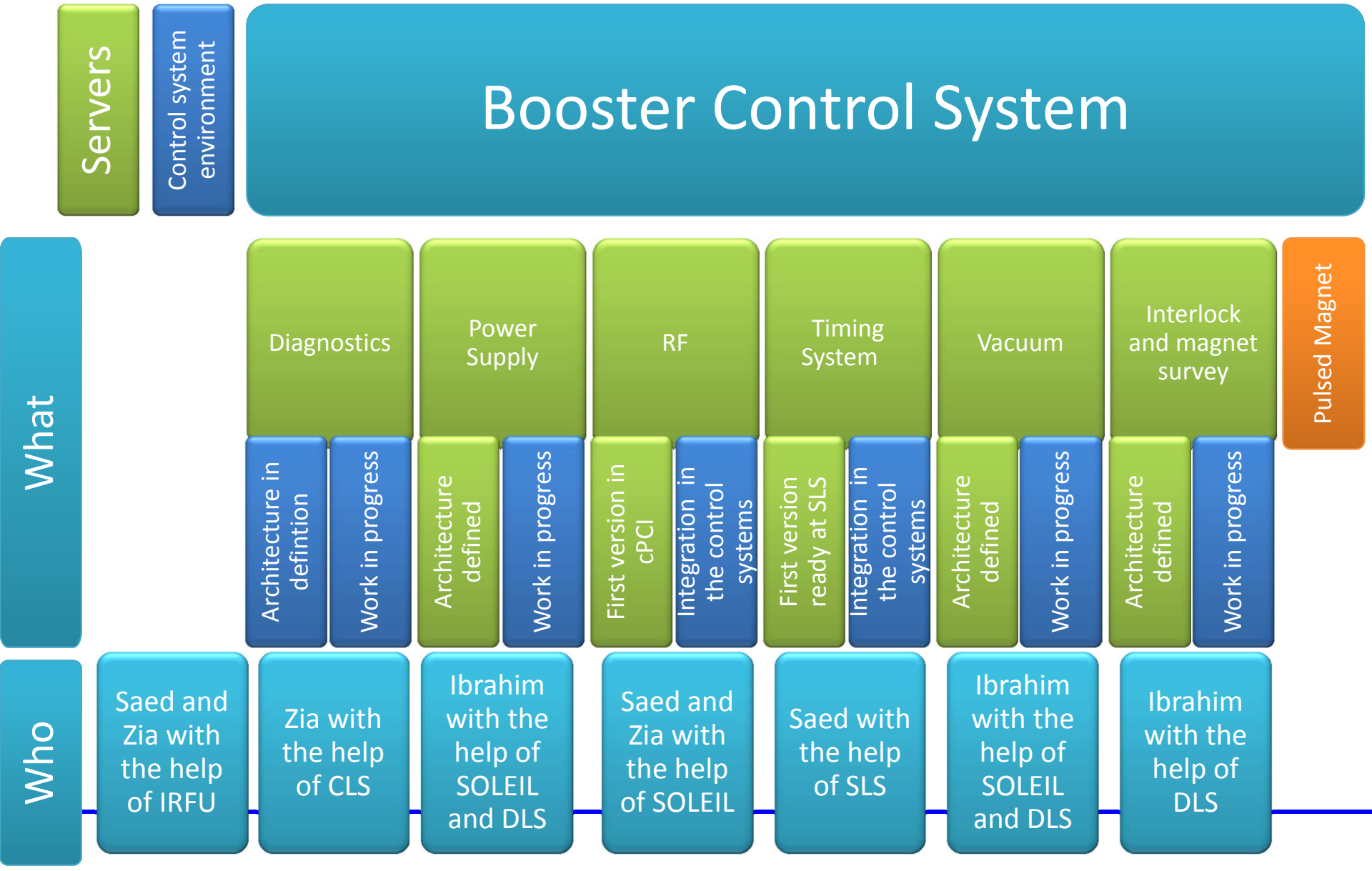
THE TECHNICAL CHOICES



Setting up the relationship with manufacturers and suppliers



Setting up the installation process



Status and outcome

☞ **After one short year of existence of the international virtual control system group and the recruitment of local engineers**

☞ **The control system development is going ahead at SESAME.**

➢ **Unfortunately we note that planning has to be flexible to handle this complex project.**

☞ **We hope to assemble most of the Booster control system by the end of this year.**

We have come this far, we have to believe we will get there!

ACKNOWLEDGMENTS

I would like to thank:

Pascale Betinelli and her team from SOLEIL

Mark Heron and his team from DLS

Elder Matias and his team from CLS

Jean-François Gournay from IFRU

Babak Kalantari from SLS

Laurent S. Nadolski from SOLEIL

For their involvement, support and advice.