

# **Science as a tool for bringing nations together**

**Herwig Schopper  
Former Director General of CERN**

Laws of Science do not respect any borders

- **Science needs and benefits from international cooperation**

This is common practice today (small science)

My main message:

**The Inverse is also true**

- **politics can benefit from science**

Requires large ambitious projects attracting the interest of politicians, the public and best scientists

# 'SCIENCE for PEACE'

Two organisations created under the umbrella of UNESCO:

## CERN

Conceived late 1940s , after WWII with two aims:

- Enable construction of a facility beyond means of individual European countries
- Foster cooperation between peoples recently in conflict



## SESAME in Jordan

Conceived late 1990s with the same aims:

- Members: Cyprus, Egypt, Iran, Israel, Jordan, Pakistan, Palestinian Authority, Turkey
- Contribute to peace building in MENA



# Foundation of CERN

Looking back in history it seems easy- it was not!

*Two initiatives in parallel:*

## 1. Physicists:

join European forces to be competitive with US, in particular for large facilities

## 2. Political initiative:

European Movement

European Cultural Conference,

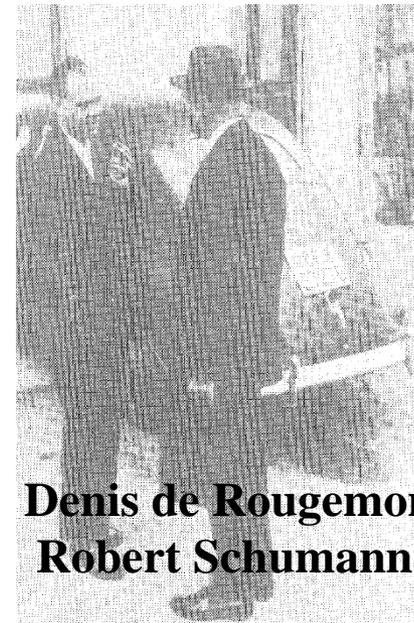
Lausanne 8-12 December 1949

Ministers, senators, member of parliaments, others from 22 countries

first time Germans could attend (C. Schmid)



Auger, Amaldi, Kowarski



Denis de Rougemont,  
Robert Schumann

## The two initiatives united at 5. General Conference of UNESCO in Florence June 1950

### Resolution drafted by Isidor Rabi

7 June 1950 addressed to DG UNESCO

*could be considered as 'conception' of CERN (or real birth??)*



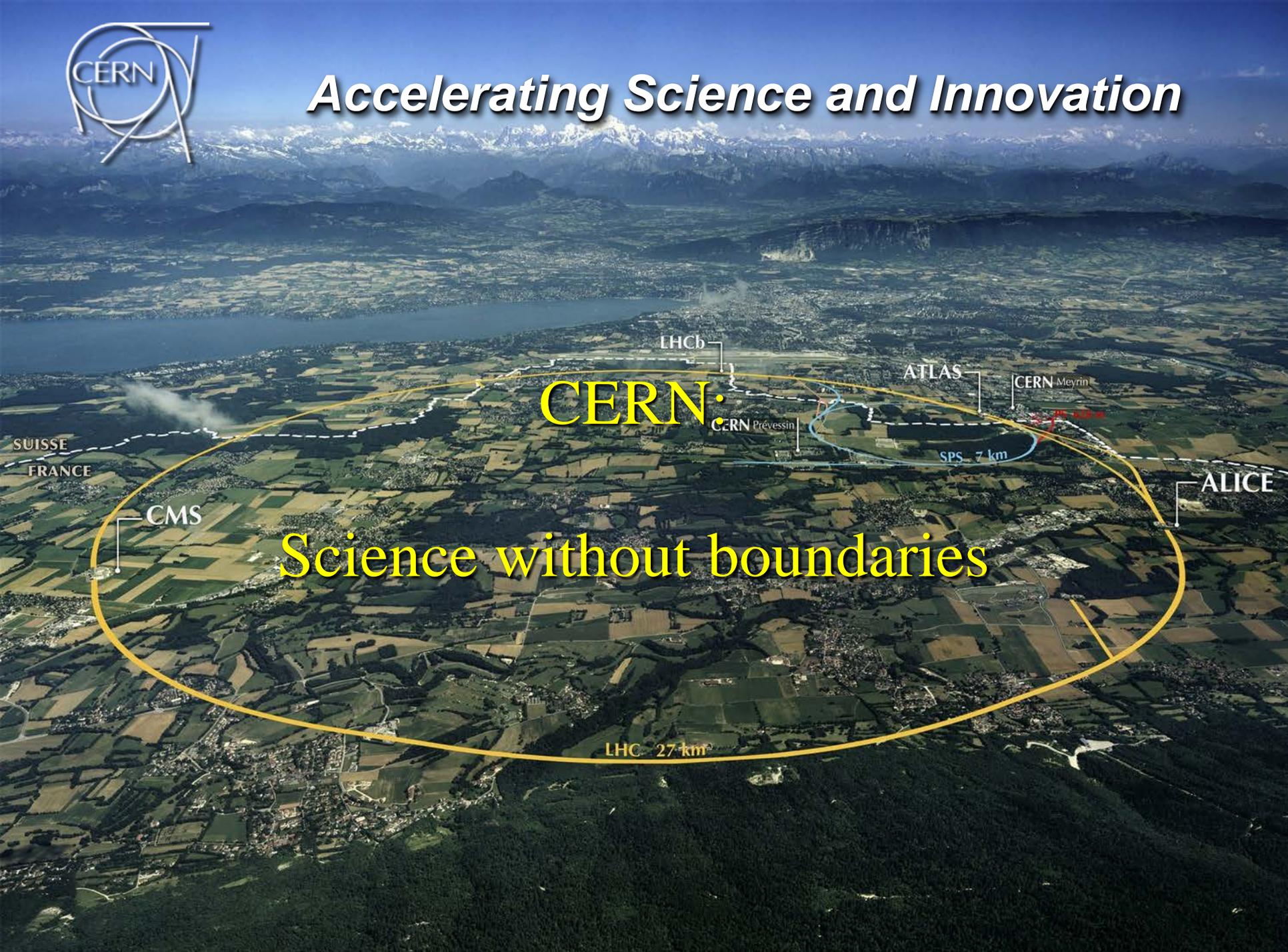
At CERN 30. Anniversary

**Rabi's speech:** CERN peaceful compensation for building bomb

...So at this point I appeal to the personalities present to remember that CERN is not just an instrument for technical progress in high energy physics, but it is **the realization of an ideal which had been part of a civilization for a long time.....**  
and can help preserve the peace of the world.”



# Accelerating Science and Innovation



CERN:

Science without boundaries

SUISSE  
FRANCE

CMS

LHCb

ATLAS

CERN Meyrin

CERN Prévessin

SPS 7 km

ALICE

LHC 27 km

# CERN was founded 1954: 12 European States

“Science for Peace”

## Today: 22 Member States

~ 2300 staff

~ 1050 other paid personnel

~ 11000 users

Budget (2012) ~1000 MCHF

**Member States:** Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Israel, Italy, the Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom

**Candidate for Accession:** Romania

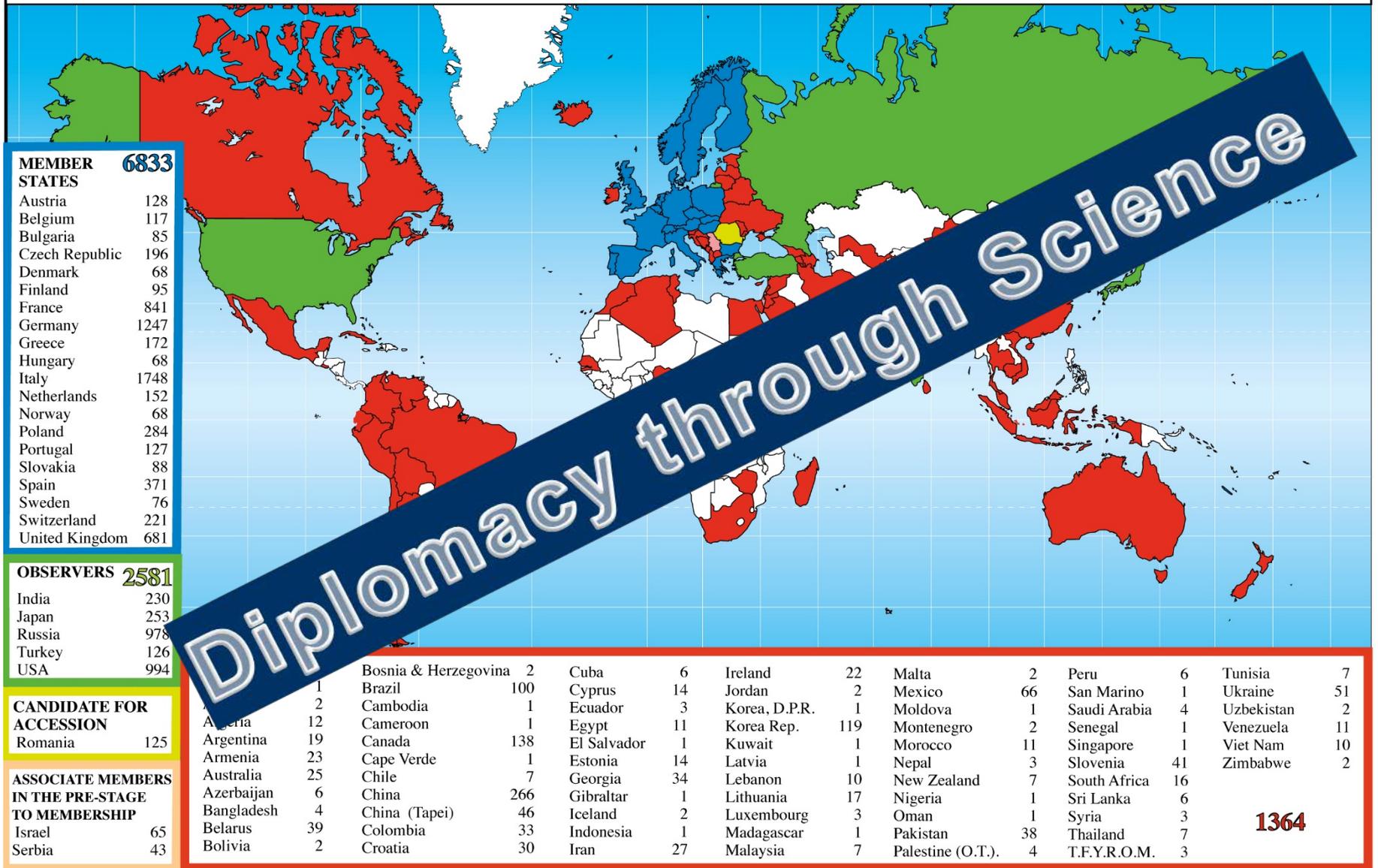
**Associate Members in the Pre-Stage to Membership:** Serbia

**Applicant States:** Cyprus (agreement signed), Slovenia, Turkey

**Observers to Council:** India, Japan, the Russian Federation, the United States of America, Turkey, the European Commission and UNESCO

# Science is getting more and more global

## Distribution of All CERN Users by Nationality on 3 September 2012



# Science can help in Confidence building - without any confidence politics is inoperable

## Examples how CERN helped:

CERN-Dubna, CERN- UdSSR:

only scientific **link East-West** during cold war

➤ CERN – IHEP (Soviet Union) agreement in 1968

*only scientific agreement during hot cold war*

**became model for IHEP- Stanford (USA) agreement**

**and later for model for USA- SovieUnion agreement (*Breshnev-Ford*)**

➤ Disarmament meeting at Geneva in 1980ies

**when in deadlock private meeting at CERN unblocked it**

➤ Chinese physicists from PR China and Taiwan

**in same LEP experiment (1980ies)**

➤ **Help dissidents (e.g. Orlov)**

➤ **SESAME founded according to CERN's example:**

**Israel -Palestine – Iran, Cyprus – Turkey**

**CERN has brought people together**

by discussions, considerations, **conflicts**, compromises  
and **finally decisions**

**All are being heard, even the weakest**  
**Competence is essential**

**Not only scientists but also**  
**administrators and politicians involved**

In Council each country has two delegates:  
one **government official** and one **scientists**  
*(formal close relations between*  
*scientists – government representatives)*

**Pragmatism and definite will**  
**to achieve a concrete goal prevailed**

# **CERN has its task splendidly achieved in Europe**

**CERN became model for other  
organisations**

***JINR, ESO, EMBL, Now CERN is  
a model for international  
cooperation  
on world scale  
SESAME***



# SESAME

**S**ynchrotronlight for  
**E**xperimental  
**S**cience and  
**A**pplication in the  
**M**iddle  
**E**ast

*An International Center for Research and Advanced Technology and Training for the Middle East and the Mediterranean Basin*

*Founded under the auspices of UNESCO according to CERN model*

*The first international organization in Muslim countries*

# A short history of SESAME

**1997:** during a workshop for Middle East Scientific Cooperation organised by S.Fubini (theoretical physicist) of CERN proposal by H.Winick and G.-A.Voss to use components of BESSY I (to be closed down) at Berlin

S.Fubini asks H.Schopper (retired as Director-General of CERN) to take care

Suggestion to F.Mayor, DG UNESCO, to repeat CERN story

**June 1999:** F.Mayor, DG UNESCO, invites all governments of the region to a meeting at Paris

**Positive decision taken,  
Interim Council created**

**with 12 members and 6 Observers (H.Schopper, President)**

# Formal establishment of SESAME by UNESCO as autonomous international laboratory

**UNESCO General Assembly** (about 180 countries)

**October 2001**

- asks Director General, K.Matsuura, to elaborate feasibility study and propose Statutes
- authorises **Executive Committee** to decide definitely (to save time)

**Mai 2002: unanimous Authorisation by Executive Committee**  
(about 50 countries) (including approval of Statutes)

**Procedure takes normally more than 4 years!!**

**”...model project for other regions....**

**Quintessential UNESCO project combining capacity building with vital peace-building through science.”**

# SESAME is intergovernmental organization

## Members of SESAME

- BAHRAIN
- CYPRUS
- EGYPT
- IRAN
- ISRAEL
- JORDAN
- PAKISTAN
- PALESTINIAN  
AUTHORITY
- TURKEY

## Observers

France  
Germany  
Greece  
Italy  
Japan\*  
Kuwait  
Portugal  
Russia  
Sweden  
UK  
USA

## Governing Body Council

Each Member one vote

SESAME Statutes are  
'copy' of CERN Convention

Open for other countries, all are welcome

# SESAME's Members in 2016



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

**Iraq has asked for Membership,  
other countries are welcome**

# Declaration

**accepted by the Plenary Meeting of the Nobel Laureates  
at the PETRA IV on 19 June 2008**

We, the undersigned Nobel Laureates, commend the remarkable progress made in creating the SESAME Synchrotron Light Source. It will provide a major center for scientific research, with the ownership shared by many nations of the Middle East. Thereby, SESAME, **as well as producing educational and economic benefits, will serve as a beacon, demonstrating how shared scientific initiatives can help light the way towards peace.**



**Location decided after difficult negotiations  
by secret vote of Interim Council**

**(proposals from 7 countries): Jordan**

## **Conditions:**

- *all scientists from the world get access*
- *Site and building financed by host state*
- *Strong support by authorities*

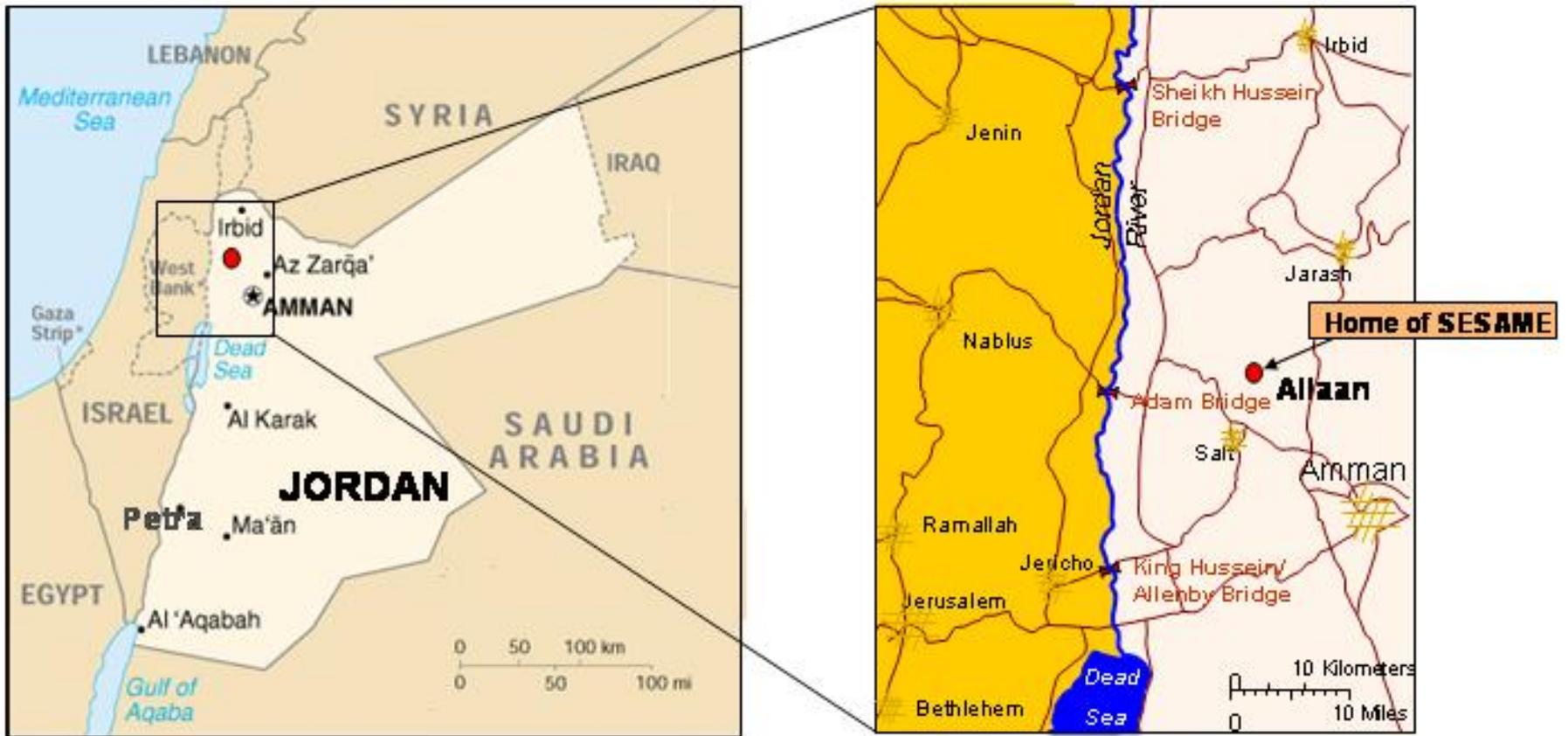
**Host country has special obligations**

**(Host State agreement,  
privileges immunity, tax free, etc, like CERN)**

**Strong support by H.M. King Abdullah II**



**H.Schopper, UNESCO-ADG Iaccarino, H.M. Abdullah, Prince Ghazi**



## SESAME location in Allaan, Jordan

# Groundbreaking SESAME Building January 2003



**UNESCO DG Matsuura and H.M.King Abdullah II unveiling marble plate,**



## Completion of building 2008

H.Schopper, International Parliamentary Union 2016



First users' meeting, January 2003 at Amman  
Financed mainly by Japan



SESAME 2. Users meeting, Isfahan, October 2003

## SESAME Inauguration 16 May 2017



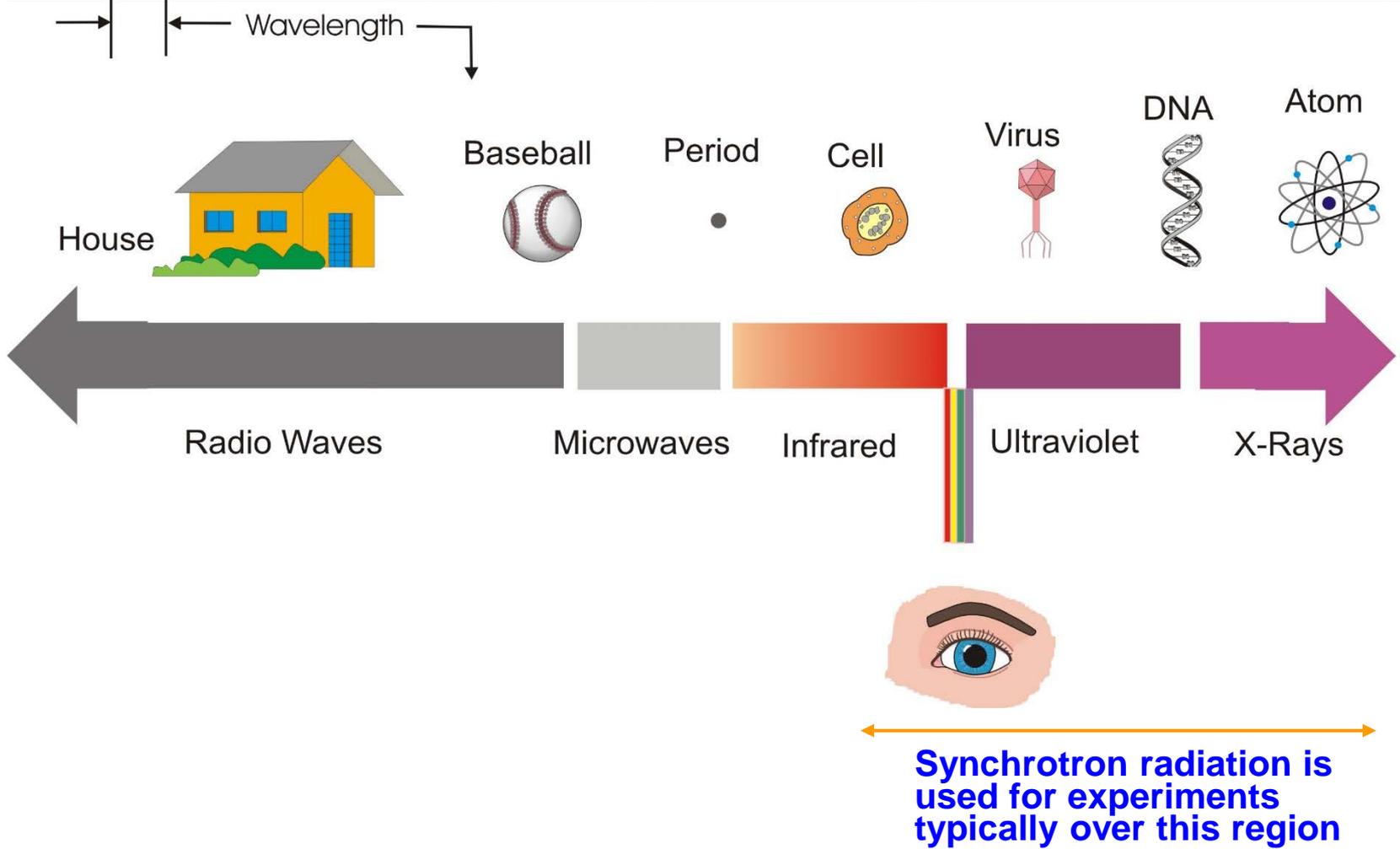
King Abdullah II with Heads of Delegations

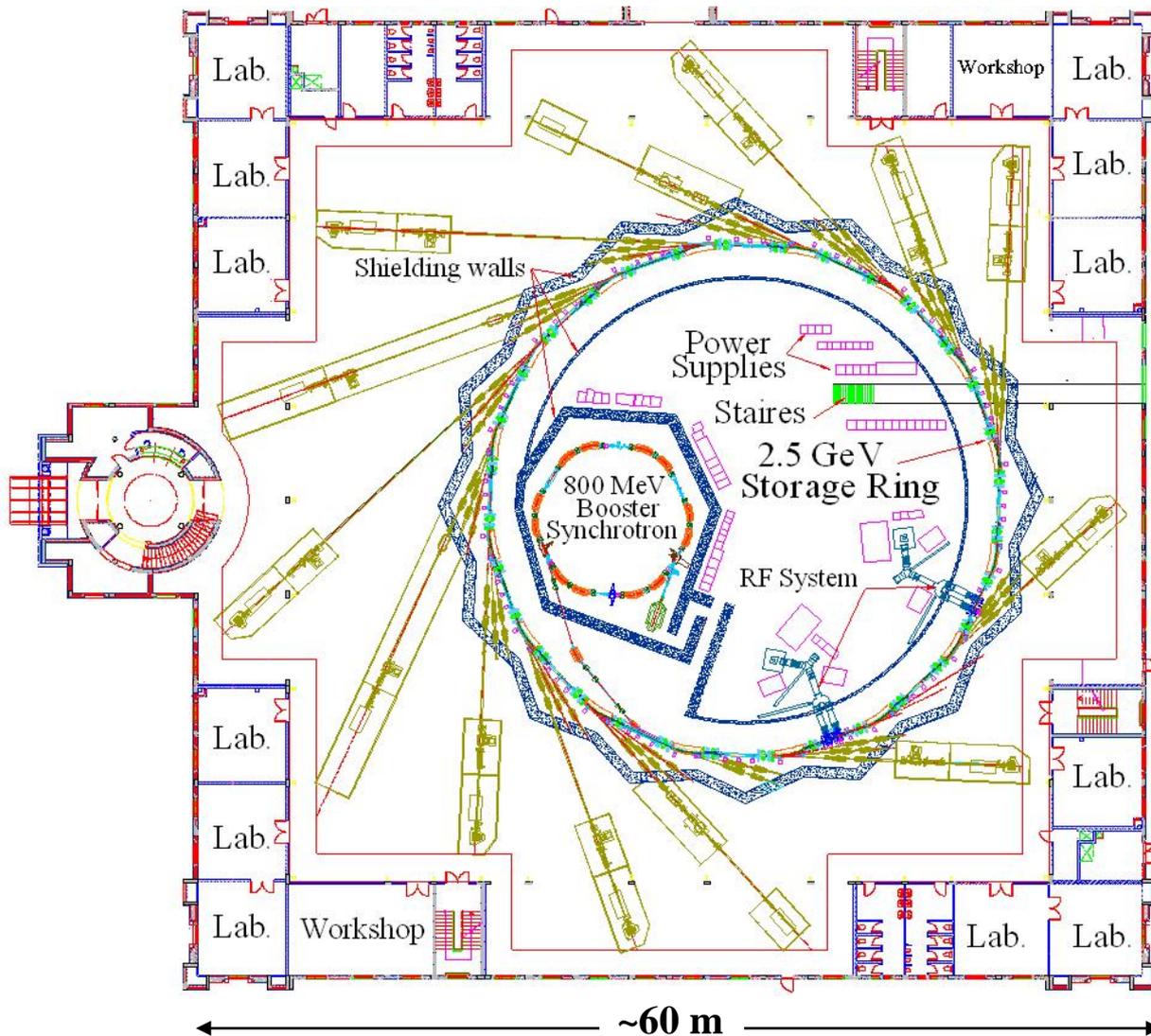
# What is the SESAME Facility ?

- **Extremely strong light source (synchrotron radiation, 3. generation)**
- **A synchrotron produces intense light from the infrared region to X-rays.**
- **Apart from high intensities, light has special properties (very short pulses, polarized)**
- **Individual beams for specific research domains**

# Electromagnetic Radiation - How It Relates to the World We Know

## ELECTROMAGNETIC WAVES



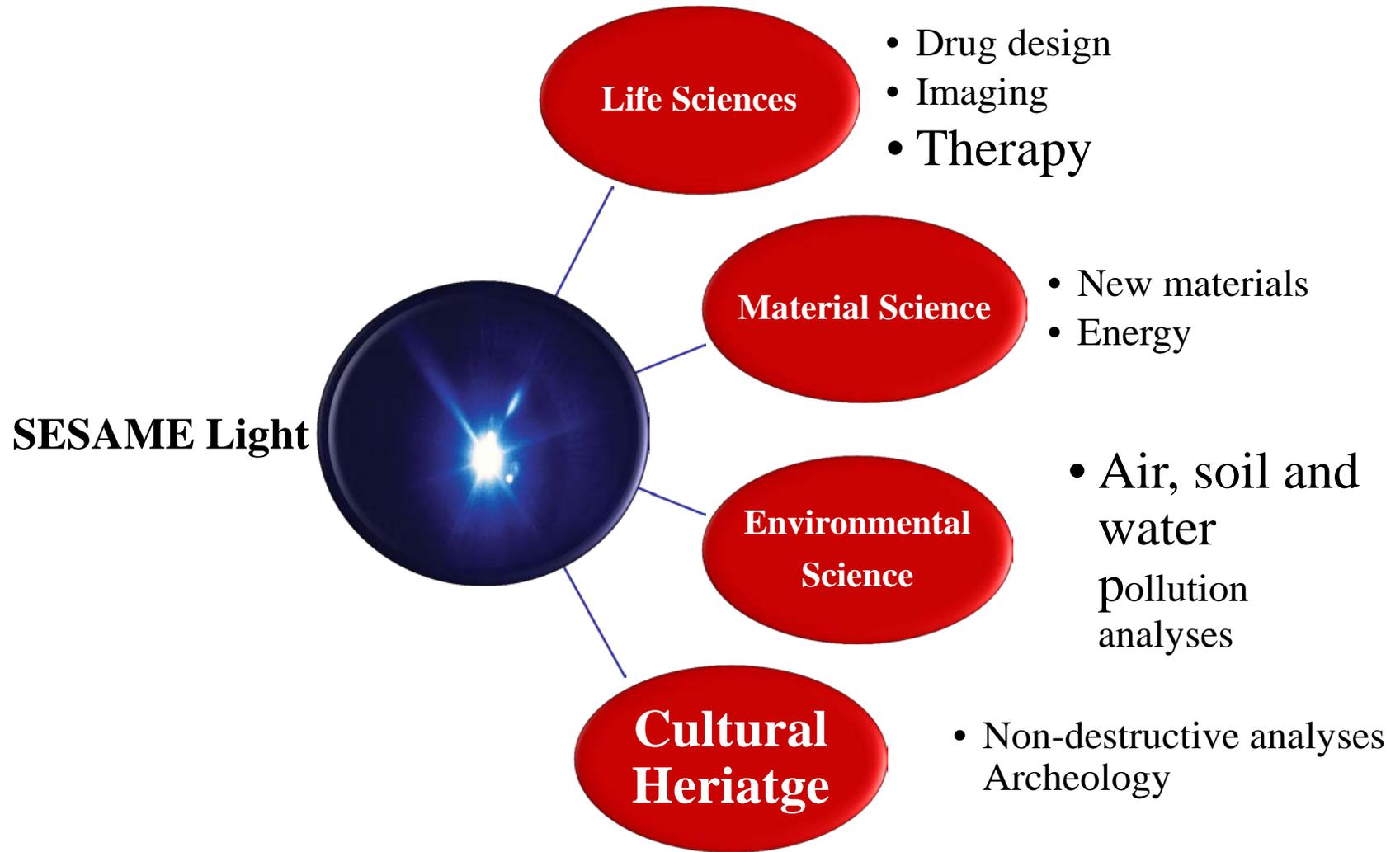


Energy	2.5 GeV
Current	400 mA
Circumference	128.4m
Emittance (horiz)	26.4 nm-rad
Possible IDs	13
ID Length	2.75 m

e <sup>-</sup> Beam Size in Straight Sections	
$\sigma_x/\sigma_y$	700 $\mu$ m/35 $\mu$ m
Critical Energy	5.9 KeV
e <sup>-</sup> Energy Spread	0.1%
Bending Mag. Field	1.425 T

**Parameters: 2.5 GeV ring with 13 possible insertion device beam lines. Beam lines can also come from the 16 bend magnets.**

# SESAME's SCIENCE



## **Material Science/Physics/Chemistry**

**Glasses  
Polymers**

**Ceramics  
Thin Films**

**Magnetic Materials  
Superconductors**

## **Biological & Medical Sciences**

**Pathogen structure**

**Genetic diversity; plants and microorganisms**

**Metalloenzymes and Metalloproteinases**

**Biosensors**

## **Industrial Applications**

**Polymer characterisation**

**Synthesis and characterisation of novel materials**

**Chemical analysis**

**Screening for drug design**

## **Environmental Science**

**Clay minerals**

**Mineral analysis of rocks**

**Soil contaminants**

**Applications in agriculture and bioremediation**

## **Archaeology**

# ORGANIZATIONAL STRUCTURE OF SESAME

## Permanent Council

*Delegates of member countries and UNESCO*

Each one vote

## Directorate

*Director: K. Toukan (former Minister)*

*Technical Director: E. Huttel (German)*

*Scientific Director: G. Paolucci, (Italian)*

*Administrative Director: Y. Khalil (Egyptian)*

## International Advisory Committees

*Scientific: Z.Sayers (Turkey)*

*Beamlines: Z.Hussain (USA)*

*Training: R.Mansouri (Iran)*

*Technical: A.Wrulich (Switzerland)*

## Staff:

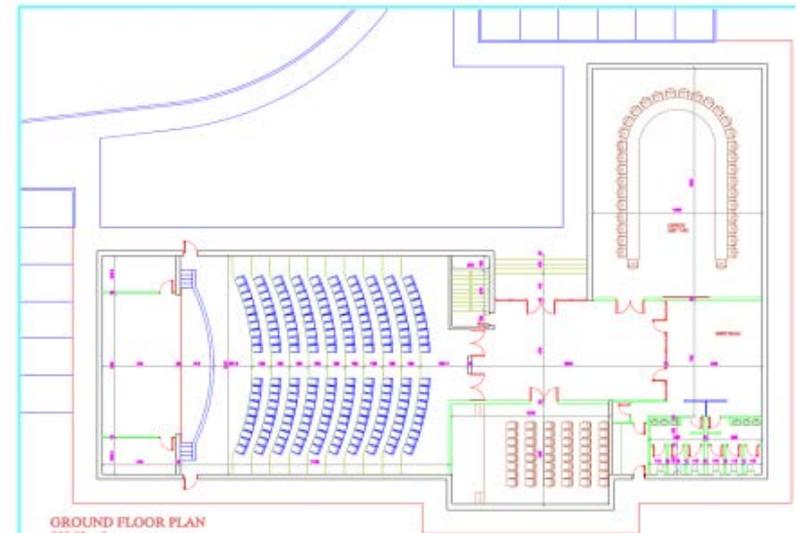
about 40,  
to increase  
to 60

# The future

SESAME is planning to build a guest house, for users

This will be followed by a Conference Centre

SESAME will be able to house meetings on other topics (food, **water**, archaeology, ...) in secure/easily accessible surroundings



**Dream: SESAME will become international meeting place**

# *Remark*

**A new project following the CERN-Model  
is presently being discussed for the Balkan**

**a “SESAME 2”**

**Coordination government of Montenegro**

# Conclusion

Cooperation in **large scientific projects** requires **scientific, administrative and political** efforts on “lower level” which irradiate into different and **even highest political levels.**

In times when relations between some nations are often characterised by **hatred and violence** it is gratifying that organisations like CERN and SESAME bring together politicians and scientists to work peacefully together

**Small light in dark times**

**Thank you**

# National Science Policy

- ❖ **Priority is given to short-term national problems**  
(infrastructure, roads, water)  
mercantile mentality prevails, promote activities with short return (tourisms)
- ❖ **Funding of R&D is completely unsatisfactory,**  
is necessary for long-term development (unemployment),  
*should spend a very small amount of available funds  
for long term development*
- ❖ **Learn how to establish priorities** and introduce evaluation.  
mechanisms for decision taking and priority setting are missing
- ❖ **Lack of cooperation inside individual countries**  
*encourage establishment of national networks*

# International Cooperation

- **little experience in international scientific collaboration**

**countries think in terms of national or at best bilateral projects**

(e.g. with international organisations EU, IAEA, UNESCO, TWAS )

*convince leaders and scientists that excellence can only be achieved  
in international cooperation*

- **lack of experience in management of international cooperation**

*Teach administrators how to deal with international bureaucracy*

- **Declaration of intention replaces sometimes real actions**

- **Political problems often only pretext to cover other issues**

*Discourage the latter attitude, use scientific cooperation for building trust*

*“Science for Peace”*