

**“... [scientifically] active men [and women] ... must be kept [in their own countries] to build for the future, but their scientific integrity must also be preserved.”**



**Abdus Salam**  
**Founding Director of ICTP**



## Programs at ICTP\*

- Diploma programs; Masters degree; Ph.D. degree (both local and SANDWICH); post-doctoral appointments
- **Associateships; TRIL fellowships**
- **Schools; Colleges; Workshops; Conferences**
- **Affiliate Centres; Federation Agreements; Networks support for starting new centres**
- **Support for regional conferences, often with other donors**
- **Provide research environment for senior researchers**
- **Provide electronic access to scientific literature**
- **And so forth**

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**\*conducted often in close collaboration with and support of Italian institutions in Trieste and elsewhere, and many other international institutions**

The essays in front of you are written by the Diploma students (about 125 responded to my request), and the SANDWICH students (about 25 responded). The response rate is not unreasonable, considering how connections become exponentially weaker in time. These articles clearly show how enormously successful these students have been, and how strongly they feel that ICTP was behind that success. Their gratitude is strong because they realize that ICTP was the necessary stepping stone for their success. You will see many mentors mentioned by name. I am at once proud, pleased and grateful for it all. I can only hope that the successful students don't forget ICTP's philosophy, which is to share one's good fortunes with those less well endowed.

- from the preface



the **ICTP** experience: **DIPLOMA and STEP** students



The Abdus Salam

International Centre for Theoretical Physics



# THE **ICTP** EXPERIENCE: DIPLOMA <sup>A</sup>ND <sup>D</sup>STEP STUDENTS

TRIESTE

ITALY

2007



Other positive features of TRIL, as seen by its Fellows, are the access that the Program provided to modern equipment, and, in several instances, the impetus that this exposure provided them to build or establish similar facilities in their own countries. Many Fellows assess the working conditions in Italian laboratories to be on par with those in other developed nations, sometimes rendered better by the social ease with which Italians take to collaborative work. For a number of Fellows, TRIL provided a turning point for the better. They rejoiced the access to outstanding scientists and equipment, freedom to pursue their work under the watch of a gentle guiding hand. What more does a motivated young scientist need?

- from the preface



the **ICTP** experience: the **TRIL** programme



The Abdus Salam  
International Centre for Theoretical Physics



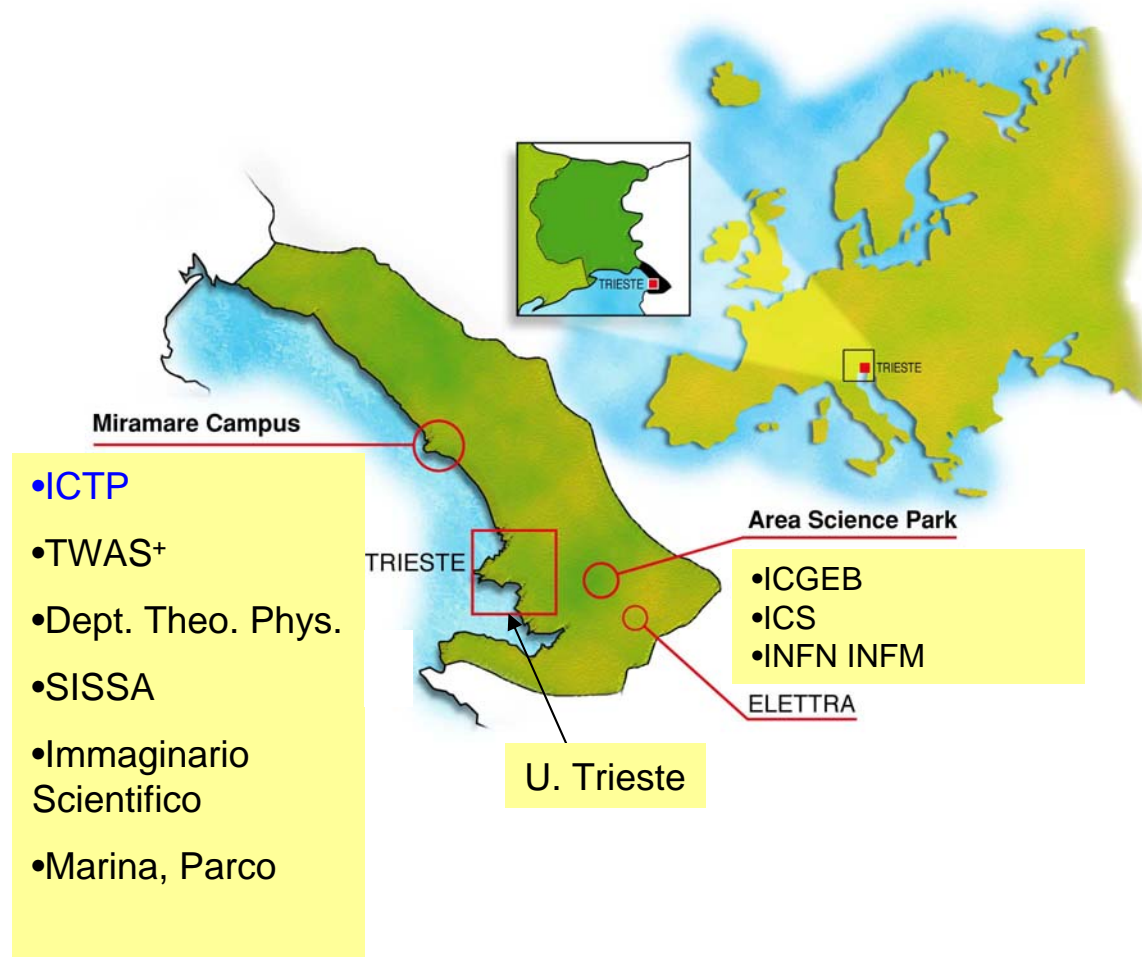
# THE **ICTP** EXPERIENCE: THE **TRIL** PROGRAMME

TRIESTE

ITALY

2007

# Major Scientific Institutions in Trieste





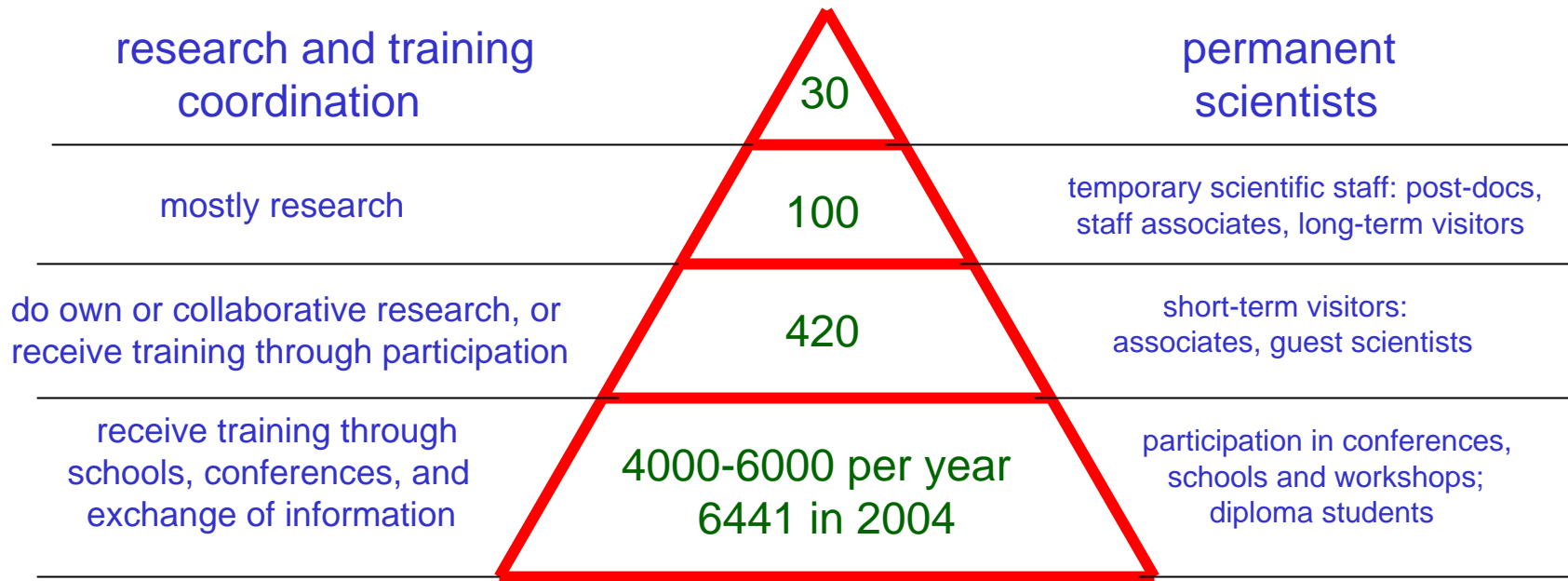
## Organization

- ICTP operates under a tripartite agreement between two United Nations Agencies—UNESCO and IAEA—and the Government of Italy. The Centre enjoys a great deal of autonomy.
- A distinguished Scientific Council sets scientific policies and a Steering Committee in setting fiscal policies.



**Some base funding is provided by IAEA and UNESCO, specific programmatic funding by other sources, and  $\cong$  82% of the Centre's budget comes from Italy.**

ICTP is an institution run by a few scientists for the benefit of many



# ICTP Scientists, Visitors and their Functions

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+ about 140 general staff

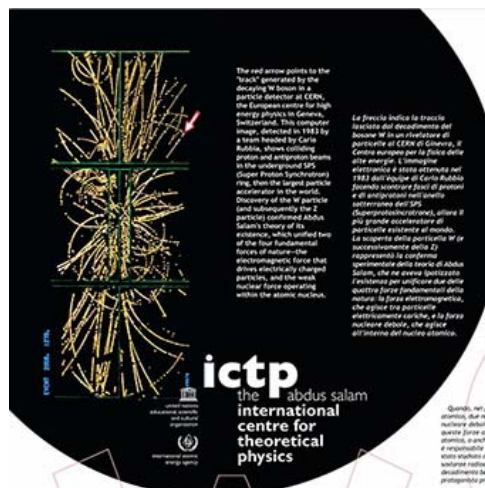




- High Energy, Cosmology and Astroparticle Physics
- Condensed Matter and Statistical Physics
- Pure and Applied Mathematics
- Applied Physics (Medical Physics, Optics and Lasers, Fluid Dynamics, Plasma Physics, Soft Matter, Nuclear Physics, Biophysics, Energy, ...)
- Earth Sciences (Weather, Climate Changes, Oceanography, Earthquake Prediction, Soil and Coastal Erosion, Desertification,...)
- Laboratory activities (Instrumentation, Information Technology, ...)
- Ecological and Environmental Economics

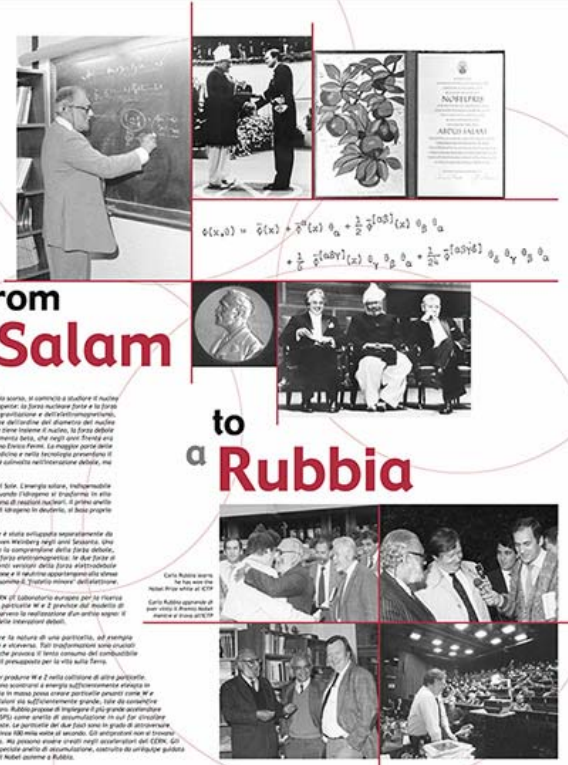
# Research at ICTP

(not merely theoretical physics)



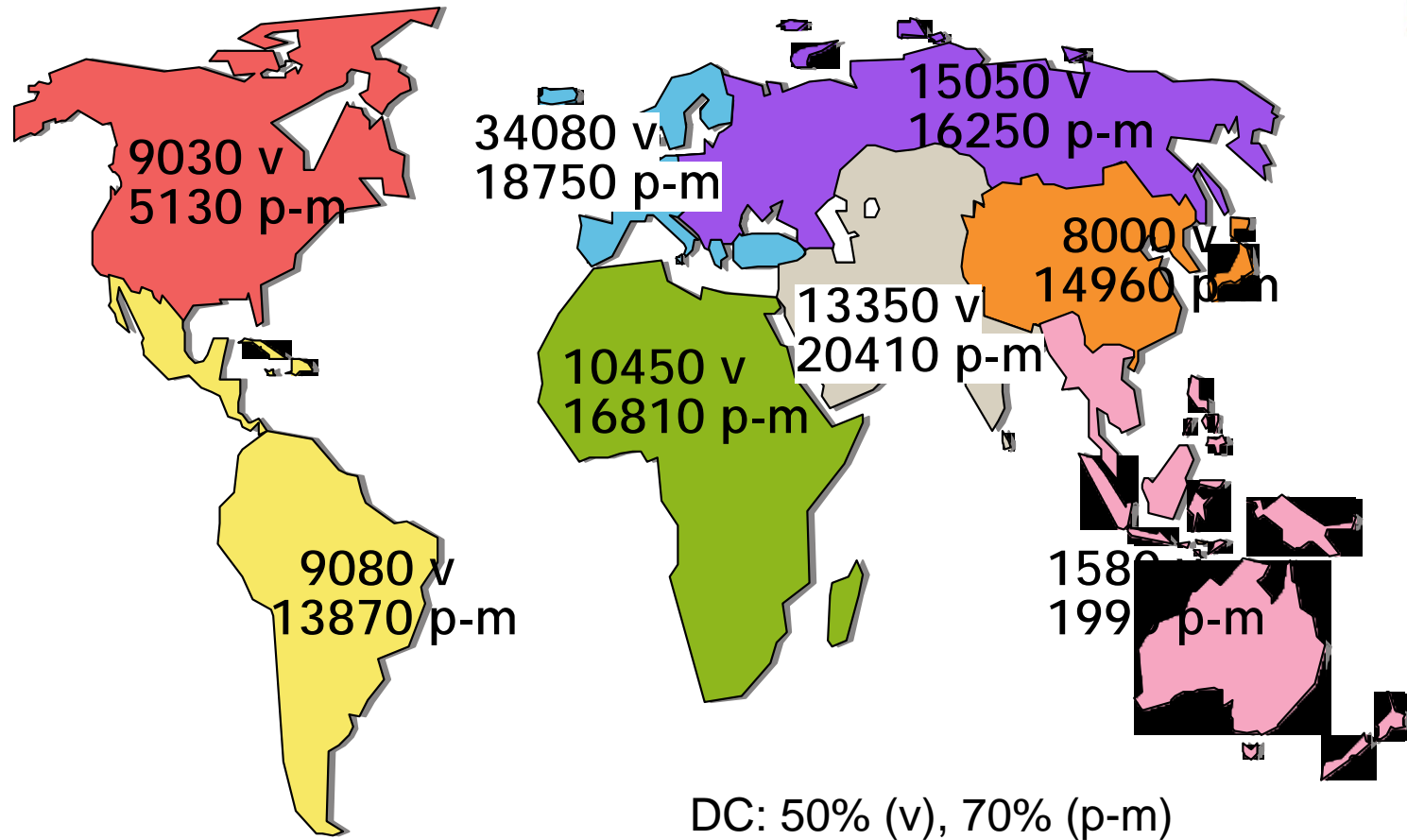
Nobel Laureates and Fields Medalists visiting the center > 100 (15+ in the last five years)

from da Salam to a Rubbia





# ICTP VISITORS STATISTICS, 1970-2006

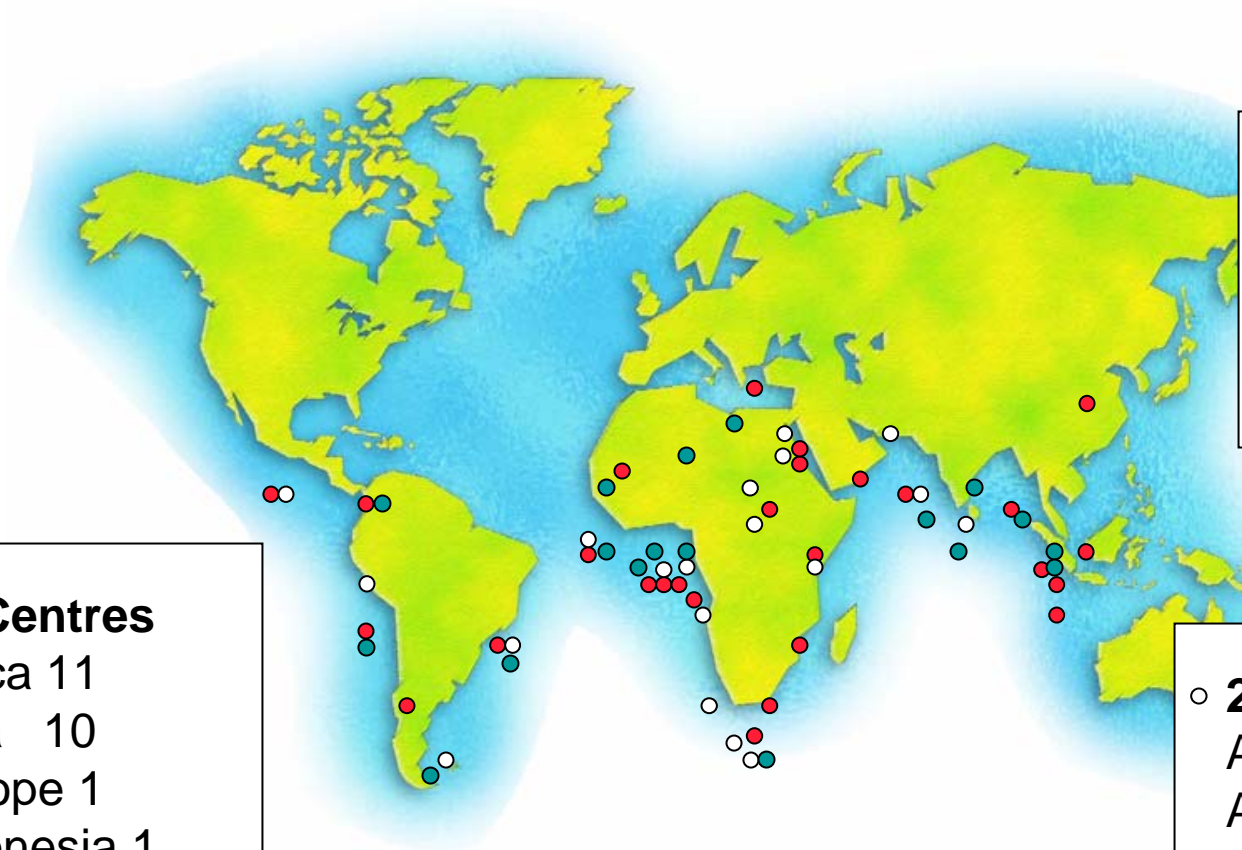


area	visitors	p-m	area	visitors	p-m
North America	9030	5130	Africa	10450	16810
Latin America	9080	13870	Middle East and South Asia	13350	20410
Western Europe	34080	18750	South East Asia and the Pacific	1580	1990
Eastern Europe	15050	16250	Far East	8000	14960

v=visitors p-m=person-months



# Affiliate Centres and Networks since 1990



## ● 31 Centres

- Africa 11
- Asia 10
- Europe 1
- Indonesia 1
- Latin America 8

## ● 34 Networks

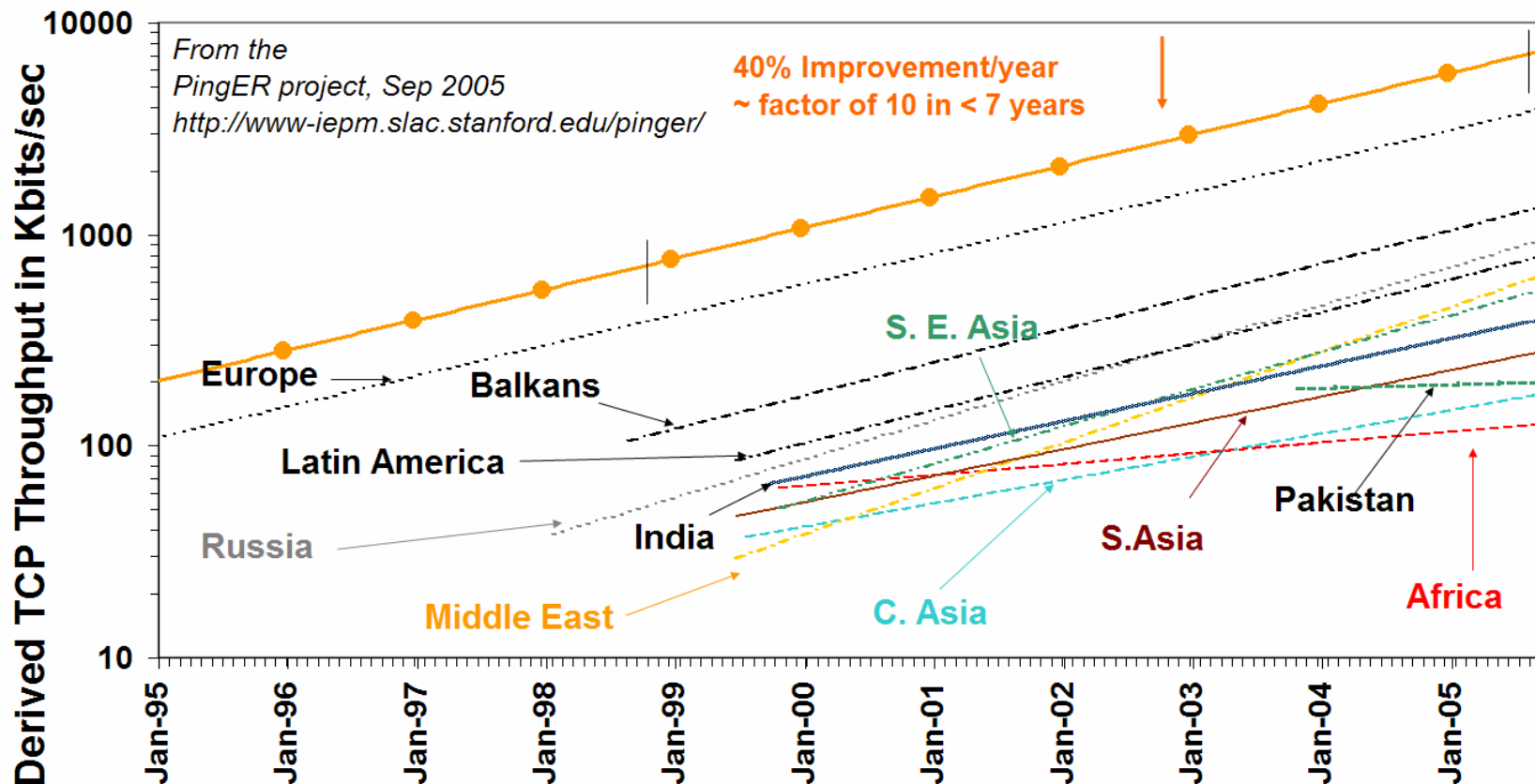
- Africa 12
- Asia 9
- Europe 1
- Latin America 12

## ○ 29 Projects

- Africa 16
- Asia 8
- Europe 1
- Latin America 4



## TCP Throughput Measured From N. America to World Regions



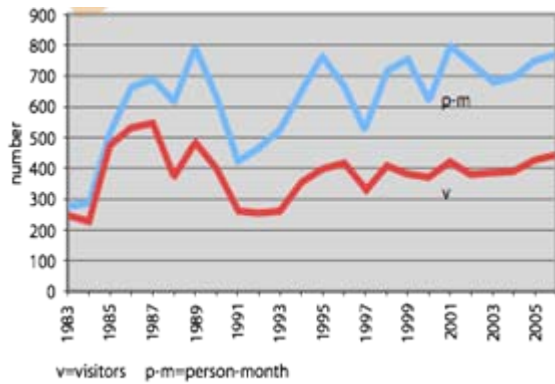
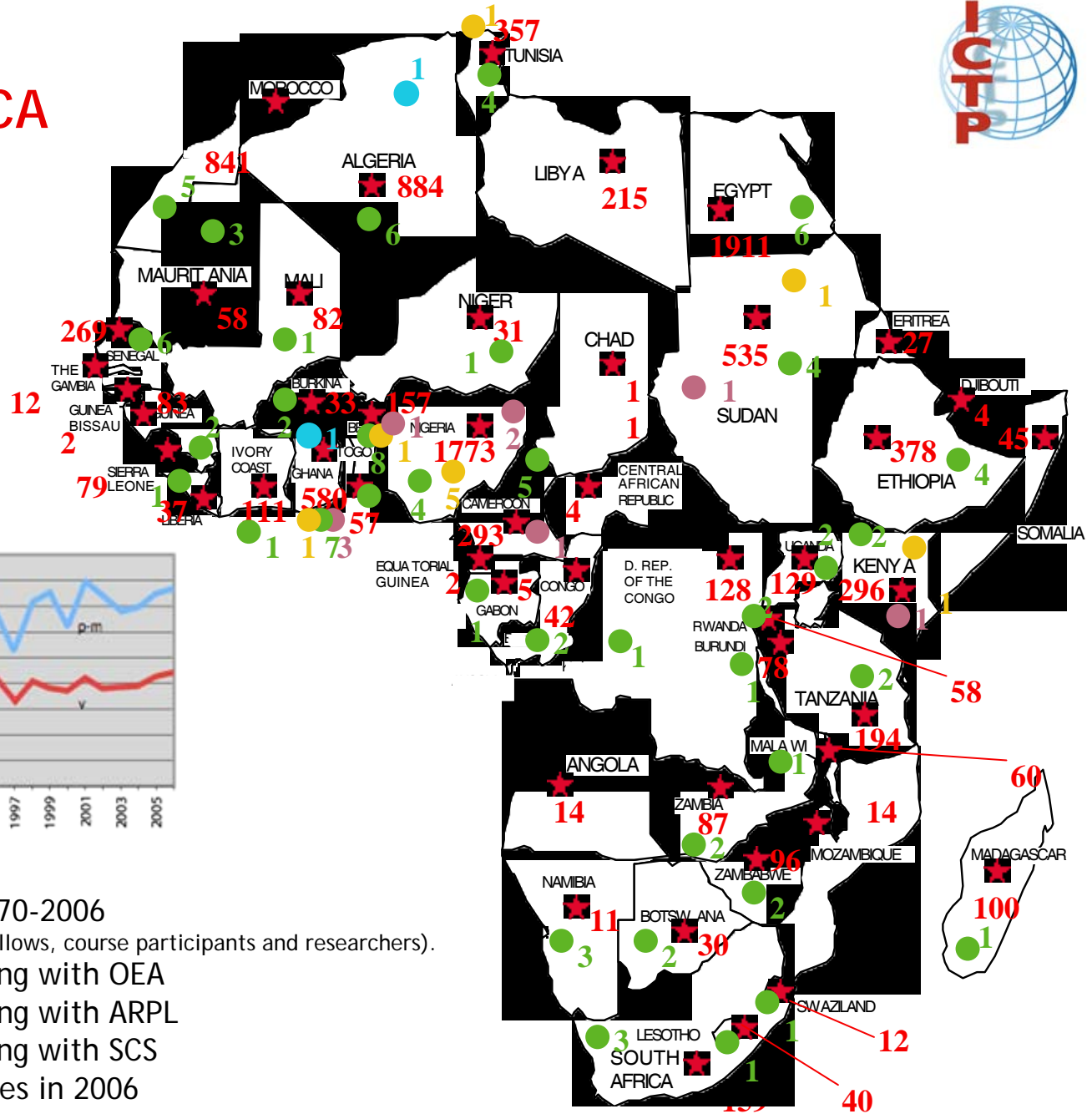
# ICTP AND AFRICA



## ICTP and Africa



Trieste, December 2006. Photograph and edited by: A. B. K. ...  
 African Science Research Professor ...  
 ...



- ★ ICTP visitors from 1970-2006  
 (including associates, TRIL fellows, course participants and researchers).
- Institutes collaborating with OEA
- Institutes collaborating with ARPL
- Institutes collaborating with SCS
- ICTP regional activities in 2006



# ICTP's impact on the world of science

## ICTP's impact on the world of science



**ICTP has had a longstanding impact on the science in Iran... the most important one is the concept of excellence...and I dare say ICTP has been the most influential institution in the world to bring that into existence. [It also has had] direct impact [on the] establishment of the various institutions; many graduate students in Iran have been exposed to international scientific community through different activities of ICTP.**

**Professor Reza Mansouri  
Deputy Minister for Research, Iran**

**ICTP was very useful to me personally ...[and] it opened up a new world to me. Almost all of my colleagues at the Centre for Theoretical Physics in Hanoi get the same help from the ICTP. In addition, we also get book donations, computers, etc. For young physicists, the ICTP Diploma program is very attractive.**

**Professor Hoang Ngoc Long  
Head of Particle Physics division, Vietnam**

**One particular international institution that has played an important role in providing resources and opportunities for physicists [in Africa] is the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy. ...ICTP's affiliated centers and visiting scholars programs are well known in African universities; nearly every PhD physicist in ... Africa has had an association with ICTP.**

**Professor Edmund Zingu  
Physics Today, January 2004**

**Italian leadership in computational condensed matter physics ...would not have happened without ICTP.**

**Professor Erio Tosatti  
SISSA, Trieste**

**This Center can make an effective contribution to the solution of the central problem of humanity, namely that of peace.**

**G. Andreotti  
Minister of Foreign Affairs in Italy in 1984**

# ICTP–IAEA collaboration



# PRESENT COLLABORATION

Scientific workshops  
and conferences  
both standard and  
hosted, shown by \*

	proposed	held
2008	16	9 + 2*
2007	18	8 + 2*
2006	21	10 + 2*
2005	15	10 + 3*
2004	7	7
2003	12	6 + 6*
2002	4	4
2001	5	5

# Present Collaboration (cont'd)

- **STEP** Students: 26 out of 47 supported by the IAEA.  
(nuclear physics, soil physics, lasers, environmental physics, synchrotron radiation, fluid dynamics, condensed matter)



# Strengthening Measures

- Joint Studies and Research with Involvement of:
  - ICTP Associates and Post-Doctoral Fellows
  - ICTP Affiliated Centres and Networks
  - ICTP Research Staff in IAEA CRPs

PhD Training for Agency Fellows (STEP)  
Participation of IAEA staff in ICTP events

# Strengthening Measures (cont'd)

- Meetings of high-level experts for:
  - Science and technology watch
  - Assessment and review of scientific fields
- ICTP associates research work in Agency Laboratories (Seibersdorf, Monaco)

# Fields for Future Collaboration

- Knowledge Management
- Energy and Climate Change
- Accelerator Applications
- Pulsed neutron, spallation and neutron sources
- Science for cultural heritage
- Plasma Focus

# Fields for Future Collaboration (cont'd)

- Ion beam technology for material research
- Radiation-resistant materials
- Plasma physics and applications
- Fusion
- Medical physics
- Synchrotron radiation research



# Fields proposed by ICTP

- Energy systems – renewable
- ITER related issues
- Marine ecology

# Accelerators

## ICTP

- School on Synchrotron Radiation (2006)
- IAEA/ICTP School on Accelerator Applications (2006)
- Workshop on Ion Beam Studies of Nanomaterials: Synthesis, Modification and Characterization (2006)

## IAEA

- CRP, TM, Symposia

# Science & cultural heritage



- Non destructive characterization
  - ions, synchrotron radiation, neutrons
- Dating
  - AMS
  - thermoluminescence
- Preservation
  - pollution
  - Climate

Practical sessions to demonstrate portable instruments (xrf, radiography, tomography etc)



(with IAEA, UNESCO, Sincrotrone Trieste, Università' di Trieste, Perugia, Milano, Roma, Napoli, etc.)



- School on Oceanography (2007)
  - OGS (Italian Geophysical Observatory)
  - ICTP
  - IAEA/MEL
- Joint PhD student

# ICTP Recurring Activities

- **Advisory Committee** for:
  - Optics
  - Medical physics
  - Plasma physics
  - Renewable energies
  - ICT
- IAEA participation in above Committee

# Fusion/Plasma

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- Theoretical aspects and modelling
- Remote access and developing countries
  - JET, ITER
- Plasma Lab
  - (with ENEA, IAEA, Russia, Polonia, Cile, ....)

# 2006 ICTP Programme

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- International Workshop on Frontiers of Plasma Science

IAEA workshop on Atomic and Molecular Data for Fusion Energy Research



# Plasma Focus Laboratory



## Neutron and x-ray source

- Training
- Biomedicine
- Material science
- Forensics and cultural heritage

(with ENEA, Pirelli, Russia, Polonia, Chile....**IAEA?**)

**IAEA CRP Dense Magnetised Plasma**

V. Gribkov, ITEP (Russia), R. Miklaszewski, IPPLM (Poland), L. Soto (NAEA), ....

# Human Health

- Workshop on accelerators for biomedicine (2007)
- ICTP School on Medical Physics (2008)
- IAEA Advanced School on Medical Therapy (2007/8)



# Summary topics of common interest

## NUCLEAR AND RADIATION ANALYSES

- Advanced x-ray/neutron/ion microscopies
- Accelerator applications
- Portable x-ray/neutron analytical systems

## INTERDISCIPLINARY PROGRAMMES

- Marine sciences (climate modelling, advanced analyses)
- Environment, soil, etc (modelling, pollution, impacts, risks)
- Cultural Heritage, Industry
- Biomolecular Medicine

## FUSION/PLASMA RESEARCH

- Theory, data, plasma lab

## GENERAL

- Management of knowledge
- ICT technologies/GRID computing
- Remote access/Virtual laboratory

