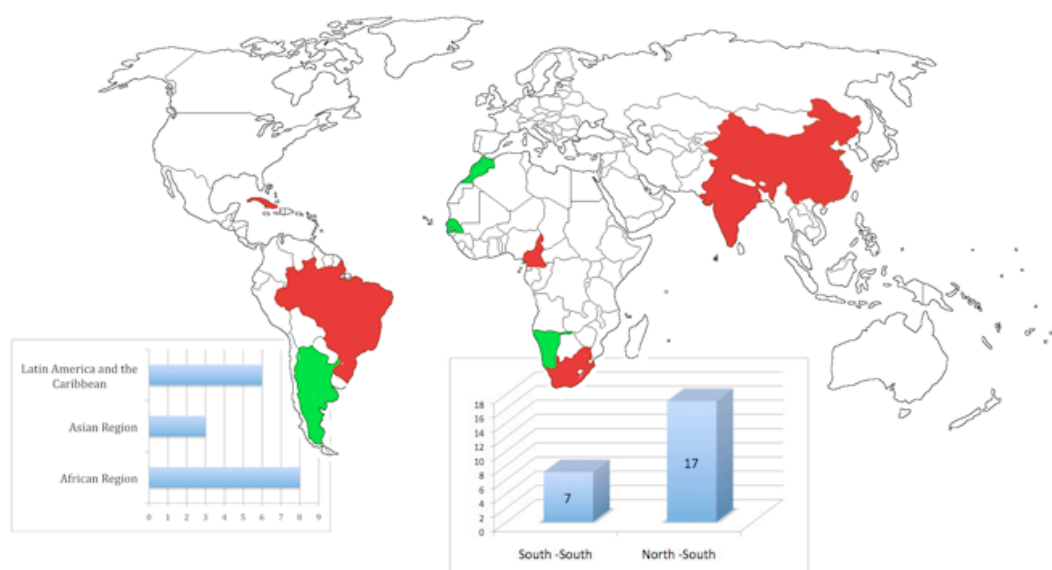


# The role of the Office of External Activities (OEA) in Asia:

*An Abdus Salam ICTP 25-year pathway for progress of science in the emerging world*



**A 5-year Report  
(2007-2011)**



## Foreword

The year 2010 was a significant date for the Abdus Salam International Centre for Theoretical Physics (ICTP). Firstly, that year was the 25 anniversary of the creation of the Office of External Activities (OEA), one of the major efforts of this Centre for sponsoring the progress of science in the emerging nations. Secondly, the ICTP started the Strategic Plan 2010-2014 (*"Science and Development for a Changing World"*). This forward-looking instrument for guiding the pathway that the ICTP is to follow in the near future intended to provide a vision and to identify clear goals, in order to move forward from the considerable and laudable achievements of OEA during its first 25 years.

We have organized this report along this line of action, stressing the achievements of the OEA during its first quarter of a century. For this purpose we have drawn a series of 11 diagrams and charts with the most significant year, namely, 2010, the data for which is available in the OEA files. This compilation of data is intended to serve as a basis for subsequent appreciation of the progress in years 2010-2014, beginning with a complete set of data in a large set of tables for the years 2007-2011. The initial step taken in this Report, uses the information received by the OEA, which is now complete and is fully incorporated in the present work.

In the appendices we have provided the set of 39 tables including the new 2011 data. (Subsequently, the same updating will be done for the remaining years covered by the ICTP Strategic Plan, namely the years 2012, 2013 and 2014.

To review the work of the OEA was a singular privilege, as well as a daunting challenge that in July 2010 the author gladly and eagerly undertook by the kind invitation of the ICTP Director Professor Fernando Quevedo.

There was no precedent for such a task, in spite of the considerable amount of excellent and significant work that the OEA—a cornerstone of ICTP influence in the emerging countries—had done for over a quarter of a century. In view of the considerable size of the OEA archives, it seemed reasonable to restrict our attention only to a brief and significant recent period for which the data available was complete and rapidly increasing due to the recent acceleration provided by the current ICTP Strategic Plan.

This report has been constrained to the period 2007-2011. Besides the present Report, three additional Regional Reports are in preparation for Africa, Asia and Latin American/Caribbean regions. They will also be focused on the same 5-year period as the present work.

We hope that this Report will help to fully appreciate the high priority that this Office has recently been granted within the well-focused ICTP Strategic Plan for the period 2010-2014.

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Adjunct to the OEA

Staff Associate ICTP

1 December 2012



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## **Acknowledgments**

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First of all, we thank the ICTP Director Professor Fernando Quevedo for the privilege and challenge he granted the author in July 2010 to become associated with the OEA. Thanks are also due to Mrs. Dorotea Calligaro and Eleonora Crotta from the OEA Office, with their valuable experience, they have generously and continually given the author their precious advice and wise counselling in their special fields of expertise.

The ICTP Multimedia Publications and Printing Services have generously contributed to improve considerably the production of the preliminary part of the present work with their characteristic selfless efficiency and proficiency in digital and related matters.

Mr. Johannes Grassberger provided invaluable help, so that the author could master the digital techniques necessary for producing the diagrams that summarise so efficiently the worldwide influence of the OEA.

Mrs. Anna Triolo, from the Public Information Office, kindly helped to select the appropriate illustrations for Appendix 1 from the ICTP Archives.

Last, but certainly not least, thanks are due to the Head of the OEA Office, Dr. George Thompson, for his continued relevant, critical and constructive advice with timely suggestions since July 2010.



## **Introduction**

The Office of External Activities (OEA) was established in 1985 and is currently headed by Professor George Thompson, research scientist of the High Energy, Cosmology and Astroparticle Physics Scientific Section, who joined the OEA in 2005.

The objective of OEA is mainly to help the research and training activities of physicists and mathematicians living and working in developing countries. OEA provides assistance to scientists in their home countries. Such support complements the training and research provided to scientists from developing countries at the Abdus Salam ICTP. The OEA programmes provide funds for student grants, fellowships for young researchers, visits of research collaborators and other activities.

The OEA actions are aimed at providing a backup to individuals, groups or institutes in the developing countries to accelerate their promotion to an international level (North-South collaboration) and to stimulate networking of scientists in the developing regions to reach a critical mass of researchers (South-South collaboration).

The present administration of the ICTP has undertaken a Strategic Plan for the period 2010-2014 "Science and Development for a Changing World". In this document it is ratified that the ICTP has a dual mission: to pursue high quality research and to nurture science in the developing world. In order to achieve these goals, the ICTP intends to enhance substantially the role of OEA by a complementary set of activities:

- • Affiliated Centres
- Projects
- Networks
- Visiting Scholars/Consultants
- Scientific Meetings

with a new major activity focusing on the creation of ICTP branch institutes.

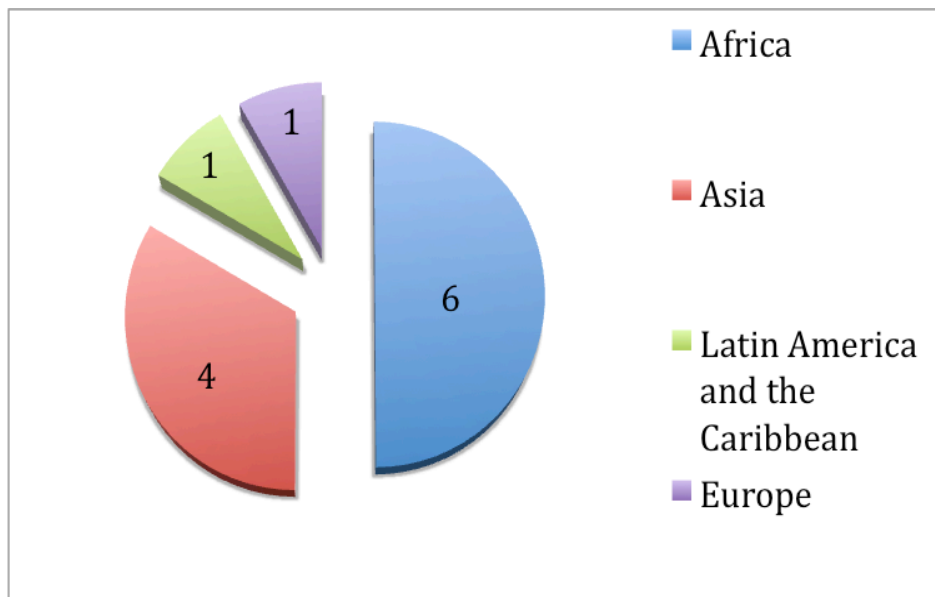
The purpose of the present report is to assess what the OEA has done regionally over a period of 5 years. The academic activities are illustrated with graphics and images. The emphasis has been placed on the turning point of the renewed efforts of the ICTP. The graphics show the OEA work for the first year of the ICTP Strategic Plan for the period 2010-2014, while the data for the period 2007-2011 has been reported in the appendices.

## Projects

There is a lack of trained personnel in physics and mathematics at universities in some developing countries. Consequently, many students from these countries who pursue their graduate studies in industrialized countries do not return to their countries of origin. To counteract this tendency the OEA supports specific PhD courses.

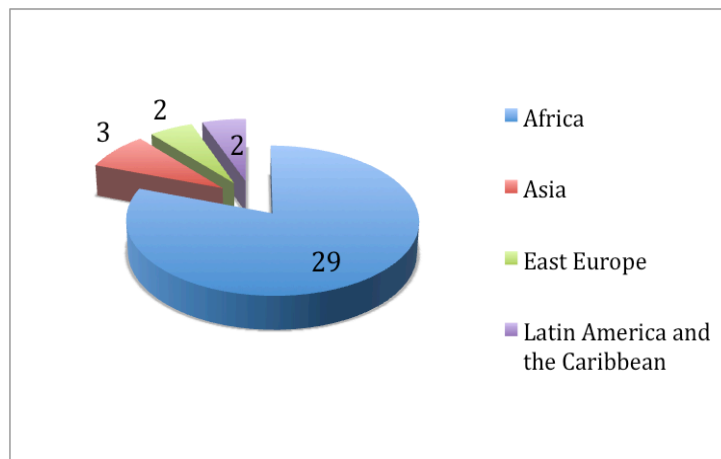
The OEA also supports several research projects that do not currently fit the category of Affiliated Centres. In 2011 there were 9 active projects, of which 4 are in Asia. The areas of research covered are: Earth Sciences, Mathematical Sciences, Physical Sciences and Space Sciences. Post-doctoral fellows and graduate school students, mainly Ph.D. candidates, are implementing the research projects. In the year 2011 the OEA was supporting altogether 20 Ph.D. students distributed amongst its 9 Projects. The Office is also supporting other graduate students amongst these projects.

In the initial year of the new ICTP Strategic Plan, there were 12 active projects, whose distribution is shown in Fig. 1:



**Fig. 1.** Distribution of projects supported by the OEA in the year 2010.

The graduate student distribution for the period 2007-2011 can be consulted in Appendix 3. In detail, by regions the work corresponding to 2010 is shown in Fig. 2:



**Fig. 2.** The distribution of graduate students supported as part of the Projects Programme.

## THE ASIAN PROJECTS

**The Salam Chair** is an OEA Project based in Lahore, Pakistan that initiated in 2000. The Federal Government of Pakistan had established the Salam Chair in Physics at Government College University, Lahore in 1999. It was named after the Nobel Laureate of Pakistan, Professor Abdus Salam (cf., Fig. 3).



**Fig. 3.** GCU Tower, Government College University, Lahore, established in 1864.

The OEA has been collaborating with its Graduate School, both in its PhD and M.Phil programmes. This project, directed by Dr. G. Murtaza distinguishes itself for its research publications and the successful Graduate School; some of its successes are summarized in the appendices. The OEA has been a significant source of support for the Salam Chair that, in addition, has been pursuing various research projects with the Pakistan Science Foundation and the Pakistan Atomic Energy Commission. This emphasis in research, especially in the area of plasma physics, has provided a favourable environment for their high-level Graduate School that OEA has singled out as a valuable Project. [*From Salam Chair in Physics GC University Lahore Summary Progress Report (March 2000-February 2007).*]

**The Project Fellowships** (at Former Affiliated Centre) is based at Islamabad, Pakistan. This project is based at the Department of Physics at the Quaid-i-Azam University. QAU was established in 1967 and assumed its present name in 1976. Since its foundation it has been contributing to the rapid advancement of Pakistan in areas of its relevance (cf., Fig. 4).



**Fig 4.** Quaid-i-Azam University Entrance

They specialize in a significant condensed matter problem, namely superconductivity that was discovered by Nobel Laureate Kamerlingh Onnes in 1911, in metallic mercury below 4 K ( $-269.15^{\circ}\text{C}$ ). The same phenomenon is possible at considerably higher temperatures with a potential technological implication. Nobel Laureates Karl Muller and Johannes Bednorz discovered high-temperature superconductors (HTS) in 1986 at the International Business Machines Corporation, IBM. Since its beginnings in 2009 the **Project Fellowships** focuses on the mechanism for HTS.

The mechanism for superconductivity is known at the lower temperatures. John Bardeen, Leon Cooper and J. Robert Schrieffer pointed it out in their seminal contribution, which was also highlighted by another Nobel Prize. In this case the flow of electrons cannot be resolved into individual electrons, but instead consists of many pairs of bound electrons, the so-called Cooper pairs. These pairs are formed when an electron moving through the material distorts the surrounding crystal lattice, which in



turn attracts another electron and forms a bound pair that is capable to flow without resistance, the normal conductivity properties become truly “super”.

However, in the case of HTS the favourable flow of electrons has a different origin, which is where the QAU researchers have been publishing their work in peer-reviewed journals with the OEA support. In HTS the Cooper pairs are formed close to a magnetic transition allowing the quantum phenomenon of spin-density waves that lead to the superconductivity. The investigation of the mechanism that drives the QAU researchers is regarded as one of the experimentally accessible methods just shedding light on the transport properties of HTS. This Project has not only enhanced research activities, but provides a useful tool to understand the mysterious mechanisms underlying HTS. [*From a QAU Report to OEA, November 24, 2009.*]

**The Theoretical Astrophysics** is an OEA Project that is based at the Uleg Beg Astronomical Institute, Tashkent, Uzbekistan (cf., Fig 5). A series of cutting-edge topics have recently been covered, including low-frequency signals in ionosphere for anticipating tectonic phenomena. Collaboration with Stanford University has provided the Uleg Beg Astronomical Institute with instrumentation capable of approaching the study of very low frequency electromagnetic phenomena in ionosphere and the magnetosphere. (Very low frequency or VLF refers to radio frequencies in the range of wavelengths from 10 to 100 kilometres).



**Fig. 5.** Observatory of Ulugh Beg.

On the other hand, extremely low frequency (ELF) is a term used to describe electromagnetic radiation (radio waves) with frequencies from 3 to 300 Hz corresponding to wavelengths from 100,000 to 1000 kilometres. This collaboration has allowed The Theoretical Astrophysics Project to set up an ELF/VLF radio receiver that can monitor signals above the atmospheric noise floor, a fundamental capability for analysis in electromagnetic phenomena in the ionosphere and in the magnetosphere. [*From the 2008 Evaluation Report.*]

The Theoretical Astrophysics Project is also oriented towards research in astronomy and astrophysics, including galaxy formation, gravitational lenses and gravitational models. Some emphasis has also been put on the role of magnetized gravitational objects. There are a number of significant publications in these fields in the specialized literature.

**The ICTP Fellows at the Centre for Space Physics (CSP)** is a Project of the OEA that is based in Kolkata, India (cf., Fig. 6).



**Fig. 6.** Indian Centre for Space Physics, Kolkata in India is a Government Aided Autonomous Institute.

In instrumentation they are responsible for the development of payloads for an Indo-Russian satellite with an X-Ray Laboratory for testing and evaluating such payloads. CSP is an upcoming space research centre located in the Eastern part of India, the only one of its kind. It was established in 1999 and has been recognized, amongst others, by the University of Calcutta and the prestigious Indian Space Research Organization (ISRO).

Their Graduate School currently has many PhD students (one of which, from Nepal, has been funded by the OEA since 2008 until his graduation, cf., Appendix 3). They have programmes in astrobiology, astrochemistry and satellite payload making significant contributions that are of vital relevance for ISRO in Moon exploration. India is now a leading nation in space research with the success of the Chandrayan 1 mission that was launched by ISRO in October 2008, and operated until August 2009. [*Partially from the CSP Report to OEA of 22 May 2006.*]

The location of CSP is ideal for collaborating with other emerging nations, such as: Bangladesh, Bhutan, Myanmar, Nepal (with the successful collaboration mentioned above) and Thailand. Graduate students from this region have joined CSP

with fellowships from OEA. One special research project has led to better understanding of emission from galactic centres due to the presence of black holes. [From 2011 Evaluation Report.]

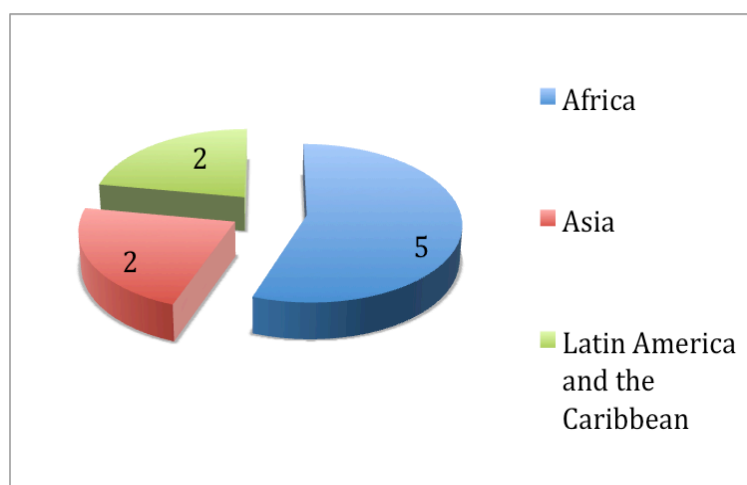
## The Network Programme

A Network is a system of research groups in an entire region, or among different regions, that pursue a common scientific project over an extended period. The OEA supports networks because they are an efficient approach to overcoming the problem of isolation and counteracting the brain drain. The ICTP emphasises South-South collaboration and the sharing of expertise and facilities. At present the Centre supports 11 networks in mathematical and physical sciences of which two networks are located in Asia:

1. The Relativistic Astrophysics, Cosmology and Gravitation, based in Pakistan.
2. Network in Theoretical Condensed Matter Physics, based in Nepal. (Bangladesh, India and Nepal).

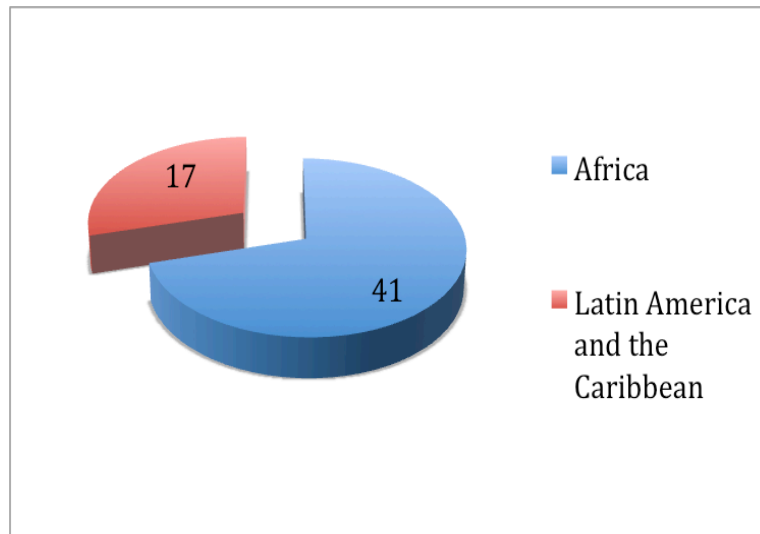
But the area of influence of the Networks is much wider, since in Asia their influence extends to Bangladesh, India, Pakistan, Thailand, Turkey, Uzbekistan and Vietnam. The related research is leading altogether to 39 doctoral theses as well as by 19 other graduate school students spread over the main three regions of the OEA influence.

In the year 2010 the Centre supported 10 networks in mathematical and physical sciences, as shown in Fig. 7:



**Fig. 7.** Distribution of Networks supported by the OEA.

The regional distribution in 2010 is shown in the Fig. 8:



**Fig. 8.** The distribution of graduate students supported as part of the Network Programme.

## THE ASIAN NETWORKS

**The Relativistic Astrophysics, Cosmology and Gravitation** is a network based in Pakistan the National University of Sciences and Technology (NUST), at the Rawalpindi Campus. This Network has adopted the acronym BIPTUN, from the initial of the countries themselves Bangladesh, India, Pakistan, Turkey and Uzbekistan (cf., Fig. 9):



**Fig. 9.** NUST Pakistan Navy Engineering College (PNEC). The campus is home to the Computer Aided Designing and Manufacturing Centre and the Professional Development Centre. The university is co-educational offering undergraduate and postgraduate degrees leading to PhD in the fields of engineering, information technology, medical sciences, and management sciences.



Their research activity has centred on the effects of the electromagnetic field on special objects of some relevance in astrophysics and cosmology, such as “gravastars” (objects hypothesized in astrophysics as an alternative to the black hole theory), wormholes (hypothetical topological feature of space-time that would be, fundamentally, a "short-cut" through space-time), black holes in a brane-world (this is an extended mathematical concept that appears in string theory and related theories). [*Based on the 2008 Scientific Report.*]

**The Bangkok-Beijing-Shanghai Network in High Energy Physics** is based at Fudan University in Shanghai, P. R. China, whose large graduate school comprises 134 sub-disciplines that are authorized to confer PhD degrees, 201 Master degree programs. Its foundation goes back to 1917. Besides the Popular Republic of China the influence extends to South East Asia and Pakistan (cf., Fig. 10). The activities of collaboration between the OEA and this Network go back to 2007.

The scientific focus is on fundamental physics, including cosmology and high-energy physics. During its first year scientists from Fudan University collaborated with Chulalongkorn University, the oldest university under the Thai modern educational system, founded in 1917. The Network benefitted the Graduate-School programme in Shanghai. [*Based on the 2007 Scientific Report.*]



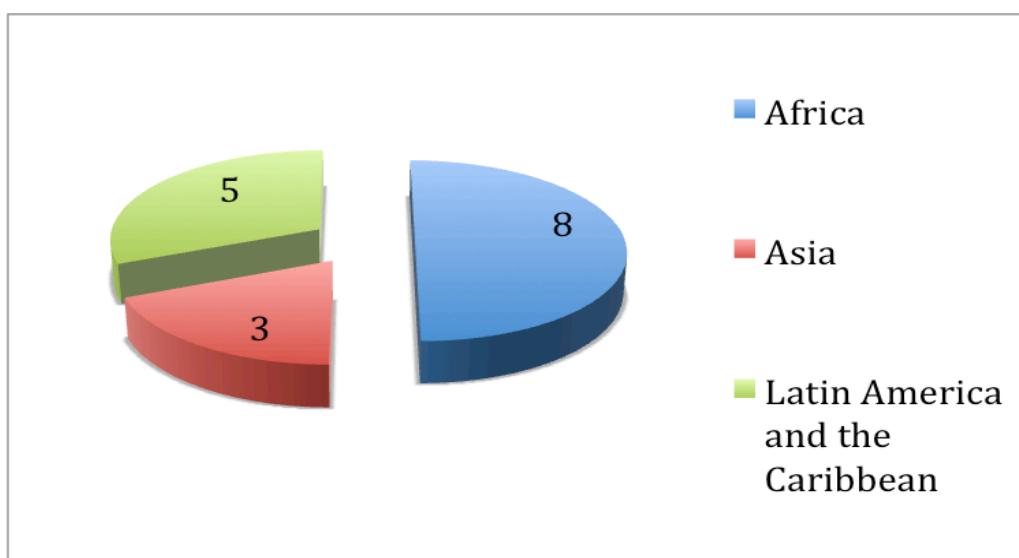
**Fig. 10.** Fudan University historic gate. The two Chinese characters Fu and Dan, literally mean "(heavenly light shines) day after day", were chosen by a distinguished educator in modern Chinese history, Father Ma Xiangbo S. J. from the Confucian Classics.

## Visiting Scholars/Consultants

This programme promotes collaboration between scientists working in institutions in the developing countries and leading scientists throughout the world. The Visiting Scholar/Consultant is required to make at least two research visits over three years, each lasting at least a month. The Visiting Scholar/Consultant carries out joint research with his counterpart and lectures students in his or her field of expertise. This is another effective way to counteract the isolation of scientists and to allow them to maintain contacts and collaborate with leading experts from other countries. There are currently 21 active Visiting Scholars of which the Asian region has 4 of them.

The programme of Visiting Scholars is being implemented in 2011 by a system of 21 grants that are distributed in the following areas: Earth, Life, Mathematical and Physical Sciences. In Asia the countries that have profited from these grants are Indonesia and Nepal.

The present situation should be compared with the initial effort at the beginning of the implementation of the 4-Year ICTP Strategic Plan, which is illustrated in Fig. 11.



**Fig. 11.** Distribution of Visiting Scholars supported by the OEA.

The Visiting Scholar/Consultant is required to make at least two research visits over three years, each lasting at least a month. The Visiting Scholar/Consultant carries out joint research with his counterpart and lectures students in his or her field of expertise. This is another effective way to counteract the isolation of scientists and to allow them to maintain contacts and collaborate with leading experts from other countries.

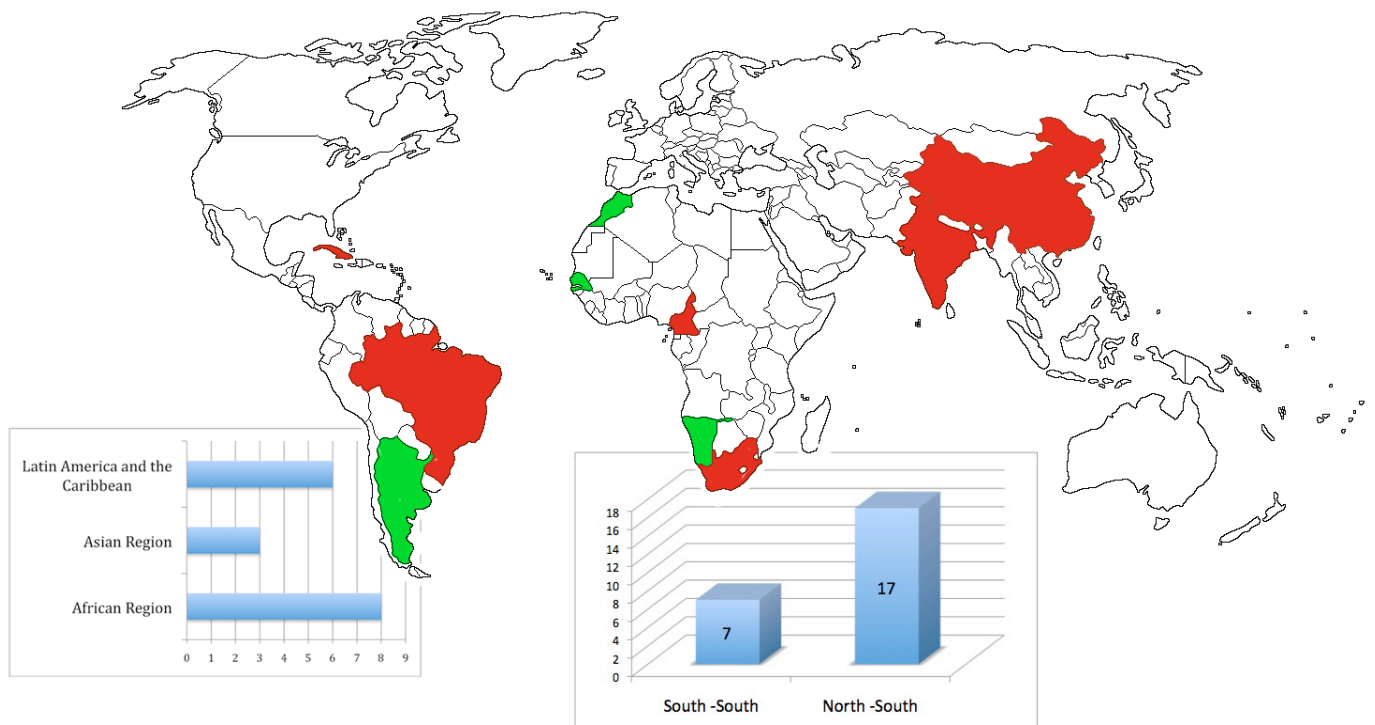
In the initial year of the ICTP Strategic Plan there were 24 active Visiting Scholars, of which 1 has been awarded in the course of that year to visit an institute in Indonesia.

## Regional encouragement

We would like to emphasize two aspects of the regional encouragement of the OEA: South-South and North-South cooperation. The active programme of Visiting Scholars for the emerging countries that we are supporting are, in a good proportion, scientists from the South itself—a fact that we are pleased to highlight. For the year 2011 these programmes included 5 South-South cooperation agreements that the OEA has been sponsoring. While the scientists from Europe, North America and Oceania are distributed among 11 nations (Australia, Austria, Belgium, Canada, Denmark, France, Italy, Poland, Spain, United Kingdom and the United States) those coming from the South, namely from Africa, Asia, Latin America and the Caribbean, are Visiting Scientists from three nations from Asia (India, People's Republic of China and Malaysia).

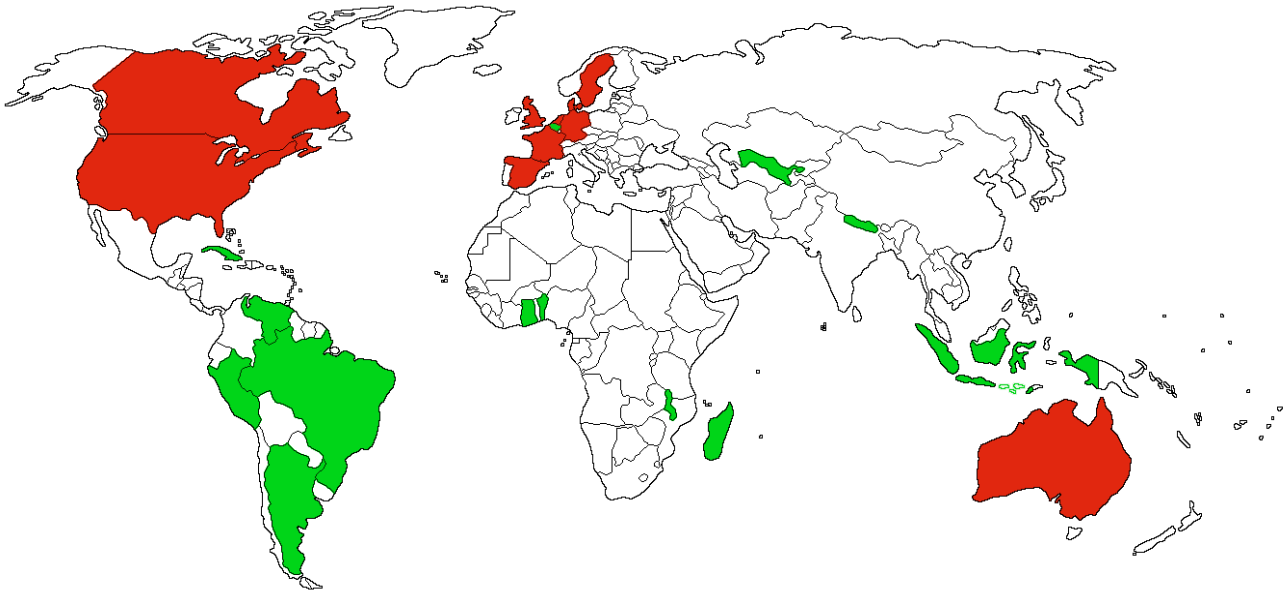
The OEA has been supporting 5 South-South cooperation agreements of which in Asia the programme includes a collaboration between Malaysia and Nepal. On the other hand, the OEA has 16 North-South cooperation agreements, for which in Asia the active programmes we are supporting are encouraging cooperation with 2 nations: Australia and Indonesia, as well as between Poland and Nepal.

In Fig. 12 we show the world distribution of South-South cooperation in the initial year of the current ICTP Strategic Plan:



**Fig. 12.** Worldwide distribution of South-South cooperation supported by the OEA.<sup>2</sup> Colour code: Nation of origin of the Visiting Scholar (red), host country (green). The insets: (centre) comparison of the regional cooperation that has encouraged by the OEA; (left) relative distribution of the regional collaborations that have been encouraged by the OEA.<sup>3</sup>

On the other hand, in the same year the OEA supported 17 North-South cooperation agreements that were distributed, as shown in Fig. 13.



**Fig. 13.** Worldwide distribution of North (red)-South (green) cooperation supported by the OEA.<sup>3</sup>

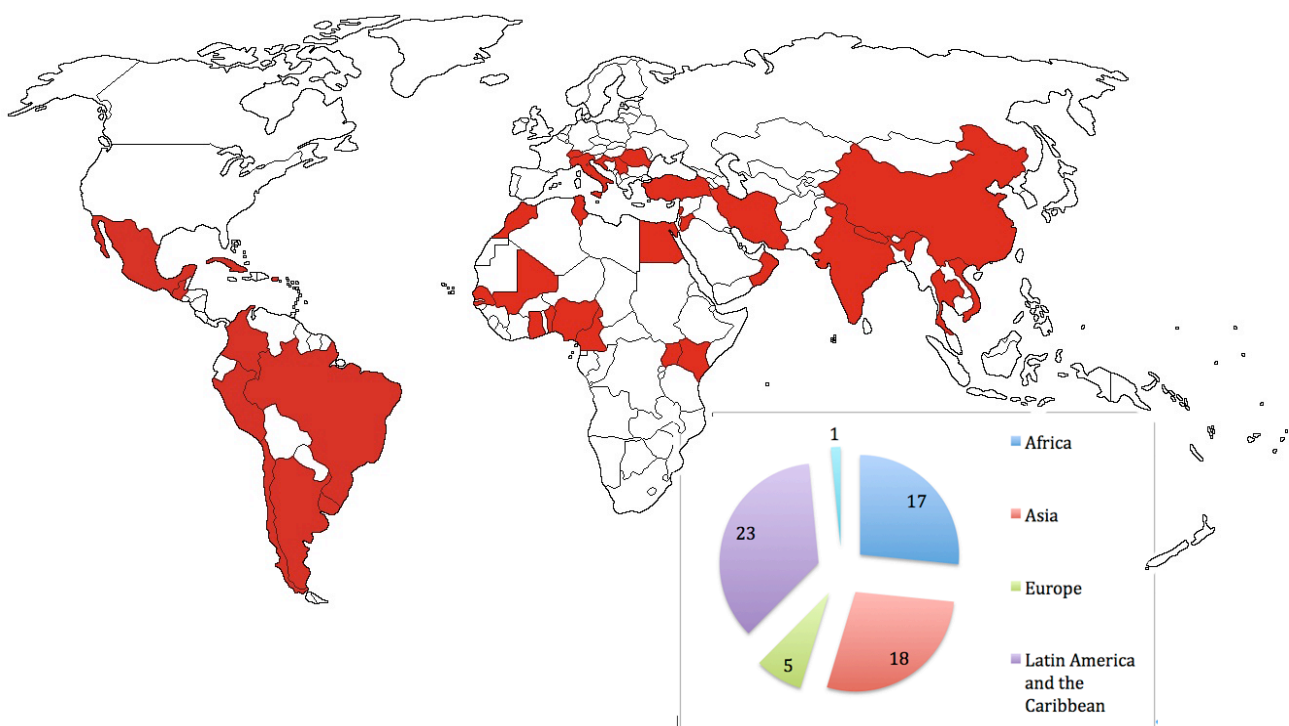


## Scientific Meetings

The OEA encourages the organization of international and regional scientific meetings in developing countries by offering financial assistance to the organizers of conferences, workshops, and schools.

In 2011 OEA has distributed 67 grants in five areas of knowledge: climate, education, mathematical sciences, physical sciences and space sciences. The grants assigned to the meetings in Asia received 26 grants distributed as follows: Armenia, Cambodia, Georgia (2), India (4), Indonesia (2), Islamic Republic of Iran, Jordan (2), Malaysia (2), Nepal (2), Pakistan, Philippines, People's Republic of China, Singapore, Sultanate of Oman, Thailand and Vietnam (3).

The present situation should be compared with the initial effort at the beginning of the implementation of the 4-Year ICTP Strategic Plan, which is illustrated in Fig. 14, where the distribution of grants for scientific meetings supported by the OEA regionally are displayed (18 took place in Asia).



**Fig. 14.** Worldwide distribution of grants supported by the OEA for scientific meetings. <sup>4</sup> Inset: Distribution of grants for scientific meetings supported by the OEA.



## APPENDIX 1: Projects (2007-2011)

### The Salam Chair, Lahore, Pakistan

Year	PhD	MPhil	Obtained (PhD)	Obtained (MPhil)	Gender	Research Papers	
						Published	Submitted
2007	3	—	—	4	2F	21	4
2008	3	—	1	—	2F	16	—
2009	3	3	1	—	1F	8	—
2010	3	2	—	3	1F	7	—
2011	3	3	—	1	2F	10	—

The Chair has on average some 12 students in total, the majority are PhD students and some are MPhil students. The OEA has funded 3 PhD Fellowships every year since 2007.

### The Southeast European Network in Mathematics and Theoretical Physics (SEENET-MTP)

Year	PhD	MSc	Obtained (PhD)	Obtained (MSc)	Gender	Research Papers	
						Published	Submitted
2007	—	—	—	—	—	—	—
2008	—	—	—	—	—	—	—
2009	3	—	—	—	1F	—	—
2010	3	2	—	—	—	—	—
2011	3	2	—	—	1F	10	2

The research has also been communicated in several book chapters. It has also been recorded in numerous internal reports and preprints.

### Ghulam Ishaq Khan (GIK) Institute of Engineering Sciences and Technology at Topi, Pakistan

Year	Ph.D	Obtained (PhD)	Research Papers	
			Published	Submitted
2007	2	1	4	1

### Mechanics and Mathematics Department, National University of Uzbekistan at Tashkent

Year	MSc and other group members	Obtained (PhD)	Research Papers	
			Published	Submitted
2007	6	—	—	2
2008	7	—	—	—
2009	9	—	1	—

### Fellowships at Former Affiliated Centre, based at Islamabad, Pakistan

Year	Ph.D/MSc	Obtained (PhD)	Research Papers	
			Published	Submitted

<b>2007</b>	—	—	11	—
<b>2008</b>	—	—	9	1
<b>2009</b>	1 MSc	1	5	—
<b>2010</b>	1 MSc	—	1	—
<b>2011</b>	—	—	—	—

**Theoretical Astrophysics based at the Uleg Beg Astronomical Institute, Tashkent, Uzbekistan**

Year	PhD	Obtained (PhD)	Gender	Research Papers	
				Published	Submitted
<b>2007</b>	—	—	—	7	8
<b>2008</b>	—	—	—	15	9
<b>2009</b>	3	3	—	15	—
<b>2010</b>	2	2	1F	20	1
<b>2011</b>	6	2	—	18	2

**ICTP Fellows at the Centre for Space Physics (CSP) based in Kolkata, India.**

Year	PhD	Obtained (PhD)	Research Papers	
			Published	Submitted
<b>2007</b>	—	—	—	—
<b>2008</b>	1	—	—	—
<b>2009</b>	1	—	—	—
<b>2010</b>	1	1	—	—
<b>2011</b>	1	—	1	1

## APPENDIX 2: Networks (2007-2011)

**Relativistic Astrophysics, Cosmology and Gravitation, originally based in Pakistan but now divides into two nodes at:**

- 1. Bangladesh, India and Uzbekistan (BIU) and  
2. Pakistan and Turkey (PT)**

Year	Support for training, fellowships and field work	Other activities		Publications	
		Conference organization	Travel Support	Published	Submitted
<b>2007</b>	1 Pakistani scientist to Turkey. 1 Uzbekistani scientist to India	—	—	—	—
<b>2008</b>	3 Uzbekistan scientists to India	—	—	—	4
<b>2009</b>	—	—	—	—	—
<b>2010</b>	1 Uzbekistani scientist to India 1 Indian scientist to Turkey. 1 Pakistani scientist to Turkey	—	—	—	—
<b>2011</b>	Exchange of researchers visits within the Network	—	—	—	—

### South East Asia Consortium for Condensed Matter Physics based in Nepal (influencing Bangladesh and India)

Year	Support for training, fellowships and field work PhD/MSc	Other activities	
		Conference organization	Travel support
<b>2007</b>	—	—	—
<b>2008</b>	—	—	—
<b>2009</b>	1 PhD 3 MSc	4	—
<b>2010</b>	—	—	—
<b>2011</b>	1 PhD 3 MSc	—	—

### Seismic Hazard in South East Asia, based in Bangalore, India

Year	Support for training, fellowships and field work	Other activities		Publications	
		Conference organization	Travel Support	Published	Submitted
2007	—	—	—	—	—
2008	—	1 Workshop on Seismic Hazards in Asia (co-sponsored by the Director's Office of ICTP).	2 travel grants for scientists	—	

### Bangkok-Beijing-Shanghai Network in High Energy Physics, based Sanghai, P. R. China (influencing South East Asia)

Year	Support for training, fellowships and field work	Other activities		Publications	
		Conference organization	Travel Support	Published	Submitted
2007	—	1 postgraduate course on cosmology in Thailand.	1 Chinese scientist to Thailand. 1 Thai scientist to P.R. China.	2	—
2008	—	—	—	—	—
2009	—	—	—	—	—
2010	—	1 Advanced School. 1 Workshop.	1 Chinese scientist to Thailand. 3 Thai scientists to P.R. China.	—	—

**APPENDIX 3:**  
**Visiting Scientists (2007-2011)**  
**Total number of collaborations supported in the region 9**

<b>COUNTRY</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
India	1	—	—	—	—
Indonesia	1	—	—	1	1
Nepal	1	—	—	—	1
Thailand	1	—	—	—	—
Turkey	1	—	—	—	—
Uzbekistan	1	—	—	—	—
<b>TOTAL</b>	<b>6</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>2</b>

**APPENDIX 4:**  
**Scientific Meetings (2007-2011)**  
**Total number of events supported in the region 119**

<b>COUNTRY</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
Armenia	—	1	—	—	1
Azerbaijan	—	2	—	—	—
Bangladesh	1	1	—	—	—
Cambodia	—	—	1	—	1
India	3	4	5	2	4
Indonesia	5	1	2	—	2
Islamic Republic of Iran	2	3	3	3	1
Jordan	—	1	—	1	2
Lebanon	—	—	—	1	—
Malaysia	1	1	2	—	2
Mongolia	1	1	—	—	—
Nepal	—	—	2	1	2
Sultanate of Oman	—	—	1	1	1
Pakistan	3	1	2	—	1
People's Republic of China	1	—	1	1	1
Philippines	2	—	—	—	1
Singapore	—	—	1	—	1
Thailand	2	—	1	1	1
Turkey	2	1	1	3	—
Ukraine	1	—	2	—	—
Uzbekistan	1	—	2	—	—
Vietnam	2	3	4	4	3
<b>TOTAL</b>	<b>27</b>	<b>20</b>	<b>30</b>	<b>18</b>	<b>24</b>

## Footnotes

1. All data in the diagrams refers to the year 2010. The data reported in the Appendices covers the period 2007-2010.
2. We write our data as host country—country of origin of the Visiting Scientist. Firstly, in the Asian Region we sponsored the following South-South collaboration: Namibia-India.
3. In Asia we supported cooperation between Indonesia-Australia, Nepal-Denmark and Uzbekistan-Germany.
4. The meetings held in Asia received 18 grants: India (2), Islamic Republic of Iran (3), Jordan, Lebanon, Nepal, Oman, People's Republic of China, Thailand, Turkey (3) and Vietnam (4).

## Photographic credits

### Projects

**Fig. 3.** GCU Tower, Government College University, Lahore, Credit Wikipedia: [http://en.wikipedia.org/wiki/Government\\_College\\_University](http://en.wikipedia.org/wiki/Government_College_University).

**Fig 4.** Quaid-i-Azam University Entrance. Credit Wikipedia: [http://en.wikipedia.org/wiki/Quaid-i-Azam\\_University](http://en.wikipedia.org/wiki/Quaid-i-Azam_University).

**Fig. 5.** Observatory of Ulugh Beg. Credit: <http://dome.mit.edu/handle/1721.3/51749?show=full>.

**Fig. 6.** Indian Centre for Space Physics, Kolkata in India. Credit Official website: <http://csp.res.in/ICSP-WEB/publicoutreach.html>

### Networks

**Fig. 9.** NUST Pakistan Navy Engineering College (PNEC). Credit Wikipedia: <http://en.wikipedia.org/wiki/File:PNEC.jpg>

**Fig. 10.** Fudan University historic gate. Credit Wikipedia: <http://en.wikipedia.org/wiki/File:Fudan000.jpg>