



The Abdus Salam  
International Centre  
for Theoretical Physics



IAEA  
International Atomic Energy Agency

# NEWS

from

# ICTP

#125-126

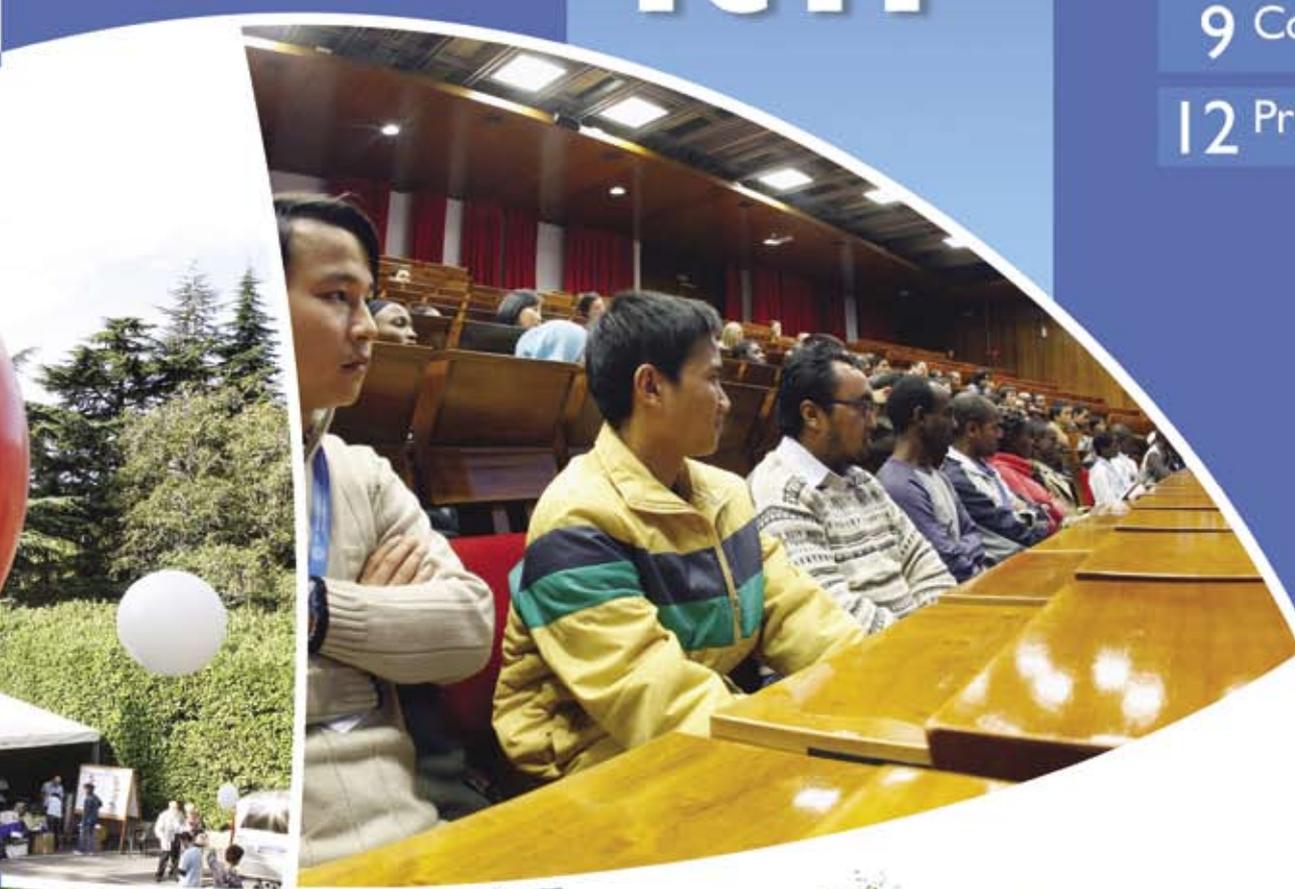
Summer - Autumn 2008

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9 Cooperation

12 Prizes



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*News from ICTP* is designed to keep scientists and staff informed on past and future activities at ICTP and initiatives in their home countries. The text may be reproduced freely with due credit to the source.

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## CONTENTS

<i>Editorial</i> . . . . .	<i>ii</i>
<i>Selected Events</i> . . . . .	<i>1</i>
<i>At ICTP</i> . . . . .	<i>2</i>
<i>ICTP in the World</i> . . . . .	<i>6</i>
<i>Cooperation</i> . . . . .	<i>8</i>
<i>Prizes</i> . . . . .	<i>13</i>
<i>Appointments and Honours</i> . . . . .	<i>15</i>
<i>Visits</i> . . . . .	<i>17</i>
<i>Science in Press</i> . . . . .	<i>19</i>
<i>Outreach</i> . . . . .	<i>20</i>
<i>In Memoriam</i> . . . . .	<i>22</i>



## EDITORIAL

Dear Reader:

You may remember that the previous Newsletter provided a comprehensive account of ICTP's activities for the year 2007. In that edition, we had paid attention to research and dissemination work being carried out by our scientific sections and to internal and external scientific activities in which ICTP played a central role. The structure of that edition was consistent with our belief that both research and dissemination to the needy parts of the world are two co-equal mandates of ICTP; only when the two aspects work in unison can ICTP be regarded to have done its job well.

The edition in your hands serves a somewhat different purpose from the last. It gives a glimpse of the events that took place at ICTP and elsewhere with ICTP's participation, of the important visitors to ICTP, of the honours received by our staff and its associated scientists, of various cooperation agreements and scientific visits of the ICTP scientists for pursuing collaborative work, and so forth. None of these items is described at great length here, but a survey of their totality presents an idea of the vibrant atmosphere of ICTP as an institution.

I take this opportunity to thank Mr. Guido Comar, Mrs. M. Fasanella, Mr. Carlo Fonda, Dr. Sandro Scandolo, and Mrs. Anna Triolo, whose participation provided the substance to this report.

As always, we welcome your comments. We would especially like to know more about your own success stories and your connections to ICTP.

Sincerely yours,

*K.R. Sreenivasan  
Abdus Salam Research Professor  
Director*



## SELECTED EVENTS

A significant part of the work at ICTP is original research, for which the focal points are its Scientific Sections. A number of programs held at the Centre are also connected to the scientific interests of these Sections. Broad-ranging programs in High Energy Physics, Mathematics, Condensed Matter Physics, Earth System Physics and some Applied Physics areas including Multidisciplinary Laboratory work are in great demand and well subscribed.

Many ICTP programs are established and well known. For example, the Spring School on Superstring Theory and Related Topics, run by the High Energy Section in collaboration with other leaders in this field, attracts many youngsters from different parts of the world; essentially all the people working in String Theory have had an association with this School at some point. Another popular example is the Winter School on Optics, which is run in cooperation with a number of institutions such as the Central European Initiative, European Optical Society, International Commission for Optics, Optical Society of America, Italian Society of Optics and Photonics, SPIE-The International Society for Optical Engineering, the US National Academy of Sciences, and other Trieste institutions; the specific focus of this program varies from one year to another and is chosen by a committee of experts representing these organizations. ICTP also holds workshops on areas at the intersection of physics with, for example, biology, information science and environmental issues. An example is the Workshop on the Development and Evolution of Nervous Systems, co-sponsored by the National Centre for Biological Sciences, Tata Institute of Fundamental Research, Bangalore, held in April.

The Center's programs are determined by the overall interest of a broad community of scientists and are run by them. Also important is a sense of balance among the scientific interests of the Centre, with some attention paid to the needs of developing countries. Through these programs, we aim to accomplish one or several of the following objectives:

- (a) Expose young people to the latest developments in a field: the Spring School on Superstring Theory and Related Topics, already mentioned, and the International Workshop on the Frontiers of Modern Plasma Physics are but two examples of this category;
- (b) Gather experts to assess progress being made on a "hot-topic", the Workshop on Supersolid and the Conference on Graphene being two examples;
- (c) Provide pedagogical training to prepare participants on important research tools, a case in point being the Advanced School in High Performance and GRID Computing;
- (d) Spread the knowledge in topics of current interest, an illustration being the School on Nuclear Knowledge Management;
- (e) Hold international meetings of established pedigree, an example of which is the Sixth International Conference on Perspectives in Hadronic Physics;
- (f) Serve as a take-off point for a subject of importance to a number of developing countries, for example the Conference on African Drought: Observations, Modeling, Predictability and Impacts.

Quite often, pedagogical elements are combined with advanced material, as in the School and Workshop on Dynamical Systems.

Some seventy such events were scheduled at ICTP this year, covering the most basic to somewhat applied areas of physical and mathematical sciences. We will not devote space here to describe them all. The interested reader is referred to the full list at the weblink

<http://calendar.ictp.it/2008/>

The next six pages describe a few selected programs held during the year. They are by no means exhaustive but are chosen to illustrate their variety.



## SELECTED EVENTS - AT ICTP

### JANUARY

Professor **Douglas Osheroff**, Nobel Laureate 1996, delivered a lecture on “Superfluid  $^3\text{He}$ : The First Unconventional BCS States” on 8 January. Osheroff’s lecture was held in the framework of the International Conference on Frontiers of Fundamental and Computational Physics, which was co-sponsored by ICTP and the University of Udine. The conference took place at ICTP on 8 January. About 100 participants were in attendance, including Nobel Laureate H. Kroto. Kroto had already visited ICTP, while it was Osheroff’s first time. Osheroff has contributed chapters in ICTP’s book *One Hundred Reasons to Be a Scientist*.



*From left: Erio Tosatti, Douglas Osheroff, Ralph Gebauer, Sandro Scandolo, Denis Basko and Mikhail Kiselev*



### JUNE

Professor **Shing-Tung Yau** (right), Fields Medallist, was at ICTP on 18 June to lecture on “Analysis in complex geometry” at the Conference on Differential Geometry (2-20 June). In the photo, he is with professor Lê Dung Tráng, Head of the ICTP Mathematics section. Between them is the statue of Leonardo da Vinci.

### JULY

The **Summer School in Cosmology** took place from 21 July to 1 August. The activity takes place every two years, covering a quite diverse set of subjects ranging from astrophysics to theoretical cosmology and the interface with particle physics. The School received a huge number of applications (472—probably a record), a clear sign of the need of this kind of activity, and the success of the previous schools. The number of selected participants was 209, 141 coming from developing countries. The percentage of women was approximately 20%.



#### Steering ICTP

*A special session of the Steering Committee was held at UNESCO headquarters in Paris on 29 January, attended by the UNESCO Director-General, Mr Koichiro Matsuura. Among other things, the Steering Committee approves the Centre’s budget for each of ICTP’s major activities. It includes representatives from the Italian Government, UNESCO and IAEA. The Committee is normally convened twice a year.*

*The ICTP Scientific Council held its annual meeting on 8-9 May. The Council meets once a year to discuss the Centre’s accomplishments and its plans for the coming year. One of the two semi-annual meetings of the Steering Committee is held in conjunction with that of the Scientific Council.*



*Scientific Council at ICTP*



## AUGUST

### DIPLOMA PROGRAMME

#### Ceremony

On 27 August, ICTP awarded Diplomas to 43 students who successfully completed their one year of intense study. Diplomas were given in Condensed Matter Physics (7), Earth System Physics (9), High Energy Physics (9), Mathematics (8) and Basic Physics (10). Nearly two-thirds of the students from the first four programs have been accepted for Ph.D. studies in Europe and North America. Most of the students from the Basic Physics Programme will advance to one of the other



four specialized Diploma Programmes. Diplomas were awarded in a ceremony attended by the instructors and Programme coordinators, as well as other members of the Centre, and was chaired by the ICTP Director, Professor K.R. Sreenivasan.

#### 2008-2009 Class

Fifty new students arrived at ICTP to begin their one-year Diploma course. They were welcomed by the ICTP Director K.R. Sreenivasan and Assistant Director and Head of the Diploma Programme Seifallah Randjbar-Daemi, as well as their course coordinators, in the Main Lecture Hall of the Leonardo Building on 16 September.



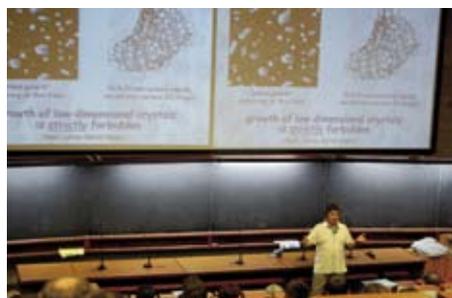
All lectures of the Diploma Programme are automatically recorded with the EyA System by the Science Dissemination Unit. For further information, see

<http://sdu.ictp.it/eya/about.html>

The EyA System won the Innovation Prize of Regione Friuli Venezia Giulia in February (see News from ICTP, No. 121-124, p. 100).

#### Diploma Students on National Press

ICTP Diploma students feature in the October issue of the Italian magazine *Flair*. The article “*Vogliamo vincere il Nobel*” (we want to win the Nobel Prize) explains to readers that the young students who gather at ICTP from all over the world have unique stories to tell and are determined to make a difference through science, both in their own countries and in the world. The article is the result of interviews done by former SISSA student Donato Ramani, while the fine portraits were taken by Francesco Jodice back in July. The article is posted on the Public Information Office’s Press Archive [pio.ictp.it/press\\_archive](http://pio.ictp.it/press_archive) [intranet only].



*Andre K. Geim lecturing at Graphene Week*

The Conference “**Graphene Week 2008**” took place during the last week of August. The conference was devoted to the rapidly progressing science and technology of graphene—an atomically thin layer of graphite—and ultra-thin graphitic films. It encompassed investigations of electronic properties of graphene, modeling of its band structure and mechanical properties, growth methods, and preparation techniques of graphene-based field-effect transistors (GraFET’s).

The annual meeting of the **IUPAP Commission on Physics for Development (C13)** took place at ICTP last August. Among the participants were Annick Suzor-Weiner (chairperson and Vice President of the IUPAP Executive Council), Robert Kirby-Harris (Chief Executive of the IOP) and the ICTP Director, K.R. Sreenivasan. IUPAP and ICTP share common interests in promoting the exchange of information and views among the members of the international scientific community. One of the aims of the meeting was to discuss possible common initiatives. The effectiveness of a combined action and the increased opportunities offered by a closer collaboration were unanimously recognized during the meeting while, in view of the forthcoming collaboration agreement between IUPAP and UNESCO, an active role of advice and cooperation was advocated for ICTP. The innovative issue of the low-cost high-level technology, with interesting potential for physics in developing countries, was presented at the meeting by François Piuzzi. He discussed the matter also with several other interested ICTP scientists during his visit.

**SEPTEMBER**

The **College on Medical Physics** was held during 1-19 September. The Colleges on Medical Physics have been run for more than 20 years (see also *UNESCO and Research for Health*, edited by S. Schneegans, a free publication available online on the page of the Natural Sciences Sector of the UNESCO website [www.unesco.org](http://www.unesco.org)).

The **9th Workshop on Three-Dimensional Modelling of Seismic Waves Generation, Propagation and their Inversion**, 22 September - 4 October, provided training in advanced methodologies of R&D in fundamental studies of the Earth’s evolution and dynamics, and in numerous applied problems, such as prospecting for mineral resources, estimation and mitigation of possible seismic hazard, and development of tsunami warning systems. The programme also included new computational approaches for numerical simulation of seismic wave fields, for processing, management and interpretation of large-volume observations. John Woodhouse, winner of the 2008 Beno Gutenberg Medal of EGS/EGU, was one of the lecturers.



*John Woodhouse*



Professor **Akio Arakawa**, University of California at Los Angeles, delivered the keynote lecture “Multi-scale modeling of the atmosphere – An overview” at the Fall Colloquium on the Physics of Weather and Climate: Regional Weather Predictability and Modelling (29 September - 10 October). In the photo, Professor Arakawa poses with the organizers of the Colloquium.



## OCTOBER

Professor **Stephen L. Adler**, IAS, Princeton, USA, gave a seminar on “Two wave propagation problems relating to axion searches: vacuum birefringence in a rotating magnetic field, and a detailed theoretical analysis of ‘light shifting through a wall’ experiments”, on 16 October. ICTP awarded Professor Adler the Dirac Medal in 1998.



*Stephen L. Adler*

Renewable energies form a very hot subject in the present context of increasing energy crisis, foreseeable scarcity of key energy sources (like oil), and the menace of global warming caused by an excessive use of fossil fuels. This growing interest raises many opportunities for research and development, at the applied (engineering) level and at the fundamental science level which is at the core of ICTP’s activities.



*Michael Grätzel*

The issue of renewable energy and sustainable growth is of great importance for developing countries and in particular for Africa. Characterized by poor infrastructure, but also by intense solar radiation, the African continent is an ideal target for small, decentralized solar energy applications. While today’s generation of solar panels is still prohibitively expensive for widespread use in Africa, modern developments in nanoscience and technology hold the promise of drastically reducing the cost of photovoltaic applications. These scientific developments are therefore important for a future use in Africa.

In this context, ICTP organized, on 27-29 October, the “**Joint ICTP-KFAS Workshop on Nanoscience for Solar Energy Conversion**”, a three-day conference focusing on recent developments of new low-cost photovoltaic materials. Some of the world’s leading experts in the field, such as Michael Grätzel (Lausanne, Switzerland), inventor of organic photovoltaic “Grätzel cells”, lectured in the event. Both theoretical and experimental researchers and practitioners from industry came to the workshop. Amongst the more than 150 participants, many Italian researchers were present. A strong participation from Africa witnessed the importance of this field of research for the African continent.

The ICTP **Multidisciplinary Laboratory** has received a €600,000 grant from the local government of Regione Friuli Venezia Giulia for its project “Development of an X-Ray Portable System for Non-Destructive Analysis of Archeological and Artistic Materials”. The Laboratory will join efforts with the ELETTRA Synchrotron Light Laboratory, based in Trieste, to develop cutting-edge methodologies and instrumentation. In particular, a compact and portable X-ray device will be developed for conducting in-situ non-destructive characterization of a wide range of materials and small objects. Such methodology can also find useful applications in other fields such as environmental monitoring, biology, paleontology and materials science. The project will span over three years. The Principal Investigator is Assistant Director Claudio Tuniz.



*Portable X-ray device*



**SELECTED EVENTS — ICTP IN THE WORLD**



**Belgium**

Professor Donald Gabriels of Ghent University, Belgium, who has been one of the directors of the ICTP Colleges on Soil Physics since 1983, was inducted to the UNESCO Chair on Eremology in a ceremony held at Ghent on 22 January. Filippo Giorgi, Head of the Earth System Physics section, was the keynote speaker.

**UK**

Professor K.R. Sreenivasan was the Rothschild Visiting Professor at the Isaac Newton Institute of the University of Cambridge, in September. This is his third such appointment in Cambridge.

**USA**

On 28-29 February, the ICTP Director, Professor K.R. Sreenivasan, delivered two Crocco Lectures at Princeton. The lectures are named after a distinguished Italian aerodynamicist, Luigi Crocco, who held successive professorships in Rome and Princeton.

A Symposium on Fluid Science and Turbulence was held on the occasion of K.R. Sreenivasan's 60th birthday at Johns Hopkins University on 30-31 May to celebrate his long scientific career. Leo P. Kadanoff, Michael E. Fisher, Mitchell J. Feigenbaum and Jacob Palis, former Chairman of the ICTP Scientific Council, were among the distinguished invited lecturers. The proceeding of the symposium will be published in a special issue of *Physica-D*. About 200 scientists from all over the world participated in the event.

**Switzerland**

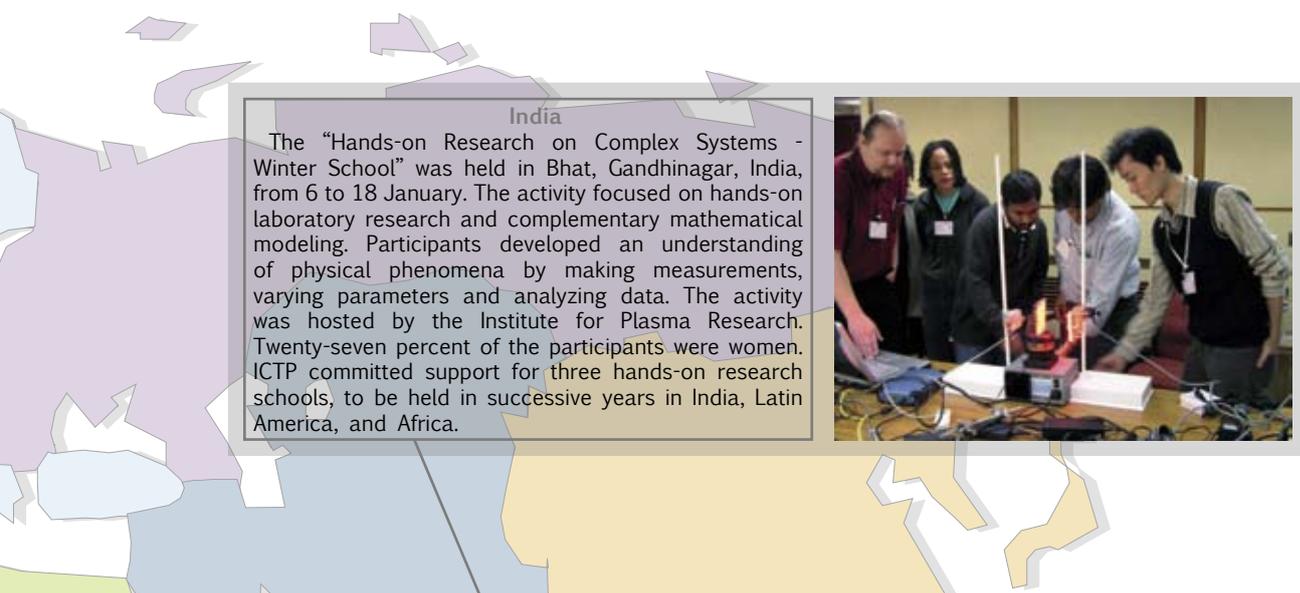
The first beam in the Large Hadron Collider at CERN was steered around the full 27 kilometres of the world's most powerful particle accelerator on 9 September. In view of the opening of LHC, ICTP has been running a programme for the benefit of students, postdoctoral researchers and associate members, focusing on the ATLAS section of LHC. The programme is coordinated by Bobby Acharya of the ICTP High Energy Section, in collaboration with Marina Cobal of the INFN *Gruppo Collegato di Udine* and University of Udine, Italy. (See *News from ICTP*, No. 121-124, pages 54-56.)



**Chile**

First Latin American Regional Workshop on Distributed Laboratory Instrumentation Systems in Physics, Valdivia, 7 January - 1 February.





**India**

The “Hands-on Research on Complex Systems - Winter School” was held in Bhat, Gandhinagar, India, from 6 to 18 January. The activity focused on hands-on laboratory research and complementary mathematical modeling. Participants developed an understanding of physical phenomena by making measurements, varying parameters and analyzing data. The activity was hosted by the Institute for Plasma Research. Twenty-seven percent of the participants were women. ICTP committed support for three hands-on research schools, to be held in successive years in India, Latin America, and Africa.



**Malaysia**

The ICTP Multidisciplinary Laboratory (MLab) organized the First ICTP Regional Microelectronics Workshop and Training on VHDL for Hardware Synthesis and FPGA Design in Asia-Pacific on 16 June - 11 July. The event was co-organized with the International Islamic University Malaysia (IIUM) and the Tunku Abdul Rahman College (TARC), and with the contribution of renowned high-tech companies. IIUM in Kuala Lumpur hosted the event. Several participants received advanced electronic development platforms specifically developed at the ICTP-MLab. They were engaged in an open source project for the production of public domain intellectual property related to Reconfigurable Virtual Instrumentation (RVI) based on FPGA technology. The first half of the course was broadcast live through the Malaysian Research and Education Network (MYREN).

**Ethiopia**

A School on Computational Materials Science was held in Addis Ababa on 15-26 September. The School was organized by Sandro Scandolo (ICTP), Nicola Marzari (MIT, Boston), Genene Tessema and Semu Kassa (Addis Ababa University) and was sponsored by the OEA-ICTP, INFN/Democritos Center (Trieste), and the International Center for Materials Research (Santa Barbara, USA). Topics of the School included an introduction to Linux and scientific computing, and a hands-on course on the use of the Quantum-Espresso codes for electronic structure calculations. About 50 students from graduate programs in Physics and Materials Science attended the School, which was held in the newly established computational laboratory of the Graduate School of the University of Addis Ababa.



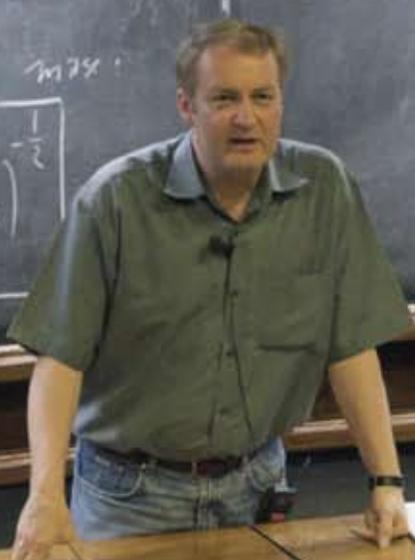
typical characteristic / parameters for

cooling

$$T_{\text{char}} = 200\text{K} ; n_{\text{char}} \approx n_{\text{crit}} = 10^4 \text{ cm}^{-3}$$

→ Insert into eqn. for Jeans mass:

$$M_J \approx 1,000 M_{\odot} \left( \frac{T}{200\text{K}} \right)^{3/2} \left( \frac{n}{10^4 \text{ cm}^{-3}} \right)^{-1/2}$$





## COOPERATION

*ICTP has signed Memoranda of Understanding with:*

... **the American Institute of Physics (AIP) and Elsevier**, marking the participation of these leading publishers in eJDS with their physics and mathematics collections.

The eJDS programme is geared to facilitate access to current cost-free scientific literature to scientists in Least Developed Countries, where they do not have access to such articles. It already counts on the support of other major publishing companies. To learn more about eJDS or register to the service, please visit [www.ejds.org](http://www.ejds.org)

... **the Foundation Horia Hulubei - ICPB**, Romania, in February. The eventual goal of the agreement is to set up a physics centre in Bucharest, to be called ICTP-Romania, under the aegis of the Foundation. Its goals and functions will be patterned after ICTP.



*K.R. Sreenivasan with Valentin Vlad and Sabin Stoica from Romania*

... **the Department of Physics of the University of Michigan (UM)**, for cooperation in research, educational and international outreach initiatives. In particular, this agreement will involve the Michigan Centre for Theoretical Physics and the UM ATLAS group. Particular focus of the collaboration will be devoted to researchers from developing countries. The cooperation was initiated on the basis of an ongoing collaboration between Professor Gordy Kane (MCTP Director) and Professor Bobby Acharya (ICTP), and is intended to enrich both institutions.



... **the Nigerian National Universities Commission (NUC)**, whereby both ICTP and NUC “will collaborate for the advancement and development of scientific capacity in Nigerian universities, particularly in the fields of physics, mathematics and ICT.” A delegation from NUC, composed of Prof. Julius Okojie, Executive Secretary, and Mr. Chris Maiyaki, Special Assistant to the Executive Secretary, visited ICTP on 3 July. The NUC is an agency within the federal Nigerian government that is responsible for the advancement of the national university system.

... **the Ministry of National and Higher Education, Executive Training and Scientific Research**, together with the **National Center for Nuclear Energy, Sciences and Techniques**, for the creation of a Centre for Physics and Mathematics (CPM) in Rabat, Morocco. To this end, K.R. Sreenivasan, ICTP Director, and S. Randjbar-Daemi, Assistant Director, visited Morocco from 6-8 July. The main objectives of CPM are to foster advanced research in theoretical physics and mathematics in Morocco’s universities and research institutions, as well as in neighboring countries of North Africa. The CPM will be patterned after ICTP, which will assist in designing and running the scientific activities of CPM. The ICTP Director also met with the President and other leading authorities at the University Ibn Tofail, Kenitra, and the Permanent Secretary, Professor Omar Fassi-Fehri, of the Hassan II Academy of Science and Technology, and discussed their commitment to CPM.



## ITU

Professors K.R. Sreenivasan and S.M. Radicella were invited by the ITU Secretary-General, Dr. Hamadoun Touré, to a meeting at the International Telecommunication Union (ITU) headquarters in Geneva on 1 February, as a follow-up on ICTP's participation in the "Connect Africa" Summit held in Kigali, Rwanda, last October. The status and future developments of the collaboration between the ITU's Bureau of Development of Telecommunications and ICTP were discussed. Further discussions on a more definite plan followed at the joint ITU/BDT-ICTP Workshop which was held at ICTP on 28 February - 5 March.



*S.M. Radicella and  
Hamadoun Touré at ITU*

## Pakistan

The Chairman of the Higher Education Commission (HEC) of Pakistan, Professor Atta-ur-Rahman, has agreed that Pakistani scientists wishing to visit ICTP may be supported by the Higher Education Commission, provided that they work in public sector universities. Applicants would be required to go through the normal ICTP selection process and selected candidates would be forwarded to the HEC for its approval and action.

## Nigeria

The Director of ICTP, Professor K.R. Sreenivasan, served on the visiting committee to review the status of the National Mathematical Centre (NMC) in Abuja, Nigeria. The Centre was established with the inspiration provided by the founding director of ICTP, Professor Abdus Salam. The committee was chaired by Professor P. Griffiths, former director of the Institute for Advanced Study in Princeton. The committee, which met in March, made a number of recommendations to improve the performance of NMC, which is situated on its splendid campus away from the city. Among the concrete steps that were followed up was the donation of 100 latest monographs and text books to NMC, arranged by ICTP through the generous donation of Springer-Verlag.

## Focus on Africa

In October, ICTP submitted to the Italian Foreign Ministry a proposal including three projects which aim at scientific capacity building in Africa. The proposal was adopted immediately and funds have already been allocated.

The proposal is composed of three main chapters:

1. Practical training and research in basic and applied sciences including education, energy, environment and health education;
2. Research infrastructure; and
3. Building environmental networks, and monitoring of the environment.

The first program will provide the practical training through the TRIL (Training and Research in Italian Laboratories), STEP (Sandwich Training Educational Programme) and the Diploma programs. TRIL will ensure adequate practical training at the post-doctoral level, while STEP and the Diploma Programme will nurture students, particularly from sub-Saharan countries, for teaching in African universities or to continue their research work for higher degrees.

Research infrastructure involves implementing a demo wireless-networking project in Malawi; developing new computational physics centres and upgrade existing clusters in Ghana and Kenya; and encouraging cooperation and exchange of researchers within the framework of the African Laser, Atomic, Molecular and Optical Sciences Network (LAM) and the African Network



of Accelerators for Sustainable Development.

Finally, ICTP will help in facilitating the access to climate predictions for end-user groups (e.g. agriculture, water resources, health), as well as in evaluating and communicating seismo-volcanic hazards within and between countries in East Africa, where an unprecedented range of volcanic and seismic activity has taken place over the past few years. In addition, a joint project involving the University of Cape Coast and Tema Oil Refinery in Ghana will result in the establishment of a ground-based station devoted to environmental monitoring and climatological observations by means of differential optical absorption spectroscopy.

### IAEA

ICTP and IAEA have a long history of close collaboration. From January to October, the two institutions scheduled a number of activities—most of them under joint supervision—which were held at ICTP and abroad:

February . - Advanced Workshop on Model Codes for Spallation Reactions

April . . . . - Advanced School on Synchrotron and Free Electron Laser Sources and their Multidisciplinary Applications

- Meeting on Environmental Issues Related to Geological Storage of Carbon Dioxide and Nuclear Wastes

- Workshop on Nuclear Structure and Decay Data: Theory and Evaluation

May . . . . - Conference on Predicting Disease Patterns According to Climatic Changes

- Workshop on Nuclear Reaction Data for Advanced Reactor Technologies

- Regional Advanced School on Physical and Mathematical Tools for the Study of Marine Processes of Coastal Areas (held in Cienfuegos, Cuba)

September - School of Nuclear Knowledge Management

October . . - Activity on Imaging in Advanced Radiotherapy Techniques.

Information on all of these activities may be obtained from the ICTP website [www.ictp.it](http://www.ictp.it)

As in every year, ICTP was also present at the IAEA General Conference in September. ICTP had its own stand at the exhibition, with a display and some publications.

Assistant Director Claudio Tuniz, staff scientist Dr. Nadia Binggeli and scientific consultant Professor Daniele Treleani also took part in the General Conference, while also meeting with officials of the Department of Technical Cooperation on matters relevant to the selection of STEP (Sandwich Training Educational Programme) candidates.



*Joint ICTP-IAEA Activity on Imaging in Advanced Radiotherapy Techniques, 20-24 October*

### UNESCO

Assistant Director Seifallah Randjbar-Daemi travelled to Paris to attend the Consultation and Information Meeting on the execution of UNESCO's Science Programmes in the present biennium 2008-2009. The meeting was held on 29 September and was chaired by UNESCO DDG, Mr. Marcio Barbosa. The Natural Sciences sector was represented by Mr. Mustafa El-Taieb, deputizing for the ADG. In his intervention, Professor Randjbar-Daemi illustrated the involvement of ICTP for the benefit of African countries and scientists, which is very much in line with the mandate of UNESCO. More specifically, he spoke about the programs targeted for young African students such as the Diploma Programme in general, and the one in Basic Physics in particular which is only for students from sub-Saharan Africa. The representative of the African Union expressed interest in these ICTP activities.



## PRIZES

### Dirac Medal

As in every year, on 8 August, birthday of P.A.M. Dirac, ICTP announced that the 2008 Dirac Medal and Prize have been awarded to Professor **J.M. Maldacena** (Institute for Advanced Study, Princeton), Professor **J. Polchinski** (KITP, UC Santa Barbara), and Professor **C. Vafa** (Harvard) “for their fundamental contributions to superstring theory”. The citation continues, “Their studies range from early work on orbifold compactifications, physics and mathematics of mirror symmetry, D-branes and black hole physics, as well as gauge theory-gravity correspondence. Their contributions in uncovering the strong-weak dualities between seemingly different string theories have enabled us to learn about regimes of quantum field theory which are not accessible to perturbative analysis. These profound achievements have helped us to address outstanding questions like the confinement of quarks and QCD mass spectrum from a new perspective and have found applications in practical calculations in the fluid dynamics of quark gluon plasma. The dualities have also led string theorists to conjecture that the five different superstring theories in ten space-time dimensions are manifestations of one underlying theory, yet undiscovered, which has been named the M-theory”.

The awards ceremony will be held in 2009.



*The awards ceremony of the 2007 Dirac Medal to Professors Luciano Maiani and John Iliopoulos was held on 27 March (see News from ICTP, No. 121-124, p. 95). Professor Iliopoulos donated his cash prize in support of the scientific activities of ICTP.*



*Mohammad Mehdi Sheikh-Jabbari received the 2007 ICTP Prize on 31 March (see News from ICTP, No. 121-124, p. 95)*

### ICTP Prize

The 2008 ICTP Prize in honour of Pierre-Gilles de Gennes has been awarded to Professor **Abhishek Dhar**, Theoretical Physics Group, Raman Research Institute, Bangalore, India, and Professor **Zhong Fang**, Center for Quantum Simulation Sciences, Institute of Physics, Chinese Academy of Sciences, Beijing, People’s Republic of China. The announcement was made on 11 June.

Abhishek Dhar is being honoured for “his outstanding contributions to non-equilibrium statistical mechanics of transport and fluctuation phenomena, classical as well as quantum mechanical. His exact and insightful results have clarified subtle issues, and corrected several misconceptions, specially about heat conduction”.

Zhong Fang is being recognized for “his theoretical and computational work on the origin of the anomalous Hall effect, and for his significant contributions to the understanding of spin and orbital physics in transition metal oxides”.

The 2008 ICTP Prize is named after the French physicist Pierre-Gilles de Gennes, Nobel Laureate in Physics in 1991. De Gennes, who died in 2007, was one of the most influential theoretical physicists of his time. His work spanned a wide variety of subjects in condensed matter theory and statistical physics, and has pushed forward the frontiers of phenomena such as liquid crystals and polymer physics. He visited ICTP several times over four decades.

The awards ceremony will be held in 2009.



### Ramanujan Prize

The 2008 Srinivasa Ramanujan Prize will be awarded to **Enrique R. Pujals**, Associate Researcher at the *Instituto Nacional de Matemática Pura e Aplicada* (IMPA), Rio de Janeiro, Brazil. Pujals is being honoured for “his outstanding contributions to dynamical systems, especially the characterization of robust dynamics for flows and transformations and the development of a theory of generic systems”. Pujals has visited ICTP several times to attend the workshops on dynamical systems since 1995, as a participant first and as speaker more recently, including in 2008. The Prize has been supported by the Niels Henrik Abel Memorial Fund, with the participation of the International Mathematical Union. The awards ceremony will be held in 2009.

The IMU Executive Board has increased the amount of the cash award of the Ramanujan Prize from US\$10,000 to US\$15,000.



*Joe Niemela and Mourad Zghal*

### ICO/ICTP Gallieno Denardo Award

**Mourad Zghal**, *Ecole Supérieure des Communications de Tunis*, Tunisia, was awarded the 2008 ICO/ICTP Gallieno Denardo Award “for his original work in the development of numerical modeling techniques for photonic crystal fibers, microstructured optical fibers, polarization, and for his active commitment aimed at the diffusion of research in optics in Africa”. The awards ceremony took place in the Kastler Lecture Hall, Adriatico Guesthouse, on 18 February, within the Winter College on Micro and Nano Photonics for Life Sciences.

Starting from 2008, the ICO/ICTP Award is named in memory of Gallieno Denardo, who was in charge of optics activities at ICTP for more than twenty years.

The awards ceremony was followed immediately by the dedication ceremony of Lecture Hall A in the Adriatico Guesthouse to Gallieno Denardo. The Lecture Hall contains some memorabilia of Professor Denardo such as his SPIE Educator Award plaque and diploma, and a collection of photos of activities that he organized.



*Denardo Lecture Hall*

<http://prizes.ictp.it>



## APPOINTMENTS AND HONOURS

**Mohamed Abdalla Darwish**, ICTP Diploma student in the academic year 1995-1996 and Regular Associate since 2003, was a visiting scholar at the Department of Mathematics of MIT from February to August. Darwish, Head of the Mathematics Department of the Faculty of Science, Alexandria University at Damanhour, Egypt, is the local organizer of the CIMPA-UNESCO-Egypt School “Recent Developments in the Theory of Elliptic Partial Differential Equations”, which will be held at the Arab Academy for Science and Technology in Alexandria, on 26 January - 3 February 2009, and was the local organizer of the ICTP School on Algebraic Approach to Differential Equations held in Alexandria, in November 2007.

**Jean-Pierre Ezin** was elected and appointed Commissioner of the African Union during the Heads of States’ Summit of the African Union in February. He is in charge of the portfolio of Human Resources, Science and Technology for a four-year mandate, which began in April. He has planned to develop a close cooperation with ICTP for the promotion of science on the African continent.

Ezin is a mathematician at the *Institut de Mathématiques et de Sciences Physiques* (IMSP) in Porto-Novo, Benin. He is a former Senior Associate 1998-2003. He has been participating in ICTP mathematics activities since 1985 and has been involved in the Edward Bouchet Abdus Salam Institute.

**Yasaman Farzan**, from the Institute for Studies in Theoretical Physics and Mathematics, Tehran, Iran, and current Junior Associate, was awarded the theoretical 2008 IUPAP Young Scientists Prize in Particle Physics. The prize, recently established, was presented during the 34th International Conference on High Energy Physics (ICHEP2008) in Philadelphia, USA, 30 July - 5 August. Yasaman Farzan is a former Ph.D. student of Professor Alexei Smirnov and has visited ICTP several times since 2004.

**Mujahid Kamran** has been appointed Vice Chancellor of the University of the Punjab, Lahore, Pakistan. Professor Kamran won the

Abdus Salam Prize in 1985 and was Senior Associate in the period 1991-1996. He participated in several High Energy Physics activities at ICTP between the mid 1980s and the late 1990s.

The US National Academy of Sciences (NAS) announced the election of new members and foreign associates in May. Two ICTP Dirac Medallists have received this honour: **Andrei Linde**, Stanford University, 2002 Dirac Medallist, was elected a member, and **Peter Zoller**, University of Innsbruck, 2006 Dirac Medallist, was elected a Foreign Associate. Election to the NAS is on the basis of “distinguished and continuing achievements in original research”. Members of the NAS may be called to act as official advisers to the US government on matters of science or technology.

**Luciano Maiani** has been appointed President of the Italian National Research Council (CNR). His mandate began in January. Maiani, who was recently Director General of CERN, was awarded the 2007 ICTP Dirac Medal (see *News from ICTP*, No. 121-124, p. 95).

Professor **Yoichiro Nambu**, Enrico Fermi Institute, University of Chicago, Chicago, IL, USA, was awarded half of the 2008 Nobel Prize in Physics “for the discovery of the mechanism of spontaneous broken symmetry in subatomic



*Yoichiro Nambu receiving the 2006 Dirac Medal from Herwig Schopper, CERN, and Abdus Salam. ICTP, 23 July 1987*



physics". Professor Nambu was one of the recipients of the ICTP Dirac Medal in 1986. He served on the Dirac Medal Selection Committee from 1993 to 2004 and visited ICTP again as a conference lecturer at the Trieste Conference on Quarks and Leptons in 1996. He also contributed a chapter in the book *One Hundred Reasons to Be a Scientist*. Professor Nambu shares the Nobel Prize with Makoto Kobayashi from the High Energy Accelerator Research Organization (KEK), Tsukuba, Japan, and Toshihide Maskawa from the Yukawa Institute for Theoretical Physics (YITP), Kyoto University, Kyoto, Japan. Kobayashi and Maskawa are being honoured "for the discovery of the origin of the broken symmetry which predicts the existence of at least three families of quarks in nature".

The Accademia Nazionale dei Lincei awarded Professor **Jacob Palis** the 2008 International Tartufari Prize in Mathematics. He received the Prize from the President of the Republic of Italy, Giorgio Napolitano, at a ceremony held on 12 June at the Accademia's headquarters, in Rome. Palis was a Member of the ICTP Scientific Council since the early 1990s and its Chairman from 2003 to 2005, and is a close friend of ICTP.



**Pasko Rakic**, Professor of neurobiology and neurology, Yale University School of Medicine, USA, was awarded the 2008 Kavli Prize in Neuroscience. Rakic was a lecturer in various ICTP colleges in neurophysics from 1986 until

2001. He shares the prize with Sten Grillner, Department of Neuroscience, Karolinska Institute, Sweden, and Thomas Jessell, Department of Biochemistry and Molecular Biophysics, Columbia University, USA. The three scientists have been honoured "for discoveries on the developmental and functional logic of neuronal circuits".

**Hamid Saleem**, ICTP Senior Associate 2001-2008, was appointed Director General of the National Centre for Physics (NCP), in Islamabad, Pakistan. Dr. Saleem works at the Theoretical Plasma Physics Division of the Pakistan Institute of Nuclear Science and Technology. He replaces Professor Riazuddin who was the DG since the founding of NCP in 1999. NCP is patterned after ICTP in many respects.

The Scientific Council of the Institute for Nuclear Research (INR) of the Russian Academy of Sciences awarded **Alexei Smirnov** and Stanislav Mikheev the 2008 Markov Prize for their contribution to the development of the theory of neutrino oscillations. INR established two Markov Prizes to celebrate the 100th anniversary from the birth of Academician M.A. Markov. Markov was a member of the ICTP Scientific Council in the years 1975-1987.

ICTP Director **K.R. Sreenivasan** has been awarded the 2008 Nicholson Medal for Human Outreach by the Executive Board of the American Physical Society "for his commitment to mentoring students and junior colleagues and his significant contributions to fostering international collaborations and promoting the advancement and education of early career scientists from the developing world." The Nicholson Medal will be presented to Sreenivasan at the APS March 2009 meeting in Pittsburgh, PA, during a special Ceremonial Session.



## VISITS

Many distinguished diplomats and politicians visit ICTP to get acquainted with its scope and activities, and explore possible avenues of cooperation. Their interest may concern the workings of ICTP in general, or may focus on some particular project. In 2008, ICTP was honoured to welcome several delegations and, above all, the President of Italy, Giorgio Napolitano. See opposite page.



12 March - Mr. A. Daniel Weygandt, US Consul General in Milan, meets Professor K.R. Sreenivasan



12 May - Professor Dr. Jürgen Mlynek, President of the Helmholtz Association of German Research Centres



26 May - Ms. Tasnim Aslam, Pakistani Ambassador in Italy, accompanied by Mr. Tariq Zameer, Consul General in Milan, with Assistant Director Seifallah Randjbar-Daemi



13 June - Dr. Thomas Dongmo (centre), Chief of Division for Scientific and Technical Cooperation, and Mr. Benjamin Loko Dika, from the Ministry of Scientific Research and Innovation of Cameroon, with Professor K.R. Sreenivasan



2 October - Eritrean Ambassador in Rome, President ad interim of University of Asmara and Minister for Education of Eritrea. They were accompanied by Town Concillor Bruno Sulli, and received by Assistant Director Seifallah Randjbar-Daemi.



27 March - The President of the Republic of Italy, Giorgio Napolitano, included ICTP in his three-day visit to Trieste. On that occasion, he renamed the Main Building of ICTP as the Leonardo da Vinci Building and unveiled the plaque. The ICTP Director, Professor K.R. Sreenivasan, presented to the President an account of the work and impact of the Centre and of the Trieste institutions, and briefly outlined a vision for the future. He was followed by the well-known local writer and Emeritus Professor of the University of Trieste, Claudio Magris, who spoke about the importance of borders between cultures and geographic regions. Professor Sreenivasan presented the President with a plaque commemorating his visit to ICTP. Most of the local authorities and the heads of scientific institutions were in attendance, as well the recipients of the 2007 Dirac Medal, Professors Luciano Maiani and John Iliopoulos.



12 April - Dr. Viviane Reding, Member of the European Commission, Information Society and Media. Commissioner Reding learnt about the ICTP activities in Africa, especially on ICT, and expressed interest in potential partnership towards curbing the digital divide in the continent.



15 May - Professor K. Osterwalder, Rector of the United Nations University. For many years in the past, UNU collaborated with ICTP and co-sponsored its Microprocessor Laboratory. During the meeting, it was suggested that ICTP could formally complement UNU in physical and mathematical sciences. Osterwalder agreed to put it to his advisory board for consideration. In the photo, from left: K.R. Sreenivasan, Mrs. and Professor K. Osterwalder.



Open Day



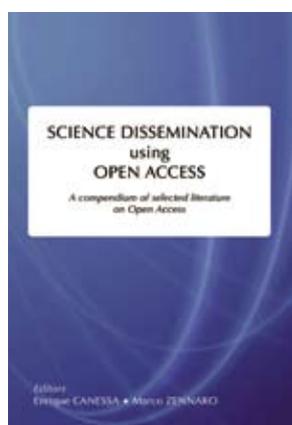
## SCIENCE IN THE PRESS

### Hadronic Physics

The Sixth International Conference on Perspectives in Hadronic Physics, held at ICTP on 12-16 May, has published its proceedings with AIP. The volume is a useful update of the subject for theorists and experimentalists working in medium and high energy nuclear physics.



*Stanley J. Brodsky was a speaker in the Conference on Perspectives in Hadronic Physics and an author in its book of proceedings*



### Book on Open Access

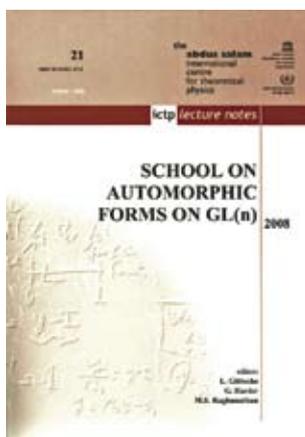
The ICTP Science Dissemination Unit (SDU) has released the new book *Science Dissemination Using Open Access*, a compendium of selected literature on Open Access, edited by E. Canessa and M. Zennaro. It can be downloaded for free, or seen on-line at the website

<http://sdu.ictp.it/openaccess/book.html>

The book is an effort by SDU in collaboration with CERN and with support from INASP.

### Salam +50

2007 marked not only the centenary of Imperial College London but also the 50th anniversary of the late Nobel Laureate Professor Abdus Salam's arrival at the College. Accordingly, a conference entitled "Salam +50" was held at Imperial College on 7 July 2007. The proceedings, edited by Michael Duff and published by Imperial College Press in 2008, record the contributions by the many distinguished guests who attended the conference and paid their respects to Professor Salam. The ICTP Director, K.R. Sreenivasan, and former Staff Scientist, Faheem Hussain, have contributed two chapters in the section "Salam the Humanitarian".



### Lecture Notes Series

Three new volumes have been published in 2008 in the *ICTP Lecture Notes Series*:

Volume 21 - *School on Automorphic Forms on  $GL(n)$* ; selected lectures delivered at the School held at ICTP on 31 July - 18 August 2000. Edited by L. Götsche, G. Harder and M.S. Raghunathan.

Volume 22 - *Nuclear Physics and Data for Material Analysis*; selected lecture notes from the workshop held at ICTP on 19-30 May 2003. Edited by N. Paver.

Volume 23 - *Some Recent Developments in Algebraic K-Theory*; selected lectures from the school and conference held at ICTP on 14 May - 1 June 2007. Edited by E. Friedlander, A. Kuku and C. Pedrini.

For further information and for downloading the documents, please see

<http://publications.ictp.it/lns.html>



## OUTREACH

*The mandate of ICTP is to support advanced studies and research. We are aware, however, of the importance of seeding and interest in science in the younger generations, and of letting the public at large know about our work, particularly the people in Trieste and the host country. To this end, ICTP involves in activities targeting college students and the general public.*

### Astrophysics for All

A series of five lectures for disseminating astrophysics to the larger public was hosted at Casa della Musica in Trieste from March to May. Paolo Creminelli, on the staff of the ICTP High Energy and Astroparticle Physics section, opened the lecture series with a presentation about the dawn of the Universe. ICTP was one of the organizing and sponsoring institutions of the lecture series.

### FEST

FEST, an international scientific media fair, opened on 16 April in Trieste. ICTP participated with a display of its publications. On the first day, K.R. Sreenivasan and Clement Onime were among the guests in a round table on science and communication in the developing countries. On the same day, in the Building of Regione Friuli Venezia Giulia, Seif Randjbar-Daemi introduced Pervez Hoodbhoy who spoke on “Islam and Science: What went wrong and how to change direction”. Numerous other scientists who have close connections to ICTP also lectured and took part in round table sessions, including Dirac Medallist Luciano Maiani.

### Climate and Water

The “WATCH Summer School for Secondary School Students: Introduction to Climate Change and the Water Cycle” was hosted by the United World College of the Adriatic (UWCAD) in Duino near Trieste and directed by ICTP. The choice of an unusually young audience reflects the desire to kindle interest in environmental graduate studies and environmentally conscious careers. The international make-up of the UWCAD student body, with 11 countries represented, offered a great opportunity to achieve this goal on a global scale. Participating students have taken their experience back to their host countries and institutions, and the response has been so enthusiastic that another summer school, with much the same format, is being planned for 2010. At the closing ceremony of the one-week school, a selection of students was asked to give a short presentation to their peers and lecturers. The ceremony was also attended by local authorities along with the directors of the most important science research centres of Trieste.

OUTREACH



*ICTP Director at round table*



*From left: Carlo Piani (ICTP), students of UWCAD and their physics teacher, Eliana Camacho (turned). Dr. Camacho is a former ICTP Diploma student in the academic year 1992-1993.*



### For Africa

The Trieste International Foundation for Scientific Progress and Freedom and the Institute for Africa and the East, in collaboration with ICTP, organized a one-day meeting focusing on Africa on 24 October. In particular, the themes discussed were health, climate, architecture, African studies, as well as the contributions by Trieste's scientific institutions and the program of the Global University Network for Africa (GUNA). The event was organized in the frame of the Year of Science and Technology, proclaimed by the African Union, and saw the participation of distinguished experts from Italian ministries and scientists from local Trieste institutions. Also present was Commissioner Jean-Pierre Ezin of the African Union.

### Astronomy Olympiad

ICTP hosted the XIII International Astronomy Olympiad, from 13 to 21 October. It was the second time the Olympiad was held in West Europe. Nineteen teams of high school students from Europe and Asia participated. The event was organized by Trieste's Astronomic Observatory.



*Practical session at the Astronomy Olympiad  
(Courtesy: M. Ramella)*

### Open Day

ICTP led the effort of organizing the third edition of the Open Day of all institutions in the Miramare area on Saturday, 20 September. A large public attended the lectures and visited the numerous scientific stands.



The guest of honour was writer Paolo Rumiz, who talked about his way of travelling "light". That means not only packing a half-empty suitcase, but also making room inside of oneself so as to be able to accept all that the journey and destination will offer. The theme of travel fits well in a scientific environment, as scientists need to travel often to meet and exchange their ideas. A videoconference connection was established with Sandro Scandolo and Clement Onime in Addis Ababa, where both Western and local scientists spoke briefly about their experiences (see p. 6-7).

The program of the day continued with a rich selection of lectures and round tables with the participation of distinguished local scientists. At ICTP, the main themes were climate change and the origin of life. SISSA offered brief lectures on the functioning of the brain, nanometrics, the Big Bang, and LHC. LHC was also discussed by the Department of Theoretical Physics, along with computational physics and quantum physics.

There was also much interest for the scientific explanations of how a karate blow can break a thick wood tablet, without injuring the hand that hits it. A demonstration was offered by a local karate school.



## IN MEMORIAM

*Several friends were lost to ICTP during 2008. We remember them for their unique connection and contribution to the life of the institution.*

**G. Franco Bassani**, a founder of the Italian theoretical condensed matter school, director of the Scuola Normale Superiore of Pisa from 1995 to 1999 and chairman of the Italian Physical Society from 1999 to 2007, died on 26 September. He was 79. Bassani played an important role at ICTP as organizer of the very first training activity in condensed matter physics, the International Course on the Theory of Condensed Matter, in 1967. He subsequently lectured at other courses on crystalline solids, until the early 1970s. At the Universities of Messina, Pisa, Rome, and at Scuola Normale Superiore, he established internationally recognized groups of condensed matter theory focused on the optical and electronic properties of semiconductors and insulators. Several scientists associated with ICTP were his students—among them, former Acting Director Erio Tosatti and Staff Scientist Sandro Scandolo.

**Ernesto Illy**, Honorary Chairman of Illycaffè, died on 3 February. He was 82. Illy was a member of the Citizen's Committee that supported Trieste's candidacy to be the host city of ICTP in the early 1960s.

**Robert H. Kraichnan**, Homewood Professor in the Mechanical Engineering Department of the Johns Hopkins University, died on 26 February. He was 80. Kraichnan was one of Albert Einstein's last assistants at the Institute for Advanced Study in Princeton. He had a long career as consultant in a variety of governmental organizations and private firms, and conducted pioneering research on field-theoretic approaches to turbulence and other non-equilibrium systems. Kraichnan shared the ICTP 2003 Dirac Medal with Vladimir E. Zakharov.

**Sir John Marks Templeton**, who created a foundation with an endowment of \$1.5 billion to foster better understanding of the frontier of science and the humanities, died on 8 July. He was 95. The Foundation awards the Templeton Prize, the largest annual award given to an individual (£1,000,000), and sponsors conferences and studies to reflect progress on what his Foundation has called the 'Big Questions' of science and the humanities. Amongst the winners of the Templeton Prize are physicists such as Paul Davies, Sir John Polkinghorne, Freeman Dyson, George Ellis and Charles Townes. With the help of the Templeton Foundation, ICTP has established Prizes for Leadership in Science and Public Life.

**Yoji Totsuka**, former head of the SuperKamiokande experiment and outstanding contributor to advances in neutrino physics, died on 10 July. He was 66. Totsuka, who was also former director general of Japan's high energy physics organization, KEK, visited ICTP in 1996 as lecturer at the Trieste Conference on Quarks and Leptons: Masses and Mixings, and in 1998 at the Summer School in High Energy Physics and Cosmology and Conference on Phenomenology in High Energy Physics.

**Muhammad Younis** from the University of Agriculture, Faisalabad (Pakistan) died suddenly on 15 April, while on a visit to ICTP. He was a Regular Associate 2002-2009, and had participated in "Entrepreneurship for Physicists and Engineers from Developing Countries" in March. His field of interest was soil physics and his research topics: design, development and evaluation of energy-efficient farm machines; renewable energy for agriculture and rural areas; and soil-plant-machine relationships. Professor Younis' colleagues at ICTP thought highly of his work and abilities, and he made many friends here.

**NEWS** from **ICTP** #125-126 Summer-Autumn 2008



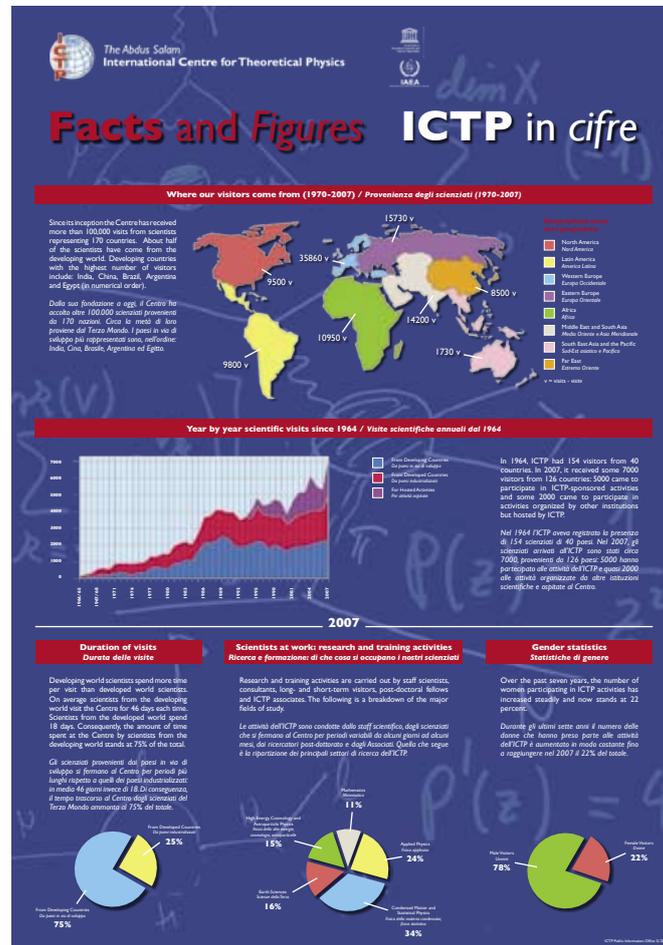
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