The Abdus Salam
International Centre for Theoretical Physics

United Nations
Educational, Scientific
and Cultural Organization

International Atomic
Energy Agency

NEWS from ICTP

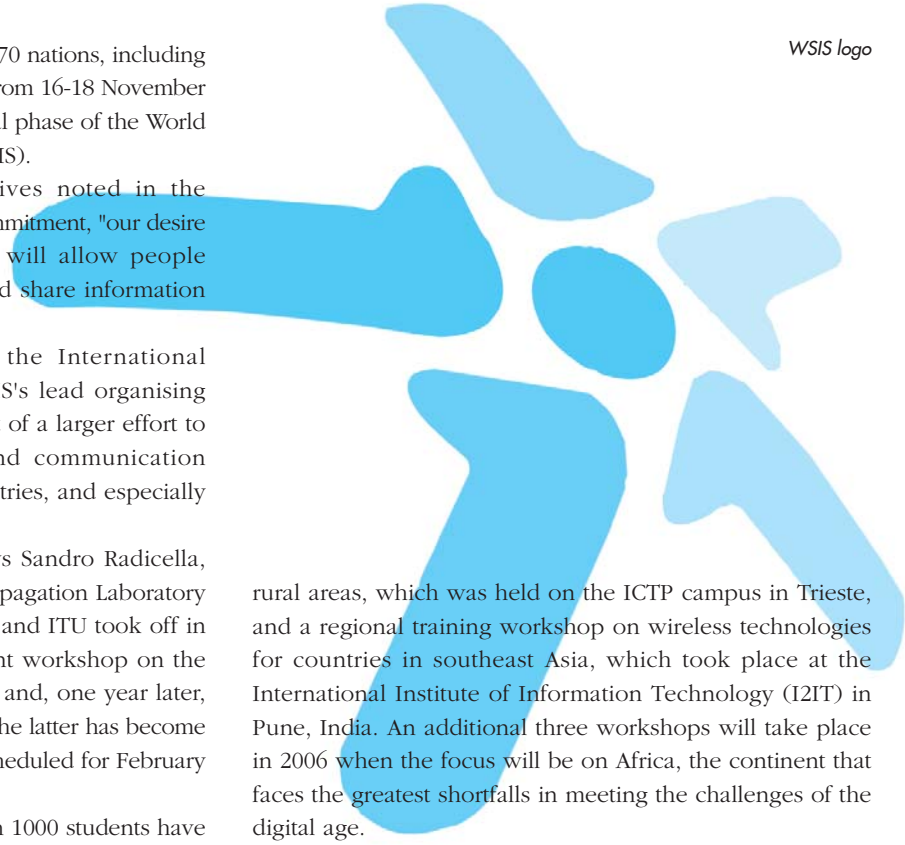
World Year of PHYSICS 2005

WINTER
2005-2006

#115

ICTP is working closely with the International Telecommunication Union (ITU) to provide developing countries with access to the new information and communication technologies (ICTs).

ICTs at ICTP



WSIS logo

More than 20,000 people from 170 nations, including 50 heads of state, met in Tunis, Tunisia, from 16-18 November 2005 to participate in the second and final phase of the World Summit on the Information Society (WSIS).

"We reaffirm," WSIS representatives noted in the conference's communiqué, the Tunis Commitment, "our desire to build an information society that will allow people everywhere to create, access, utilise and share information and knowledge."

ICTP has worked closely with the International Telecommunication Union (ITU), WSIS's lead organising agency, for more than a decade, as part of a larger effort to bring access to new information and communication technologies (ICTs) to developing countries, and especially to the world's poorest countries.

"Like digital information itself," says Sandro Radicella, head of ICTP's Aeronomy and Radiopropagation Laboratory (ARPL), "the partnership between ICTP and ITU took off in the 1990s. In 1997, we organised a joint workshop on the use of radio for digital communications and, one year later, we held a school on the same subject." The latter has become an annual event with its ninth edition scheduled for February 2006.

"In total," Radicella notes, "more than 1000 students have received training on how to efficiently build and then utilise low-cost radio wave technology for bringing email and the internet to universities and research institutes."

"We all know that electronic communications has become the preferred method of communication, particularly in universities and research institutions," says Hamadoun I. Touré, ITU's director of the Telecommunication Development Bureau (ITU-BDT).

"In fact, communications experts estimate that some 90 percent of all official information—in business, government and science—is now produced in an electronic format; yet 80 percent of the world's population remains wedded to print material," adds Touré. "In today's world, being disconnected from electronic information spells deep trouble for an entire society, but for modern-day scientists it marks a death note to their careers."

Touré visited ICTP in February 2004 to sign a memorandum of understanding with ICTP director K.R. Sreenivasan that called for greater collaboration between the two organisations (see "Dot Dash Digital," *News from ICTP*, Spring 2004, p. 2).

Since then, the two institutions have co-organised three training activities, including an advanced workshop for the use of wireless technology at universities and hospitals in rural areas, which was held on the ICTP campus in Trieste, and a regional training workshop on wireless technologies for countries in southeast Asia, which took place at the International Institute of Information Technology (I2IT) in Pune, India. An additional three workshops will take place in 2006 when the focus will be on Africa, the continent that faces the greatest shortfalls in meeting the challenges of the digital age.

At the WSIS in Tunis, Marco Zennaro, a consultant with ICTP who represented the Centre at the Summit, spoke before a group of participants in the exhibition hall on the final day of the event. Amid displays showcasing mouse-less computers, where fingers drag files from one folder to another, and high-tech gadgetry that enables information to be transmitted through a 'wired' handshake, Zennaro reaffirmed ICTP's commitment to bring the new information and communication technologies down-to-earth for those most in need.

"By training individuals to use off-the-shelf equipment—antennas, micro-transmitters, and radio links—and then providing them with access to free software to drive the flow of information," Zennaro notes, "we can lay the foundation for modern wireless communications in the most remote and poorest parts of the world." Such efforts, which have already borne fruit, will help the WSIS achieve its noble goal of allowing people everywhere to "create, access, utilise and share" knowledge.

And that, in turn, will enable the global age of information to become truly global in its reach and impact.□

For more on ICTP's wireless research and training activities, see http://wireless.ictp.it.

Island of San Giorgio Maggiore, in Venice, site of Fondazione Giorgio Cini

COMMENTARY

After three years under the wing of ICTP, the Ecological and Environmental Economics (EEE) programme has shed its protective cover and will transfer its operation to Venice.

EEE Finds New Home in Venice

When ICTP agreed to sponsor an ecological and environmental economics (EEE) programme in 2002, it marked a new, innovative strategy in the Centre's 40-year-old quest to build scientific and intellectual capacity in the developing world.

First, the decision pushed the Centre's agenda well beyond physics and mathematics into areas that lie at the interface between the natural and social sciences. In fact, the initiative called for the use of highly sophisticated tools usually associated with physicists and mathematicians (for example, modelling and computer simulations) to examine critical social and economic problems.

Second, ICTP, for the first time in its history, agreed to provide substantial 'seed' money for an 'external' project that would be housed at the Centre's campus in Trieste—that is, money to help launch and nurture the programme during its initial phases of development.

At the same time, the Centre and project organisers also agreed that after three years of ICTP assistance, the programme would have to find its own sources of revenue in order to continue its operations.

Well, the three-year 'incubation' period is now over and the EEE programme is indeed out on its own, having successfully transformed itself from a fledgling operation, nurtured by ICTP, into an independent entity.

Beginning this January, EEE assumed a new name—the International Research Centre on Climate Impacts and Policy; a new headquarters—at *Fondazione Giorgio Cini* (FGC), on the island of San Giorgio Maggiore, in Venice; and a new financial base—from FGC, which will not only provide meeting space but computer rooms, guest quarters and a cafeteria. The *Fondazione ENI Enrico Mattei*, which was one of EEE's original institutional partners, will also continue to sponsor the initiative extending its managerial and administrative expertise to the effort.

"I am thankful for the opportunity that ICTP gave us," says Sir Partha Dasgupta, Frank Ramsey professor of economics at Cambridge University, UK, and one of the chief supervisors of the project. "We have tried our best to make sure that the Centre's investment earned an excellent return—in terms of expanding individual knowledge, strengthening institutional networks, and encouraging extensive and fruitful exchanges between scholars and scientists in the natural and social sciences."

Making good on this pledge, over the past three years EEE has organised 29 workshops and 32 seminars in a wide-range of subject areas that include such topics as property rights in environmental management, ecosystem tourism in southern Africa, and ecological and economic strategies for understanding and mitigating the spread of infectious diseases.

Working closely with ICTP's Physics of Weather and Climate group, EEE has also organised research and training activities that examined climate change issues from an environmental and ecological economics perspective. "This partnership," notes Dasgupta, "will continue and likely strengthen once EEE settles into its new quarters in Venice."

"One of the most pleasing aspects of the EEE's work," says Karl-Göran Mäler, who worked with Dasgupta as co-leader of the initiative, "has been the active involvement of the scientific and scholarly community in developing countries. Six of the EEE's 29 workshops, for example, were held in developing countries, and virtually all of the five books and 13 peer-reviewed articles published as a result of our activities included authors from the developing world."

In addition, in May 2005 EEE organised a workshop for environmental economists from the Middle East and North Africa to explore the possibility of creating a network similar to those that exist in other regions of the world. The Academy of Sciences for the Developing World (TWAS), whose secretariat is located on the ICTP campus, has agreed to host the network's headquarters at its regional office in the new Library of Alexandria in Egypt. "The network is off to a good start," Mäler says, "and we are optimistic that it will gain strength and visibility in the future."

As for the new International Research Centre on Climate Impacts and Policy, two activities are already planned for 2006: a workshop examining integrated climate models for the purpose of assessing climate impacts and policies, scheduled for January, and a workshop on climate change and the future of biodiversity, scheduled for October. The first members of the new Centre's resident research group will also be appointed. When fully staffed, the group is expected to have seven members, each of whom will retain his or her association with the Centre for at least three years.

"The once separate natural and social science communities have moved closer together over the past several years," says Carlo Carraro, professor of econometry and environmental policy at the University of Venice *Ca' Foscari* and a member of the EEE steering committee. "Each community increasingly realises that a greater understanding of the complex problems that the world faces demands a better understanding of both nature and human nature."

"That's the interface that EEE focussed on," continues Carraro, "and that's the interface that the International Research Centre on Climate Impacts and Policy will continue to focus on by paying particular attention to what is likely the most challenging global problem that we face today: our changing climate. Indeed there may be no more critical issue for the field of ecological and environmental economics to explore, and we are thankful that ICTP has created such a strong foundation for us to do just that."□

A fellowship programme, funded by the Japanese government and organised by ICTP, will enable African students to study abroad yet remain affiliated with institutions in their home countries.

Lifting Science and Math in Africa

As endless reports have shown, a large number of native-born Africans with advanced degrees in mathematics and science have abandoned their homeland to pursue their careers elsewhere. Equally disturbing, only a small percentage of students in Africa over the past several decades have sought advanced degrees in mathematics and science in the first place.

"No one doubts that there's a crisis," says K.R. Sreenivasan, ICTP director. "In fact, analysts have been lamenting the chronic shortfalls of well-trained professors and talented students in science and mathematics in Africa for some time. I just completed an informal survey of African scientists and everyone I spoke to put this problem at the top of the list of their concerns."

"The critical question," adds Sreenivasan, "is not what's happening—that's painfully obvious—but what to do about it. That's why we are so pleased to have received generous funding from Japan's Fund in Trust (JFIT) to launch the Mori Fellowship programme for young scientists and mathematicians from sub-Saharan Africa." The initiative is named after Yoshiro Mori, a former prime minister of Japan who has been a tireless proponent of international cooperation and assistance.

Specifically, the Mori Fellowship programme will provide 10 fellowships each year over a three-year period to qualified students in a broad range of fields in mathematics and physics. Its ultimate goal is to strengthen the human capacity of sub-Saharan Africa by offering high-level educational and research opportunities to students pursuing advanced doctorate and post-doctorate degrees in areas such as condensed matter physics, the physics of weather and climate, fluid dynamics, oceanography and seismology, as well as in pure and applied mathematics.

"The Mori Fellowship programme," says Noureini Tidjani-Serpos, UNESCO Assistant Director-General for Africa, "adds a strong science education component to JFIT's other human capacity initiatives which include, for instance, audiovisual media training in Kenya, information and communication technology capacity building for journalists in Ghana, and a feasibility study for the creation of a virtual library in Nigeria." Approximately US$440,000 has been allocated for the three-year programme which, if proven successful, may be renewed.

"During the 1970s," says Gallieno Denardo, special advisor to the ICTP director and the past head of the Centre's Office of External Activities (OEA), "sub-Saharan Africa had some of the finest institutions of higher education in the developing world, including Dar-Es-Salaam in Tanzania, Ibadan in Nigeria, Khartoum in Sudan, and Makerere in Uganda."

"Decades of neglect, political uncertainty and violence," Denardo laments, "have left these institutions in a poor state and forced a large number of the region's most able mathematicians and scientists to pursue their careers elsewhere."

The problem, as many observers see it, is that professors have been unable to engage in the kind of research and

teaching that their colleagues in many other parts of the world take for granted. Meanwhile, students have been unable to enrol in courses or conduct laboratory experiments that would allow them to gain the knowledge and skills they need to become successful mathematicians and scientists.

"Studies," adds Denardo, "show that when a mathematician or scientist from a developing country, particularly a least developed country (LDC), stays away from his or her country for several years, he or she is unlikely ever to return on a permanent basis." To stem this chronic brain drain phenomenon, institutions, including ICTP, have turned to a strategy that requires students to remain enrolled in universities in their home countries while still enjoying access to state-of-the-art science facilities and people elsewhere.

"The strategy we have adopted for the Mori Fellowship programme," says Sreenivasan, "works like this: Participants matriculate in institutions in their home countries but can visit ICTP—and other scientific institutions in Trieste—for extended periods over three successive years to participate in research and training activities and engage in discussions with eminent scientists. In fact, all students will be assigned two supervisors—one from their home country and another from a Trieste-based scientific institution."

"Beyond the immediate benefits it provides to participating students," Sreenivasan continues, "we anticipate that the programme will have a substantial 'multiplying' effect as those who earn their degrees assume teaching responsibilities in their home countries. Over time, more and more young African students interested in science and mathematics will benefit."

ICTP is no stranger to such a strategy, which is often called a "sandwich" programme. Charles Chidume, a staff member of ICTP's mathematics group, launched a Centre-supported "sandwich programme in mathematics" at the University of Nigeria, Nsukka. The programme has since provided support to 10 students, who have spent roughly half of their time in their home institutions and half at ICTP.

Similarly, the International Atomic Energy Agency (IAEA) in Vienna joined ICTP in launching an ICTP/IAEA Sandwich Training and Educational Programme (STEP) in 2004 to provide research and training opportunities in a wide variety of fields in physics and mathematics to students from developing countries. Under the STEP programme, students spend part of their time at home and part of their time in institutions in Italy. At present, approximately 50 STEP students are enrolled (see "Step by Step," *News from ICTP*, Spring 2004, pp. 4-5).

"The experience ICTP has acquired through its 'sandwich' programmes over the past several years," says Chidume, "has enabled us to rapidly implement the Mori Fellowship programme."

Ali Bashir, who is a lecturer in mathematics at Bayero University in Kano, Nigeria, the same place where he received his master's degree, arrived in Trieste in early February. His area of specialty is functional and nonlinear analysis. He hopes that his three extended visits to ICTP over the next three years—each for about six months—will enable him to obtain his Ph.D degree from the University of Nigeria, Nsukka, by 2008.

Other students, all seeking advanced degrees, will soon follow:

- Paulina Ekua Amponsah, a lecturer at the Department of Geology, University of Ghana, Legon, and principal seismologist at Ghana's Geological Survey Department, Accra, who examines earthquake hazards and mitigation strategies in Africa by developing ground motion simulation models that help to determine potential seismological behaviour on the continent.
- Oluwayomi Peace Faromika, an assistant lecturer at the Federal University of Technology, Akure, Nigeria, who specialises in fluid dynamics and, more specifically, the development of mathematical models and computational simulations as tools for blood flow analysis.
- Brice Rodrigue Malonda Boungou, who was born and raised in Congo and is currently studying for his Ph.D at the University of Douala's Centre for Atomic Molecular Physics and Quantum Optics (CEPAMOQ), in Cameroon. Malonda Boungou's research focusses on condensed matter physics and, more specifically, the electronic and magnetic properties of nanostructures.
- Uguette Flore Ndongmouo Taffoti, who obtained her Ph.D in November 2005 from the Institute of Mathematics and Physical Sciences in Porto-Novo, Benin, and who focusses her studies on molecular dynamics, particularly as it relates to water absorption of icy surfaces.
- Folsade Mayowa Olajuyigbe, an assistant lecturer at the Federal University of Technology, Akure, Nigeria, who applies laser technology to biological studies, especially for better understanding the enzyme structure, function and dynamics of soil-bound micro-organisms.
- Mohammed Khalil Salih Saeed, a medical physicist at the Radiation and Isotopes Center in Khartoum, Sudan, who examines dosage levels and improved quality control mechanisms for radiotherapy in order to better protect both patients and medical personnel.
- Abdulrafiu Tunde Raji, who was born in Nigeria and is now an instructor at University of Cape Town, South Africa. Raji specialises in solid state physics and, more specifically, develops computer simulations to study the ways in which stress, temperature and pressure effect materials and particularly metals.

When Koïchiro Matsuura, director general of UNESCO, who proved instrumental in arranging this grant, announced the launch of the Mori Fellowship programme during a ceremony celebrating Africa Week at UNESCO's headquarters in Paris last May, he noted that Africa is a continent that has enormous scientific talent. Yet, inadequate educational opportunities and the lack of scientific exchange—both within Africa and between Africa and scientific communities abroad—have created serious impediments to nurturing this talent.

The Mori Fellowship programme is designed to overcome these impediments by helping the continent's 'best and brightest' young scientists and mathematicians reach their full potential without having to leave for far-away places from which they may never return.□

ICTP served as a co-sponsor of the concluding event for The World Year of Physics 2005—an event that was more of a beginning than an end.

World Year of Physics Looks to Future

The centennial anniversary of Albert Einstein's *annus mirabilis* (miraculous year) provided the rationale for celebrating the World Year of Physics 2005.

But it was the future, not the past, that defined the endless array of events that took place across the globe last year to examine the vital role that physics plays in our world.

Such forward-looking thinking also shaped the agenda of the World Year of Physics' concluding event: the World Conference on Physics and Sustainable Development, held in Durban, South Africa, from 31 October to 2 November.

More than 300 physicists from around the world attended the event, which was co-sponsored by ICTP, the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Union of Pure and Applied Physics (IUPAP), and the South African Institute of Physics (SAIP).

The conference focussed on the relationship of physics to four major issues of broad public concern: education; energy and the environment; health; and economic development.

"The meeting," noted Edmund Zingu, president of the South African Institute of Physics and one of the major organisers of the event, "represented a modest step to redirect the attention and efforts of physicists towards the United Nation's Millennium Development Goals (MDGs)."

The MDGs, says Zingu, "focus on such critical global concerns as poverty reduction, improved environmental management and education."

What makes the MDGs unique are that benchmarks have been established in each of these areas so that in the future researchers and public officials can assess the progress—or lack of progress—that has been made. For example, the MDGs call on the global community to reduce the number of people worldwide who do not yet have access to safe drinking water by 50 percent by 2015.

"Many people," notes K.R. Sreenivasan, director of ICTP, "think that basic physics is an ivory tower pursuit that has little bearing on economic development. That's simply not true."

Without physics, Sreenivasan continues, "we could not speak of the nuclear age, the computer age, or the age of the internet, three of the defining forces shaping our global community over the past century."

While we often think of physics as a cutting-edge science of primary importance to developed countries, Claudio Tuniz, ICTP's assistant director, observes that "it can also serve as a valuable tool for developing countries."

"The modelling that is essential for evaluating potential earthquake and tsunami activity and for forecasting the behaviour of typhoons and monsoons is based on the principles of statistical physics. Biophysics is providing critical insights into the field of genomics that could play a central role in efforts to curb tropical diseases. On another front, the emerging field of nanotechnology could lead to the production of nano-filtering systems capable of purifying water at a cost that even the poorest villages in the world will be able to afford. In each of these areas, physics plays—and will continue to play—a central role."

The importance of physics to the developing world was reflected by the large number of physicists from the South who attended the event. Some 180 of the 321 participants were from the developing world. Women were also well represented, accounting for about 25 percent of the total. Speakers at the event included John Mugabe, advisor on science and technology to the New Partnership for Africa's Development (NEPAD); Yang Guozhen, president of the Chinese Physical Society; and Rob Adam, director-general, Department of Science and Technology, South Africa. Talks were also given by Sara Farley, science and technology specialist and consultant to the World Bank and the Rockefeller Foundation; and Marvin Cohen, president of the American Physical Society.

To help ensure that the conference's broad ideals are translated into tangible plans of action, participants unanimously agreed to a resolution that offers a concrete strategy for moving ahead. Specific groups of scientists and scientific institutions have been asked to implement parts of the plan and monitor its progress.

Under the theme of physics education, the resolution/action plan calls for the development of high-quality internet-based instructional material designed to enhance physics teaching, particularly in developing countries. Model teacher-training workshops, drawing on this instructional material, will be held in Africa, Asia and Latin America. ICTP and the Institute of Physics in the UK are among the primary groups that have been asked to spearhead this effort. The goal is to nurture student interest in physics and ultimately increase the number of students who choose physics as a career path.

Official logo of the World Conference on Physics and Sustainable Development

Under the theme of physics and economic development, the resolution/action plan calls for the development of courses to help provide physicists, especially those in developing countries, with a greater understanding of the knowledge and skills that it takes to successfully commercialise their research. The courses will focus on the challenges posed by intellectual property rights and patenting, and will explore the steps that must be taken to bring technology-based products and services to market. ICTP will host the pilot course, which will be held in Trieste in 2006. The purpose of this effort is to help ensure that physicists can participate in the commercialisation of their intellectual property, if they so choose, from a position of knowledge and strength.

Under the theme of physics, energy and the environment, the resolution/action plan calls on the physics community to expand its role as a 'bridge of knowledge' in ways that help to balance the world's increasing appetite for energy with its desire to protect and preserve the environment. Physics has played—and will continue to play—a central role in increasing the efficiency of energy production and consumption and in charting a course for the development of alternative energy sources. Basic physics research could also prove essential for reducing the levels of pollution that accompany energy use. Specifically, the plan calls for the creation of an international physicist network devoted to renewable energy.

Under the theme of physics and health, the resolution/action plan highlights the role of physics in clinical medicine and calls for greater cooperation between physicists working in traditional institutes of physics and those working in medical research centres and hospitals. It also calls for the development of guidelines for medical physics educational programmes, which have expanded enormously over the past two decades. Other possible avenues of exploration include an examination of the role that physics could play in telemedicine, which is helping to revolutionise medical practice in remote areas of the developing world, and the potential impact that the emerging field of bio-nanotechnology could have, for example, on targeted cancer therapies that may improve the effectiveness of current regimens.

The hope is that the groups of scientists and scientific institutions involved in the implementation and monitoring of the resolution/action plan will approve the plan by this summer.

"The World Year of Physics 2005," says Sreenivasan, "has proven to be an enormous success in raising the public profile of physics and in re-energising the physics community's efforts to reach out to the larger society. Now we must be sure that we don't lose momentum and that we remain diligent in our efforts to fulfil the goals we have laid out for ourselves. We should be pleased with what we have accomplished over the past year but not pleased enough to become complacent."

Or, as one observer noted, the end of the World Year of Physics doesn't mean the end of physics. Indeed far from it.□

For additional information on the World Year of Physics and the Durban conference, see www.wcpsd.org.

TALKING POINTS

The World Conference on Physics and Sustainable Development also featured plenary lectures that helped frame the major themes of the conference. Walter Erdelen, assistant director general for natural sciences, UNESCO, emphasised the important role that basic physics research plays in development and expressed concern that declining enrolments in physics in schools across the globe may spell trouble for meeting the challenges of development in the years ahead. Werner Burkart, deputy director general and head of the Department of Nuclear Sciences and Applications, International Atomic Energy Agency (IAEA), underlined the critical role that the sciences, and particularly basic nuclear science, play in meeting such basic needs as nutrition, access to safe water, and disease prevention. And Hans Falk Hoffman, director of technical transfer and scientific computing, CERN, stressed how physics both instigates and benefits from advances in rapid broad-band access to electronic information.

DATELINE

Nobel Prize in Physics 2005

The Royal Swedish Academy of Sciences has awarded the Nobel Prize in Physics 2005 to **Roy J. Glauber**, Harvard University, Cambridge, MA, USA; John L. Hall, University of Colorado, Boulder, CO, USA; and Theodor W. Hänsch, *Max-Planck-Institut für Quantenoptik*, Garching, Germany. Glauber lectured at the Adriatico Conference on Vacuum in Non-Relativistic Matter-Radiation Systems in 1987. In the 1970s, he collaborated extensively with Luciano Bertocchi (former deputy and acting director of ICTP), Daniele Treleani and the late Giorgio Alberi, all physics professors at the University of Trieste.

Roy J. Glauber

Rubbia at ICTP

Carlo Rubbia, Nobel Laureate in Physics, 1984, and former director general of CERN, Geneva, Switzerland, delivered a special lecture, "Does Nuclear Energy Have a Future?", on 17 October in the Main Lecture Hall. Rubbia received the Nobel Prize for confirming the unification of nature's electromagnetic forces, a theory for which ICTP's founding director, Abdus Salam, shared the Nobel Prize in physics in 1979 with Sheldon Glashow and Steven Weinberg.

ICTP Prize 2005

Xiaohua Zhu, professor at the School of Mathematical Sciences, Peking University, Beijing, China, has won the 2005 ICTP Prize. Xiaohua Zhu is being honoured for his fundamental contributions to complex differential geometry. At 37, Zhu is one of the world's foremost young geometers. The ICTP Prize carries a cash award of US$3,000, a medal and a certificate. The 2005 Prize is named in honour of the late Armand Borel, long-time professor at the Institute for Advanced Study at Princeton who has lectured at ICTP. The award ceremony will take place in April.

First Trieste Science Prize

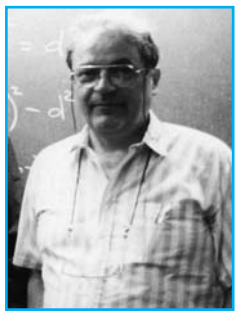
The official ceremony for the first Trieste Science Prize took place at *Teatro Giuseppe Verdi* in Trieste on 11 October. **T.V. Ramakrishnan**, former member of the ICTP Scientific Council and DAE Homi Bhabha professor of physics, Banaras Hindu University in Varanasi, India, and Sergio Henrique Ferreira, professor of pharmacology in the Faculty of Medicine at the University of São Paulo in Ribeirão Preto, Brazil, were honoured for their distinguished contributions to science—Ramakrishnan for his fundamental theoretical contributions to our understanding of how liquids turn into solids and Ferreira for research that has paved the way for the development of a new class of highly effective drugs to combat high blood pressure and ease inflammatory pain. The Trieste Science Prize, which is sponsored by Illycaffè and TWAS (The Academy of Sciences for the Developing World), in collaboration with the Municipality of Trieste, carries a US$50,000 cash award.

T.V. Ramakrishnan (right)

Shukla and Tosatti Honoured

Padma Kant Shukla, *Ruhr-Universität Bochum*, Germany, has been awarded the American Physical Society's (APS) Nicholson Medal for Human Outreach. The medal is awarded annually "to recognise the humanitarian aspect of physics and physicists." Shukla, a world-renowned expert in theoretical plasma physics, has participated in ICTP training activities in plasma physics for more than two decades, serving as a course director since 1995. Specifically, APS honoured Shukla "for his prodigious and successful efforts in encouraging young scientists from under-represented countries throughout the world." The medal was presented at the APS's Plasma Physics Meeting in Denver, CO, USA, in October.

Former ICTP acting director **Erio Tosatti** has been awarded the American Institute of Physics Tate Medal for International Leadership in Physics. The award is being given for Tosatti's "leadership and tireless effort in helping scientists from developing countries to bring research in their home institutions to world standards." Previous winners include ICTP founding director Abdus Salam and former ICTP Scientific Council member Roald Sagdeev.

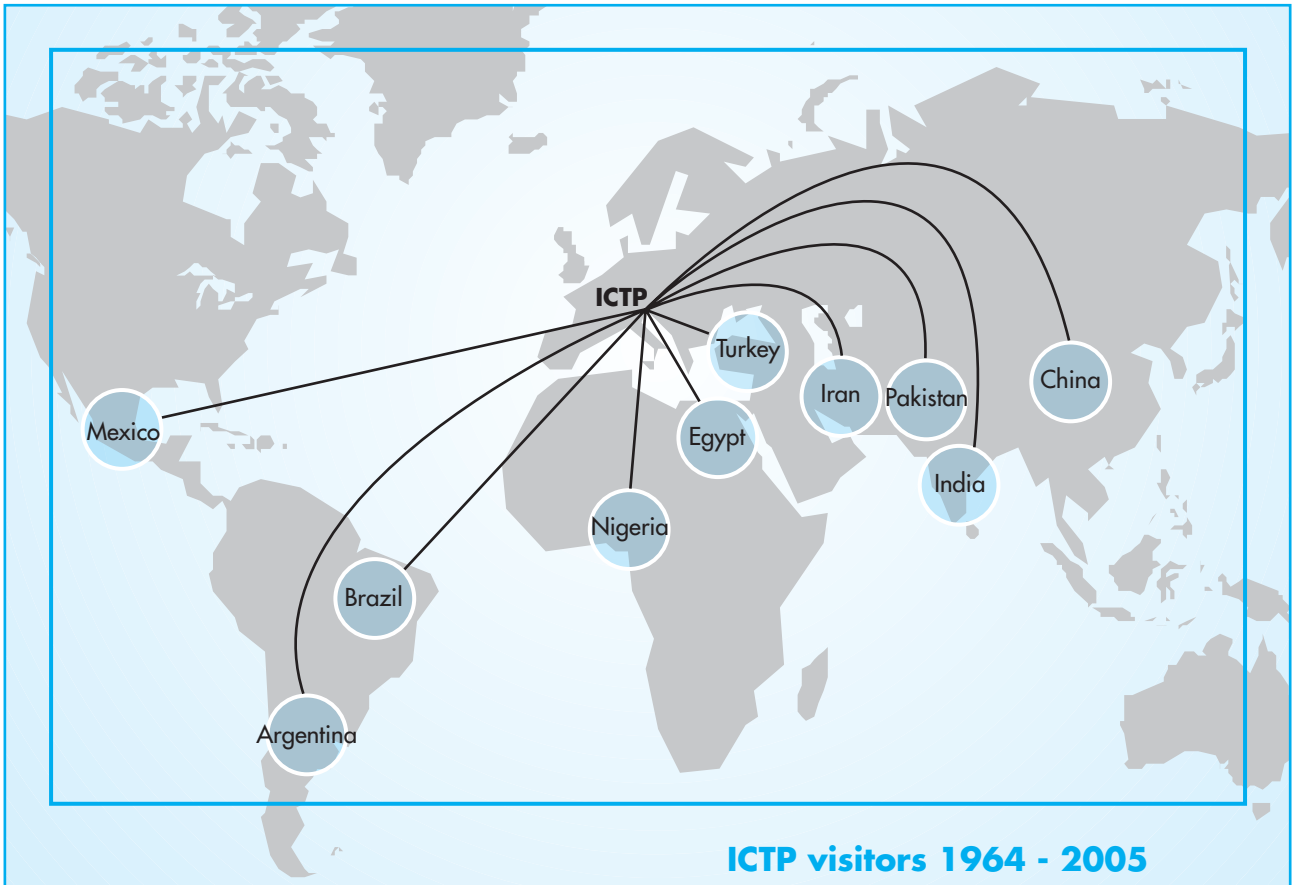


Physics and Sustainable Development

ICTP Director **K.R. Sreenivasan** published a wide-ranging article in the October 2005 issue of *Physics World* on the relationship between physics and sustainable development, focussing specifically on the challenges and opportunities faced by the developing world. The article appeared on the eve of the concluding event of the World Year of Physics—an international conference titled "Physics and Sustainable Development", which took place in Durban, South Africa, in autumn 2005 (see "World Year of Physics Looks to Future," pp. 6-7).

The Science of Culture

ICTP held a two-day workshop on Research Infrastructures and Cultural Heritage, RICH, on 12-13 December. The workshop—organised by several European scientific institutions, including Laserlab Europe, the Council for the Central Laboratory of the Research Councils (CCLRC), UK, and the Nuclear Technology Laboratory for Cultural Heritage (LABEC) in Florence, Italy—examined ways to bridge the knowledge gap between scientific research and cultural heritage. Specifically, participants discussed how laser, neutron, and synchrotron radiation techniques could aid efforts to investigate and conserve objects of historical and cultural significance. Special attention was paid to the role that such techniques can play in providing information for protecting and restoring heritage sites damaged by human and natural disasters and in curbing illegal trade in counterfeit art.



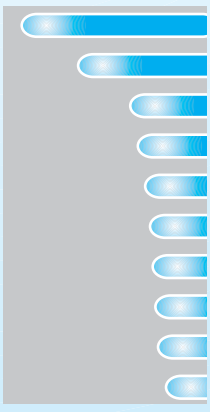
ICTP's Top 10 List

Since 1964, ICTP has welcomed scientists from more than 180 countries.

The top 10 developing countries in visitation are listed on the right.

As ICTP's host country, Italy has provided the highest number of visitors —12,500 in all. The majority of Italy's visiting scientists have been conference organizers, lecturers and consultants.

ICTP visitors 1964 - 2005



6363	India
4278	China
2449	Brazil
2155	Argentina
1866	Egypt
1687	Nigeria
1662	Turkey
1558	Iran
1498	Pakistan
1212	Mexico

ACTIVITIES

WORKSHOP ON NOISE AND INSTABILITIES IN QUANTUM MECHANICS

3 - 7 October

Organisers: G. Casati (*Università degli Studi dell'Insubria*, Como, Italy), S. Lloyd (Massachusetts Institute of Technology, Cambridge MA, USA) and G.J. Milburn (University of Queensland, Brisbane, Australia).
Local Organisers: G. Benenti (*Università degli Studi dell'Insubria*, Como, Italy) and G. Carlo (*Università degli Studi dell'Insubria*, Como, Italy).

EIGHTH WORKSHOP ON NON-LINEAR DYNAMICS AND EARTHQUAKE PREDICTION

3 - 15 October

Co-sponsor: Commission on Earthquake Hazard, Risk and Strong Ground Motion of the International Association for Seismology and Physics of the Earth Interior.
Organisers: V.I. Keilis-Borok (Russian Academy of Sciences, International Institute of Earthquake Prediction Theory and Mathematical Geophysics, Moscow, Russian Federation) and G.F. Panza (University of Trieste and ICTP).

TECHNOLOGY AND APPLICATIONS OF ACCELERATOR DRIVEN SYSTEMS (ADS)

17 - 28 October

Co-sponsor: International Atomic Energy Agency (IAEA, Vienna, Austria).
Organiser: A. Stanculescu (IAEA).
Local Organiser: B. Stewart (ICTP).

SCHOOL ON PULSED NEUTRON SOURCES: ENHANCING THE CAPACITY FOR MATERIAL SCIENCE

17 - 28 October

Organiser: G. Bauer (*Forschungszentrum Jülich*, Germany, and *Institut Laue-Langevin*, Grenoble, France) and G. Mank (International Atomic Energy Agency, IAEA, Vienna, Austria).
Local Organiser: B. Stewart (ICTP)

WORKSHOP ON PHYSICS FOR RENEWABLE ENERGY

17 - 29 October

Organisers: G. Furlan (University of Trieste and ICTP), D. Nobili (*Istituto per la microelettronica e i microsistemi*, IMM, Bologna, Italy), A.A.M. Sayigh (World Renewable Energy Network, WREN, Brighton UK) and B. Stewart (ICTP).

NUCLEAR POWER PLANT SIMULATORS FOR EDUCATION

31 October - 11 November

Co-sponsor: International Atomic Energy Agency (IAEA, Vienna, Austria).
Organisers: J. Cleveland (IAEA) and A. Pryakhin (IAEA).
Local Organiser: C. Tuniz (ICTP).

WEB ENABLING TECHNOLOGIES AND STRATEGIES FOR SCIENTIFIC E-LEARNING

7 - 12 November

Co-sponsor: Department of Theoretical Physics of the University of Trieste.
Organisers: E. Canessa (ICTP) and G. Pastore (University of Trieste, Italy).

SUMMER SCHOOL ON THE WATER CYCLE OF SOUTH EAST ASIA

14 - 25 November

Organisers: F. Molteni (ICTP), J. Slingo (University of Reading, UK) and P. Webster (Georgia Institute of Technology, Atlanta GA, USA).

WORKSHOP ON MODELLING AND QUALITY CONTROL FOR ADVANCED AND INNOVATIVE FUEL TECHNOLOGIES

14 - 25 November

Co-sponsor: International Atomic Energy Agency (IAEA, Vienna, Austria).
Organisers: Y.N. Busurin (IAEA), C. Ganguly (IAEA) and J.C. Killeen (IAEA).
Local Organiser: C. Tuniz (ICTP).

MEETING ON A BOOK ON PROPERTY RIGHTS IN THE INDIAN SUBCONTINENT

20 - 23 November

Organiser: K.-G. Mäler (The Beijer International Institute of Ecological Economics, Stockholm, Sweden).
Local Organisers: M. Eberle (*Fondazione ENI Enrico Mattei*, FEEM, Italy) and M. Marsili (ICTP).

FIRST TEACHING WORKSHOP ON ENVIRONMENTAL ECONOMICS FOR THE MIDDLE EAST AND NORTH AFRICA & JOINT EEE PROGRAMME - CEEPA FIRST TRAINING OF TRAINERS WORKSHOP

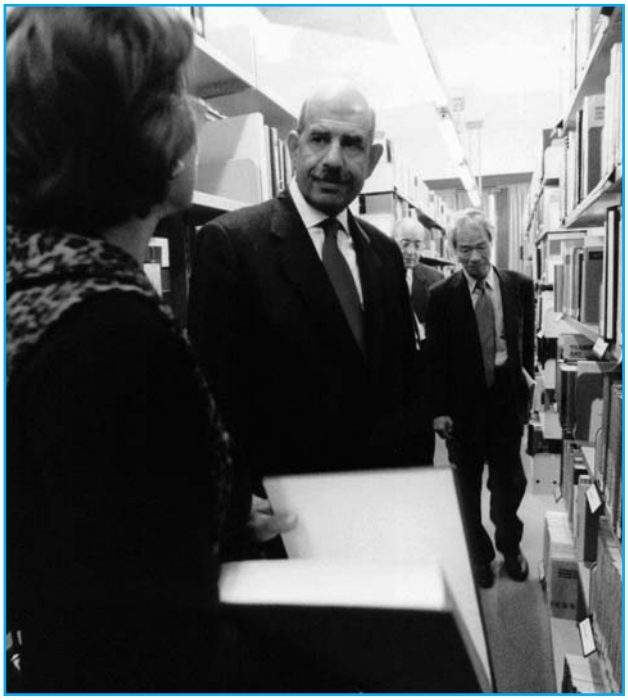
5 - 16 December

Organisers: P. Dasgupta (The Beijer International Institute of Ecological Economics, Stockholm, Sweden, and Cambridge University, UK), R. Hassan (University of Pretoria, South Africa), K.-G. Mäler (The Beijer International Institute of Ecological Economics, Stockholm, Sweden) and R. Mabugu (University of Pretoria, South Africa).
Local Organisers: M. Eberle (*Fondazione ENI Enrico Mattei*, FEEM, Italy) and M. Marsili (ICTP).

MONITOR

Nobel Peace Prize

The Norwegian Nobel Committee awarded the 2005 Nobel Prize for Peace to the International Atomic Energy Agency (IAEA) and its Director General **Mohamed ElBaradei** "for their efforts to prevent nuclear energy from being used for military purposes and to ensure that nuclear energy for peaceful purposes is used in the safest possible way". Mohamed ElBaradei has visited ICTP several times. His latest visit took place in 1999 when he came to discuss how to strengthen ties between ICTP and IAEA. At the time, he conducted a lengthy interview with ICTP's public information officer, which was subsequently published in *News from ICTP*, Spring 2000 (see www.ictp.it).



Mohamed ElBaradei at ICTP in September 1999

Ramanujan Prize Award Ceremony

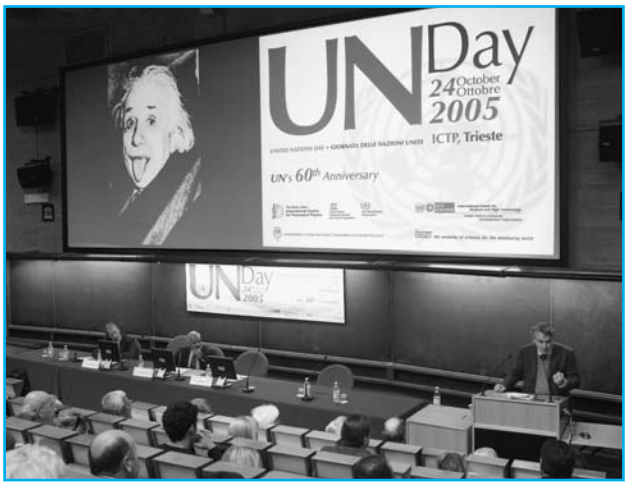
Marcelo A. Viana, *Instituto de Matemática Pura e Aplicada* (IMPA) in Brazil, was awarded the first Ramanujan Prize on 15 December. Guests of honour attending the ceremony included Arne Sletsjoe, vice-chair of the Niels Henrik Abel Memorial Fund; John Ball, president of the International Mathematical Union (IMU); Rajiv Dogra, India's ambassador to Italy; and Eva Bugge, Norway's ambassador to Italy. Viana lectured on "Lorenz Strange Attractors." Sponsored by the Niels Henrik Abel Memorial Fund and jointly organised by ICTP and IMU, the prize carries a US$10,000 cash award. It is named after Srinivasa Ramanujan, whom many consider India's most gifted mathematician.

Dirac Medal Ceremony

ICTP's Dirac Medal 2005 award ceremony took place in the ICTP Main Lecture Hall on 11 November. ICTP Director **K.R. Sreenivasan** presented the Dirac Medal to **Sir Sam Edwards** and **Patrick A. Lee**. In the awardees' lectures that followed, Edwards spoke about the potential applications of statistical mechanics to granular systems and Lee about the Dirac spectrum in condensed matter physics.

UN Day, 24 October 2005

ICTP served as host for UN Day on 24 October. The celebration, presided over by ICTP Director K.R. Sreenivasan, took place in the Main Lecture Hall. Representatives of Trieste's UN-related institutions—including the International Centre for Genetic Engineering and Biotechnology (ICGEB), the International Centre for Science and High Technology (ICS) and The Academy of Sciences for the Developing World (TWAS)— were present. So too were officials from Trieste and the surrounding region. The celebration began with a video message from UN Secretary General Kofi Annan. **Giulio Giorello**, University of Milan, Italy, presented a lecture on Albert Einstein in honour of the 2005 International Year of Physics. High school students from Trieste who have excelled in physics received cash prizes for their achievements. A photographic exhibit by local photographer Carlo Pacorini and a concert by SISSA's Choir were also part of the event. This year marked the 60th anniversary of the founding of the United Nations.



G-77 and Trieste's Scientific Institutions

In early November, ICTP director **K.R. Sreenivasan** met with Stafford O. Neil, president of the Group of 77, to discuss possible avenues of cooperation between the UN's largest network of member states and the Centre.

ICTP and Consuls Meet

Claudio Tuniz, ICTP assistant director, met in December with the *Corp Consulaire* in Trieste. Speaking before consuls from nearly 40 countries, Tuniz described the Centre's broad-ranging research and training activities and discussed ways to enhance interactions between ICTP's staff and visitors and representatives from the consular offices in Trieste.

Women and Physics

UNESCO's Center in Turin, Italy, in collaboration with the University of Turin's Department of Physics, Italian National Institute of Nuclear Physics (INFN), Gustavo Colonnetti Meteorological Institute (IMGC), and *Centro studi e documentazione pensiero femminile* in Turin, organised a two-day trip to Trieste for winners of the contest "Women and Physics: A Possible Vocation". In addition to visiting ICTP, the 40 winners (chosen from an applicant pool of 300) spent time at *Elettra* Synchrotron Light Laboratory and the Astronomic Observatory.

IN MEMORIAM

John Ziman

John Michael Ziman, a friend and colleague of Abdus Salam and former member of the ICTP Scientific Council, has died at the age of 79. Born in New Zealand, he obtained his Ph.D in mathematics and physics at Balliol College in Oxford, UK. He then moved to Cambridge where he lectured and conducted fundamental research on the theory of liquid metals. In 1964 he was appointed professor of theoretical physics at Bristol University. Four years later, he expanded his intellectual fields of interest from science to humanities publishing his first non-technical book, *Public Knowledge*, emphasising the social character of science. Ziman subsequently devoted increasing time to reflections on the relationship between science, politics and society. In 1982, he closed out his career as a research scientist when he became a visiting professor in the department of humanities at Imperial College, London. His most important books are *The Force of Knowledge* (1976) and *Real Science* (2000). Ziman was a frequent visitor to ICTP, coming for his last time in November 1997 to participate in the Abdus Salam Memorial Meeting.

John Ziman with Abdus Salam at ICTP, 1987

PROFILE

ICTP Senior Associate Zohra Ben Lakhdar has spent a lifetime lighting the way for others.

Lighting the Way

We are all products of our time, shaped by the events that surround us.

But few of us ever have an opportunity to serve as shining symbols of our time, reflecting through our own life experience larger trends within our societies.

Zohra Ben Lakhdar, director of the Laboratory of Atomic-Molecular Spectroscopy and Applications at the University of Tunis and ICTP Associate (2001-present), is one such person.

Raised in Tunisia in the early 1950s, at a time when efforts to educate women were considered misguided, she has methodically navigated the obstacles she faced as a woman from a poor country in North Africa to gain international recognition in the field of laser physics.

Last year, Ben Lakhdar, in recognition of her pioneering life-long contributions, was awarded the l'Oréal-UNESCO Award for Women in Science for furthering the "development of optics and photonics as a scientific discipline in Tunisia and all of Africa," and "making a number of contributions to optical science and its applications."

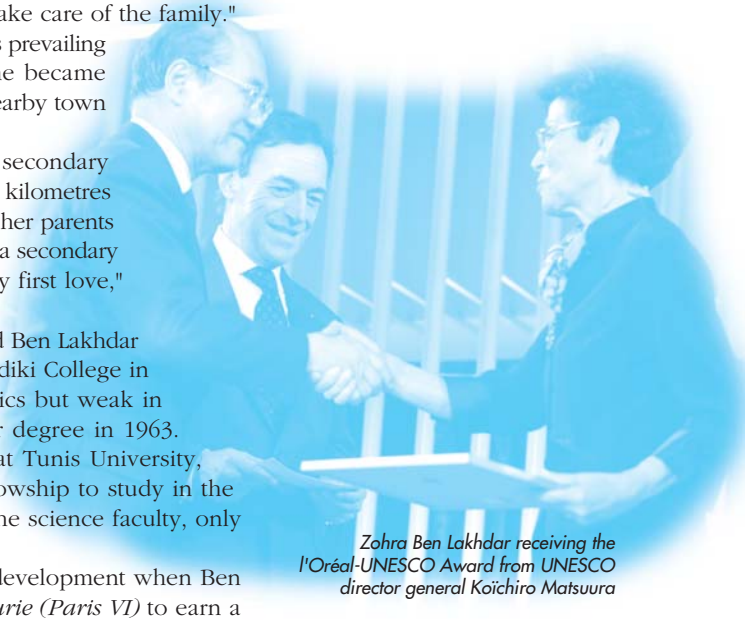
"When I was young," says Ben Lakhdar, who has visited ICTP at least once a year for the past 10 years both to attend the Centre's laser workshops and, more recently, to conduct research as an ICTP Associate, "everyone around me said that science was for men. They assumed the role of women was to take care of the family."

Even at a young age, Ben Lakhdar was determined to prove this prevailing attitude wrong. In 1956, before she reached the age of 13, she became only one of two girls to graduate from a primary school in the nearby town of Jemmal.

Her education would have likely ended there—the nearest secondary school, after all, was located in the town of Sousse, more than 20 kilometres away. But following Tunisia's independence from France in 1956, her parents decided to move to the capital city of Tunis, where she enrolled in a secondary school concentrating on French and Arabic studies. "Science, my first love," Lakhdar explains, "was barely a part of the curriculum."

Tunisia's new constitution provided equal rights to women and Ben Lakhdar took advantage of this welcomed reform measure to enrol in Sadiki College in 1962, a men's school that was strong in physics and mathematics but weak in efforts to provide gender balance. She would be awarded her degree in 1963.

Next stop along her long road to academic success came at Tunis University, then just a three-year-old institution, where she received a fellowship to study in the faculty of science. At the time, of the 200 students enrolled in the science faculty, only five were women.



Zohra Ben Lakhdar receiving the l'Oréal-UNESCO Award from UNESCO director general Koïchiro Matsuura

In 1967, her good grades led to another step in her career development when Ben Lakhdar was selected to attend the *Université Pierre et Marie Curie (Paris VI)* to earn a *diploma d'études approfondies*. The university, Ben Lakhdar recalls, was home to an atomic spectroscopy laboratory, which helped to "open a new world of science for me—a world of atoms and stars and cells." It was also a world where she came in contact with world-class scientists, including Nobel Laureates Claude Cohen-Tannoudji and Alfred Kastler.

She would be awarded her advanced degree at Paris VI in 1978, successfully completing a dissertation on the use of spectral analysis for determining how different atoms interact with one another.

Despite being offered an opportunity to remain in Paris, Ben Lakhdar decided to return to Tunis University so that she could help to provide students in her own country with the same opportunities that she had enjoyed in France.

The task would not be easy. Computers had to be acquired, software purchased, and administrators convinced that not only was her research worth doing but that a woman was capable of doing it. Because expensive laboratory equipment was beyond the university's budget, Ben Lakhdar turned to theoretical studies, exploring advanced spectroscopic methods for examining the interaction of atoms and molecules. Her specific research interest lied in applying this knowledge to the detection of air- and water-borne pollutants. It would take her 10 years to publish her first paper.

"ICTP has proven instrumental in helping me continue my career," she says. "My visits to Trieste have allowed me to keep current in the field and to exchange ideas with colleagues around the world. I am particularly grateful to Gallieno Denardo. His efforts, through the Office of External Activities (OEA), have not only boosted my research but have given me an opportunity to develop contacts with scientists across Africa via OEA's Laser, Atomic and Molecular (LAM) network."

"People often think that personal willpower and determination have allowed me to succeed. But having help from friends, like those at ICTP, has made a big difference. The truth is that I couldn't have done it without them."□

WHAT'S NEXT

9 - 27 January
Advanced School and Conference on Representation Theory and Related Topics

12 - 13 January
3rd International Workshop on Integrated Climate Models: an Interdisciplinary Assessment of Climate Impacts and Policies

16 - 20 January
Advanced Workshop on Recent Developments in Inorganic Materials

16 - 20 January
First ICTP West African Workshop on Regional Climate and Impacts,
Accra, Ghana

23 - 27 January
School on Mathematical Methods for Optics

30 January - 10 February
Winter College on Quantum and Classical Aspects of Information Optics

6 - 17 February
ICTP/INFM-Democritos Workshop on Porting Scientific Applications on Computational GRIDs

6 - 24 February
ICTP-ITU-URSI School on Wireless Networking for Development

20 February - 3 March
Workshop on Nuclear Structure and Decay Data: Theory and Evaluation

6 - 10 March
Technical Meeting on Analytical Methods for Characterization of Hot Particles and their Impact on Environment

6 - 11 March
ICTP/Democritos Joint Workshop on Tools for Computational Physics

13 - 17 March
Workshop on the Organization and Maintenance of Tropical Convection and the Madden Julian Oscillation

13 - 24 March
School on Ion Beam Analysis and Accelerator Applications

27 March - 4 April
Spring School on Superstring Theory and Related Topics

Throughout the year, the most up-to-date information on ICTP activities may be found on the World Wide Web and via e-mail. Here's how to find out what's going on.

ON THE WORLD WIDE WEB (WWW)
Our address is `http://www.ictp.it/`
The site includes detailed information on our research groups and activities, and a listing of our preprints, awards and job opportunities.

ON E-MAIL
(1) For Scientific Calendar of Activities
Create a new e-mail message and type
To: `smr@ictp.it`
Subject: `get calendar 2006`
Leave the body of the message blank. Send it.
Your e-mail will generate an automatic reply from the ICTP server containing the most updated version of the Calendar.

(2) For Information on a Specific ICTP Activity
Each activity in the Calendar has its own 'smr' code number, which is located on the last line of each activity description. The 'smr' number will enable you to obtain more information—if available—on those activities you are interested in. To receive this more detailed information, create a new e-mail message and type the smr code number that you found on the Calendar:
To: `smr####@ictp.it`
Under the e-mail's subject, type
Subject: `get index`
Leave the body of the message blank and send it.
You will receive automatic reply messages containing all documentation available on that particular activity.

(3) For Information on All ICTP Activities
A free online service for the dissemination of information on all ICTP activities, programmes and related announcements is available via e-mail. To subscribe, create a new e-mail message and type:
To: `courier-request@ictp.it`
Leave the subject line empty.
In the body of the message type
`subscribe`
and your e-mail address. Send the message.
Any comments or suggestions on this service are most welcome. Please address them to `pub_off@ictp.it`.

NEWS from ICTP

The Abdus Salam International Centre for Theoretical Physics (ICTP) is administered by two United Nations Agencies—the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Atomic Energy Agency (IAEA)—under an agreement with the Government of Italy. Katepalli R. Sreenivasan serves as the Centre's director.

News from ICTP is a quarterly publication 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.

Editor-in-Chief
Daniel Schaffer

Staff Writer*/Direttore responsabile*
Fabio Pagan

Managing Editor
Anna Triolo

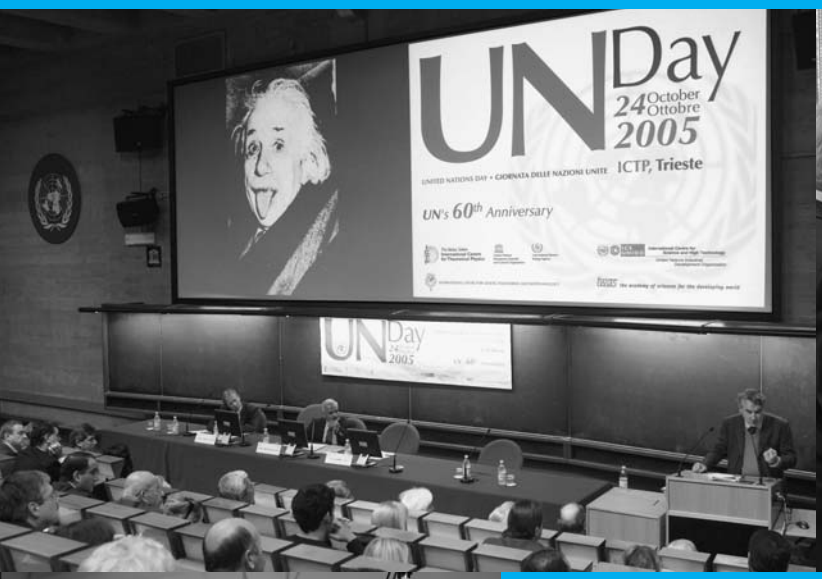
Copy Editor
Katrina Danforth

Statistician
Giuliana Gamboz

Photos
ICTP Photo Archives,
Massimo Silvano

Layout
Associazione Progettisti Grafici

Printed by
Graphart s.r.l.



World Year of PHYSICS 2005

Public Information Office

The Abdus Salam
International Centre
for Theoretical Physics

Strada Costiera, 11
34014 Trieste
Italy
sci_info@ictp.it
fax: (+39) 0402240565
www.ictp.it

Poste Italiane S.p.A. - Spedizione in A.P. - D.L. 353/2003 conv. in L. 27/02/2004 n° 46) art. 1, c. 2, DCB Trieste