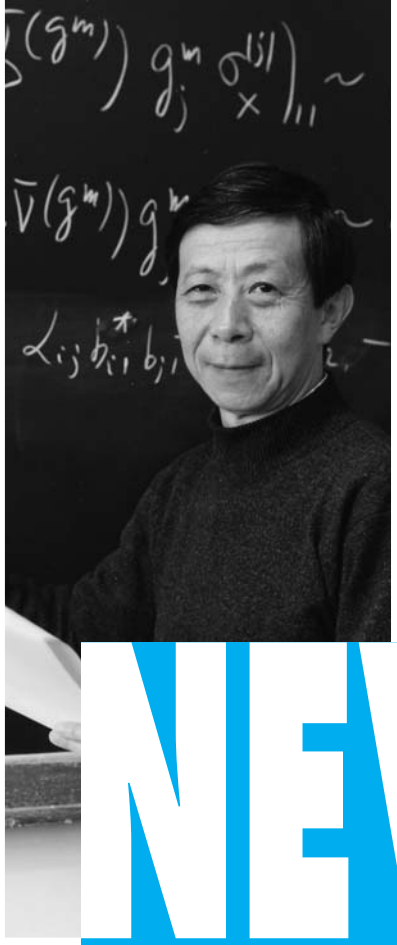



NEWS from ICTP

the
abdus salam
international centre for theoretical physics

SPRING
1998

#84

WHAT'S NEW

This spring, the Abdus Salam International Centre for Theoretical Physics (ICTP) will run a full-page announcement in some of the world's most prestigious scientific journals and newsletters, including *Physics Today, CERN Courier* and *Europhysics News*, which urges scientific institutions and individual scientists from the North and South to join the Centre in its ongoing efforts to aid scientists in the developing world.

Specifically, the announcement or "call for proposals" invites scientific institutions and scientists from around the world to become partners in our associate scheme. It urges institutions to join our networks. It encourages researchers to teach at our affiliated centres. And it solicits submissions for the organization of schools, conferences and workshops.

The proposals are expected to be submitted over the course of this year. The partnerships will begin in January 1999.

For more than three decades, the ICTP has served as an intellectual refuge for scientists from the developing world, a place where they have been able to nourish and replenish their scientific talents through periodic visits to our facilities. At the same time, the Centre has served as a scientific crossroads between North and South and East and West. Our "call for proposals" seeks to widen the Centre's main thoroughfares of exchange while providing clear sign posts for our future activities.

Every institution must explore new strategies from time to time if it is to remain strong and relevant. The breathtaking speed of scientific and technological progress, one of the hallmarks of the twentieth century, has reached unprecedented levels over the past decade. Topics that barely existed several years ago now dominate various fields of research. Take, for example, the current focus on the universe's origins in physics or the emphasis on genetic engineering in biology. At the same time, nations once on the margins of science—for instance, Argentina, Brazil, China, India and South Korea—today produce world-class scientists.

All of this means that state-of-the-art science is unfolding at a more rapid pace and in more places than at any time in human history.

The ICTP's past success and sterling reputation make it an ideal place to serve as a link between scientists and scientific communities in the North and South and East and West. By creating a blueprint for global partnerships, our "call for proposals" seeks to broaden and strengthen our activities in ways that will help us meet the needs of science and society on the eve of the new millennium. We hope that many scientists and scientific institutions decide to join us in this effort.

Miguel Virasoro, Director
Abdus Salam ICTP

The Climate Change Conference, held in Kyoto, Japan, last winter, made international headlines. After more than a week of intensive negotiations,150 nations signed a historic treaty to curb greenhouse gas emissions. What's next promises to be even more contentious.

Hot Stuff Gets Hotter

The Earth's surface covers an area of more than 500 million square kilometres. Simply put, our planet is a huge place. In fact, it's so huge that you would think it could absorb massive environmental assaults before any effects were felt. To a certain extent that's true.

But the Earth is also a fragile place and small differences—say, in temperature—often have big impacts. For example, about 20,000 years ago, during the last ice age, the glaciers that cascaded over Europe and North America were set in motion by a fall of 4 degrees centigrade in average summer temperatures.

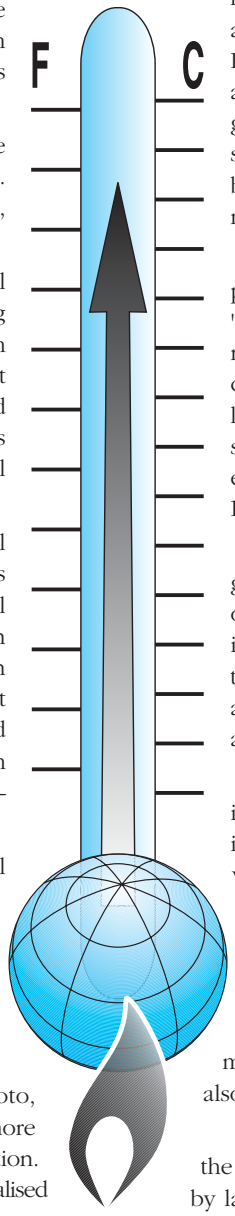
Now, during the past 120 years, the Earth's average temperature has increased by 0.5 degrees centigrade. What will be the consequences of this warming trend, which at first glance may seem insignificant?

The greenhouse effect is largely a natural phenomenon due to the atmosphere's heat-trapping capabilities. In fact, without such warming, the Earth would be a cold and desolate place unable to support life. Emissions due to human activities—coal- and gas-fired power plants, automobiles and biomass burnings—account for less than 5 percent of all greenhouse gas emissions.

Are these human activities now causing global warming? Nobody, not even climatologists, knows for sure. Over the past decade many mathematical models have been developed. Yet historical data on climate and temperature remains sparse. And even if humans have had a hand in global warming, that hand may prove to be a minor factor when compared to the powerful forces of nature—everything from ocean currents to sunspots to volcanic eruptions—that effect our climate.

Knowing who or what is responsible for global warming would certainly help us to devise a more effective long-term strategy for addressing the issue. Yet, a more compelling concern is this: We may not be able to wait until we have all the answers because the consequences of delay could be catastrophic.

The Climate Change Conference, held in Kyoto, Japan, last December, with representatives from more than 150 countries, marked a step in the right direction. But it was just a small step. The pact calls for 38 industrialised nations to cut their greenhouse emissions by an average of 5.2 percent from 1990 levels by 2012. The United States, which produces 25 percent of the world's greenhouse gas emissions, agreed to a 7 percent cut. Meanwhile, the 15 nations of the European Union agreed to an 8 percent reduction, and Japan signed on to a 6 percent cut.



Such measures are admirable but they are by no means sufficient. First, even if the targets set by industrialised nations are met (which is by no means certain), the benefits that accrue will be overwhelmed by increases in emissions taking place elsewhere. From 1990 to 2015, carbon dioxide emissions from Russia and Eastern European nations as well as from developing countries are likely to double. In fact, in less than 20 years, these nations will likely account for more than one-half of the world's greenhouse gas emissions. As a result, unless subsequent agreements require these nations to abide by emissions targets, the Kyoto accord will not do much to alleviate the global warming problem.

Second, the Kyoto agreement calls for a sizeable portion of the cutbacks to be achieved through "emissions trading." This strategy will allow industrialised nations with high pollution levels to buy "pollution credits" from developing nations with low pollution levels. Supporters call "emissions trading" a wise strategy that puts the market to work for the environment. Critics label the plan a "license to pollute." Beyond the rhetoric, nobody is sure it will work.

Third, the Kyoto agreement treats all greenhouse gases as equal. The truth is they are not. One tonne of carbon dioxide emissions does not effect our climate in the same way as one tonne of methane. And one tonne of methane does not have the same impact as one tonne of chloroflourocarbons. All of this makes a strategy for emissions reductions extremely complex.

Fourth, the Kyoto agreement fails to address the impact of forest and underbrush burning, which is increasingly viewed as a significant source of global warming. Such practices, which are often used to clear land in remote areas throughout the developing world, affect global warming on two fronts: they raise the atmosphere's carbon dioxide levels while curbing the Earth's ability to absorb this greenhouse gas through photosynthesis. In the short-term, moreover, the burnings of forests and underbrush are also having a dramatic impact on local climate change.

So, where does this leave us? Given the fact that the conference nearly collapsed and was only rescued by last minute negotiations, we should be thankful for the progress that was made. Yet, we have not heard the last about global warming. An issue that has been on the front burner of the global environmental agenda for the past decade is likely to remain there in the years ahead. □

Emilia Mezzetti
is a professor of mathematics at the University of Trieste.

Last December, the ICTP hosted the 8th General Meeting of European Women in Mathematics. The gathering attracted more than 100 women from 30 different countries worldwide. Emilia Mezzetti, who served as the chief organizer, examines the plight of women within the profession today.

Women Mathematicians Count on Brighter Future

Feminine mathematics? The term sounds preposterous. As every school child knows two plus two is four. From the simplest calculations to the most complex equations, the unbending rules of mathematics conform to laws of nature that reach well beyond differences in gender.

Gender nonetheless has played an important role in mathematics when it comes to some critical factors—most notably, hiring and promotions. And that's why women have begun to join together in organizations like European Women in Mathematics (EWM). Their goal is to recalibrate the profession's disturbing demographics so that university mathematics departments become as gender-free as the research findings of their faculty members.

These numbers may surprise you. In Denmark, just 2 percent of all mathematicians teaching in universities are women; in Germany, it's 3 percent; in the United Kingdom, 7 percent. Among Mediterranean countries, the situation is better but by no means satisfactory. In Greece, nearly a quarter of all math professors are women; in Italy, it's 35 percent. Across Europe, when it comes to math professors, only Portugal has a 50-50 gender split. And this dismal picture becomes even worse when calculating the number of women serving as department heads or deans.

The roots of the EWM reside in discussions that took place among a small group of European women during the 1986 International Congress of Mathematicians at the University of California in Berkeley. These women took their cues from the Association for Women in Mathematics, which had been a driving force in mathematics departments in the United States over the previous decade. After several additional years of informal discussions, the EWM was formed in 1993.

EWM's constitution, signed in Helsinki, outlines the organization's objectives:

- To encourage women to study mathematics, especially women interested in receiving advanced university degrees.
- To provide opportunities for women mathematicians to meet and discuss their research and career aspirations and concerns.
- To cooperate with other groups that have similar goals.

The small number of women in university mathematics departments, especially in northern European countries, leads to another problem: women who are fortunate enough to have university teaching jobs often feel isolated from their colleagues and uncomfortable in their male-dominated work environments. Women mathematicians in the developing world, moreover, must also contend with poor working conditions and inadequate resources—problems they unfortunately share with their male counterparts in these regions.

Such difficulties have discouraged many women from entering the field of mathematics in the first place. At the same time, a disturbing number of women have left the profession even after receiving advanced degrees.

So what's to be done? How can we begin to address the status of women in mathematics in ways that make the discipline more inviting to women while simultaneously protecting its deeply rooted dedication to excellence?

Conference participants in the Main Lecture Hall

This much must be acknowledged. The problem has existed for a long time and there's no reason to think that it will be overcome in a year or two. Solutions will require changes in the current thinking that often takes place within math departments and a willingness among women who are interested in mathematics to stay the course despite the adversities they face.

Some positive steps have been taken. The EWM, for example, has created a video, *Women and Mathematics Across Cultures*, which examines the plight of women mathematicians in Europe, the United States, and Latin America. The German government has appointed a "women math commissioner" who serves as an advocate for women's issues in university math departments across the country.

Meanwhile, Sweden and Norway have set aside faculty positions that are opened solely to women. And organizations like EWM and others have launched "mentoring" programs designed to encourage girls who display talent in mathematics at a young age not to drift into other fields that may seem friendlier and more inviting.

As discussed extensively at the EWM meeting in Trieste, women mathematicians—like professional women in other fields—are struggling to balance several full-time commitments while seeking to overcome a host of unrealistic expectations that society has imposed on them. The responsibilities of family, especially if a woman chooses to have children, likely will interfere with a woman's career at critical moments. Today, time "lost" to child-rearing can rarely be made up in the work place. As a result, women are often placed at a permanent disadvantage in their efforts to climb the career ladder.

Universities could make significant contributions to closing the gender gap in mathematics and other disciplines by reforming their systems to ensure that women employed in their institutions are not penalised for having children. Such reforms might also have important positive impacts on nations now experiencing low—indeed negative—birthrights, a demographic trend now common in several European countries.

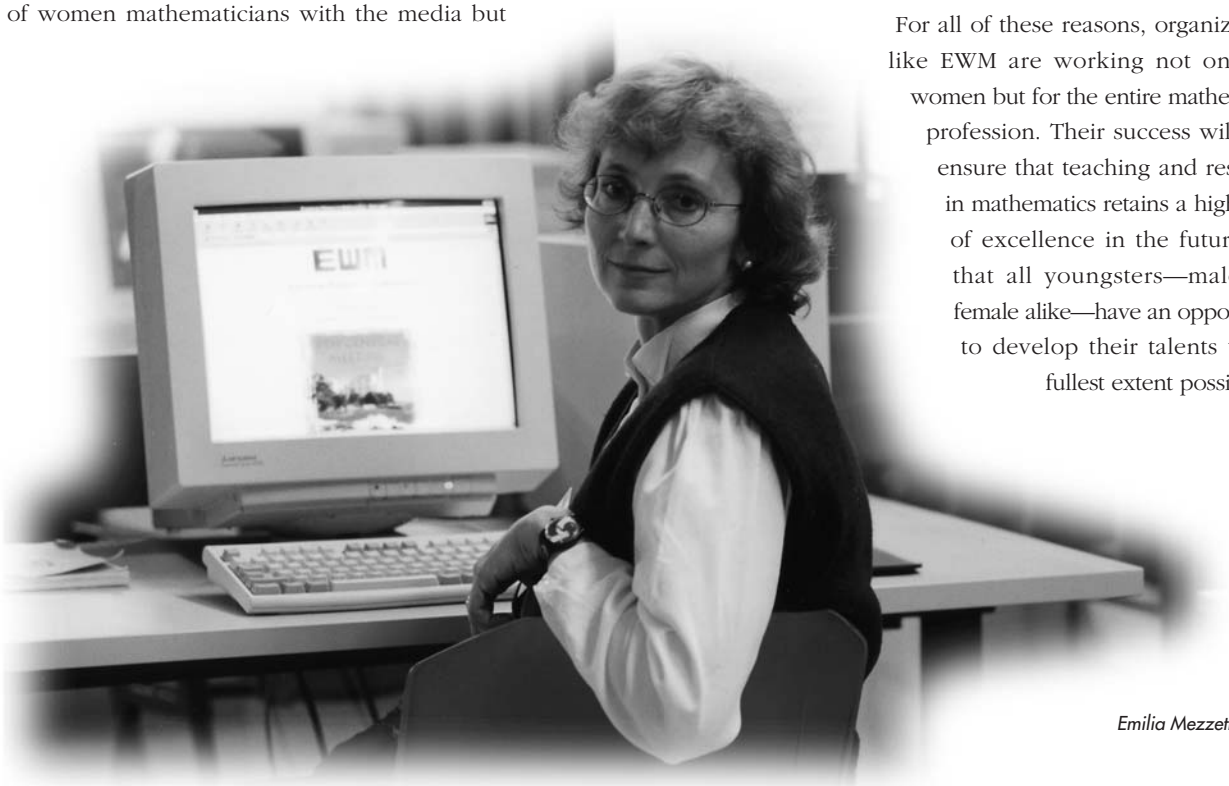
Women mathematicians who are well established in their careers also have a responsibility to their profession in general and their younger colleagues in particular. These women should not only be willing to actively discuss the status of women mathematicians with the media but should personally encourage and inspire young women in their own countries who are interested in mathematics. The creation of help centres, scholarships and networks, designed specifically to assist young women, could have an enormous impact in increasing the number of women who enter and remain in the field of mathematics. Such initiatives, however, are likely never to get off the ground unless women themselves take the lead.

As for EWM, it will continue to promote the cause of women in mathematics through newsletters, workshops and conferences. Over the next few years, it will also seek to secure additional funding from foundations, which will help EWM to become more effective and more visible. At the same time, EWM will become more active in Eastern Europe, which has a large contingent of women mathematicians who are eager to share their experiences with their colleagues in the West. The next general meeting of the EWM will take place in Hannover, Germany, in late 1999.

Is there such a thing as feminine mathematics? Of course not. But is there a gender crisis within the profession? Unfortunately, the answer is yes.

Solving this crisis is not only important for young women who would like to pursue careers in math, it is critical to the overall profession as well. How can any discipline, which is dedicated to excellence, achieve that goal while discriminating against 50 percent of the population? And how can a field that is having difficulty attracting new students hope to remain vital without appealing to young women as well as young men?

For all of these reasons, organizations like EWM are working not only for women but for the entire mathematics profession. Their success will help ensure that teaching and research in mathematics retains a high level of excellence in the future and that all youngsters—male and female alike—have an opportunity to develop their talents to the fullest extent possible. □



Emilia Mezzetti

ICTP's Condensed Matter Section seeks to promote workshops and conferences of professional excellence and develop world-class in-house research capabilities to meet the ever-changing circumstances of science in the developing world.

Condensed Matters

When Abdus Salam launched the ICTP in 1964, his goal was to establish a "centre of excellence" in Trieste that would pay particular attention to the needs of scientists from the developing world.

"At the beginning," says YU Lu, Head of ICTP's Condensed Matter Section, "the Condensed Matter programme focused on training activities designed to teach basic skills. Today, we continue to pursue that goal through 'colleges' and 'workshops' opened to a wide range of young scientists from the South. But changing circumstances in the developing world have required us to pursue other strategies as well."

YU Lu notes that in the 1960s science and math education in the South lagged far behind the North. As a result, many young scientists receiving training in their home countries simply did not have the skills they needed to be competent in their fields.

"That's still true in many cases, but not always," says YU Lu, who was educated in China and Ukraine and spent several years working in the United States. "Many developing countries, including India, China, Brazil and Argentina, now produce high-level scientists. And a number of research institutions in the South—notably, the Indian Institute of Science in Bangalore—compare favourably with the best facilities in the North. In fact, Bangalore, a metropolis in southern India, has been called the Silicon Valley of the South because of its growing high-tech capabilities."

YU Lu insists that the Centre must respond to these changing circumstances if it wants to continue to be of service to scientists in the developing world. For ICTP's Condensed Matter Section, this has required a continual rethinking of its training and research strategies.

Condensed matter physics, which is the largest subdiscipline in physics, is the study of solid and liquid materials. The field has led to some of the most important scientific discoveries of the twentieth century, including transistors, solid-state lasers and high-temperature superconductors. As YU Lu observes, condensed matter physics "has revolutionised all aspects of life from food processing to entertainment."

At ICTP, courses on the study of condensed matter began three years after the Centre's creation. The first college on condensed matter attracted 150 participants, mostly from the developing world.

"Several years later, ICTP launched a series of condensed matter workshops," notes YU Lu. "These activities were organized by outside researchers who came to the Centre for several weeks or months each year and then returned to their own universities or research centres to resume their regular work."

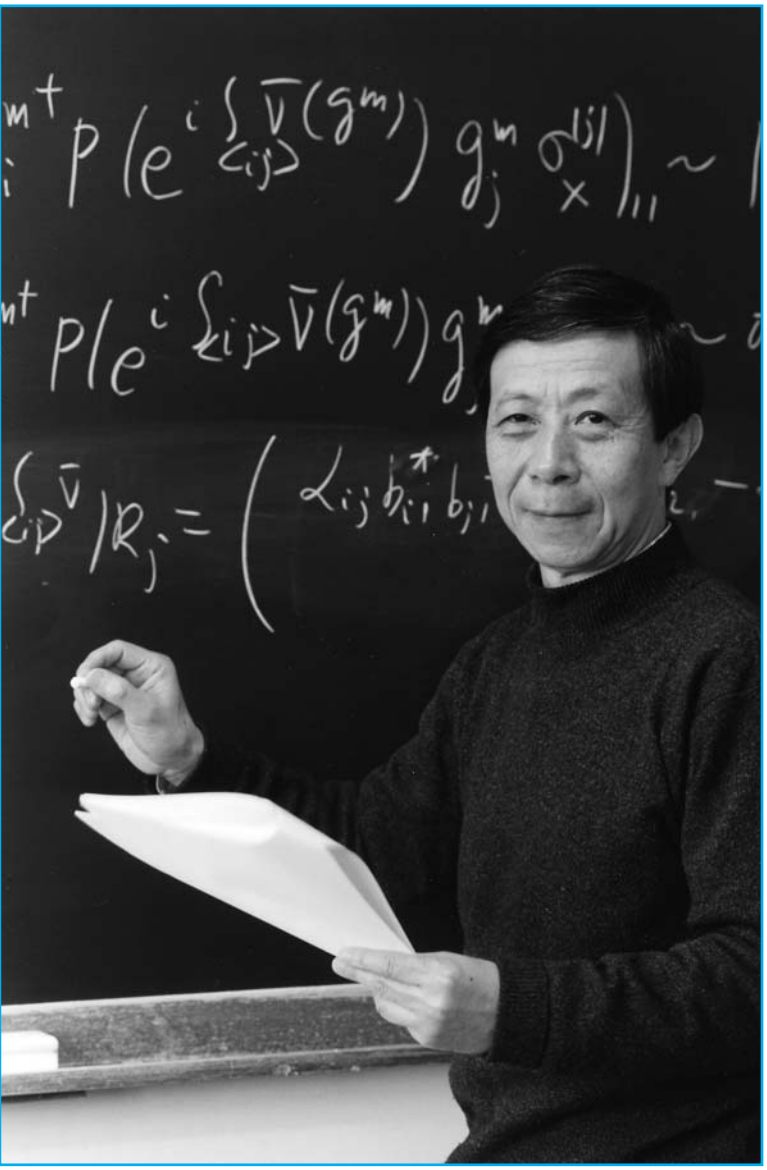
"Condensed matter research at the ICTP received a big boost in the late 1970s when the University of Trieste established a condensed matter programme and hired Erio Tosatti and Mario Tosi. Then, in 1979, SISSA (the International School for Advanced Studies) was launched right next door to the ICTP. Its strong presence in condensed matter physics made it a natural ally of the Centre and a ready source of cooperative ventures."

But programme continuity in condensed matter remained a problem at ICTP until 1986 when YU Lu was hired as the Centre's first full-time staff member with expertise in this field. "For more than a decade," YU Lu observes, "my colleagues and I have tried to create a balance between community service and excellence."

To achieve that balance, ICTP's colleges in condensed matter promote general training programmes for scientists with a wide range of skills. The section also supervises about 10 Diploma Course students in condensed matter who come to Trieste each year. These students receive training comparable to pre-doctoral work at many leading universities. Many then seek Ph.D. degrees in the U.S. and Europe.

YU Lu notes that the group, with the help of ICTP associate scientists, "tries to identify our most talented participants from all of our activities and then encourage them to remain in contact with the Centre over extended periods."

"Ganapathy Baskaran, who is a first-class researcher currently at the Indian Institute of Mathematical Sciences, and Olatunde Akinlade, who has enjoyed a distinguished career at the University of Agriculture Abeokuta in Nigeria, are two shining examples of the Centre's nurturing efforts," YU Lu observes. "Both Baskaran and Akinlade freely admit that they owe a good deal of their success to their affiliation with the Centre, particularly during the early stages of their careers."



YU Lu

Since 1987, the Condensed Matter Section has organized a large number of topical workshops in a wide range of research areas. Of particular note has been a series of workshops—10 in all—on strongly correlated electron systems. These workshops have taken place over the past decade following the discovery of high temperature superconductors. Each year, they have attracted some 80 people for 10 days of informal talks and discussions.

"Our goal is to replicate the success of the Aspen Institute of Physics in the United States," says YU Lu. "I think we're moving in the right direction. In fact, we've drawn some of the best people both to lead and participate in the workshops. Last year, for instance, Nobel Laureate Philip Anderson was here."

At the same time, the Condensed Matter Section continues to hold its long-standing Adriatico Research Conferences that were initiated by Stig Lundqvist, a close friend of Abdus Salam and one of the moving forces behind the Centre throughout its first decades of existence.

"These conferences, which are more formal than the topical workshops, attract 50 to 100 participants," YU Lu notes. "They usually last four days and include presentations by some of the most noted people in their fields. Last summer, Stuart Kauffman, an international expert in the field of complex systems, directed one of our conferences."

Workshops and conferences are not the only places where the Condensed Matter Section seeks excellence. The same goal shapes the strategy of its in-house research, which has grown from a three-person operation in 1986 to a section now boasting a research staff of 11, including several SISSA consultants and visiting scientists.

"The increasing level of sophistication of scientific research in the developing world," YU Lu notes, "means that it's no longer sufficient to be solely a training centre. If you want to have a strong presence in the world of science, you must demonstrate strong in-house research capabilities."

And that's what ICTP's Condensed Matter Section is trying to do in three core areas of the field:

- Studies of strongly correlated and disordered systems that seek to advance our fundamental knowledge of the physical world.

- Computational condensed matter physics, which has enhanced our understanding of the physics and chemistry of materials—and has the potential to do the same for biology.

- Statistical physics, which aids the development of mathematical modelling of complex systems and has important implications for physical and life sciences.

"The ultimate goal of our growing in-house research capabilities is to establish a presence in these fields that will lead physicists throughout the world to recognise the ICTP as a research centre of excellence in condensed matter on a par with the best in the world."

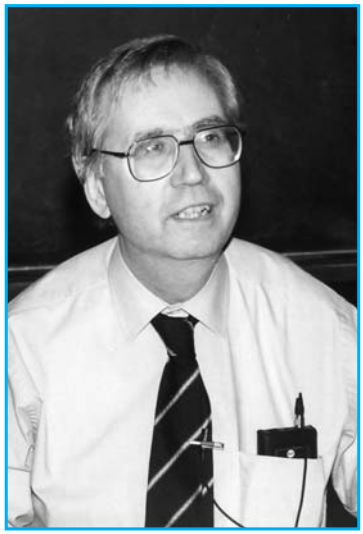
"We are not there yet," YU Lu acknowledges, "but we have an opportunity to reach our goal in 10 to 15 years—if we continue on the current path."

"As the challenges facing both scientists and scientific research institutions change in the South, the ICTP must change as well. The Centre has played a significant role in advancing science throughout the developing world. Now, the Centre's training and research activities—such as those in condensed matter—can continue to play a valuable role in the South by aiming at levels of excellence that were only a dream a generation ago but are now a distinct possibility." □

DATELINE

Dirac Medal Awarded

Peter Goddard, Master of St. John's College at the University of Cambridge in the United Kingdom, and David Olive, Research Professor in the Department of Physics at the University of Wales in Swansea also in the United Kingdom, were awarded the ICTP's Dirac Medal on 26 March. Goddard and Olive were honoured for their contributions to string theory. Following the ceremony, the award winners presented a public lecture titled "Strings, Monopoles and Duality." The Dirac Medal, first presented in 1985, is designed to recognise outstanding contributions to the fields of theoretical physics and mathematics. It is named in honour of Paul A.M. Dirac, one of the fathers of quantum mechanics. Dirac, who won the Nobel Prize in Physics in 1933, was a staunch friend of the ICTP.

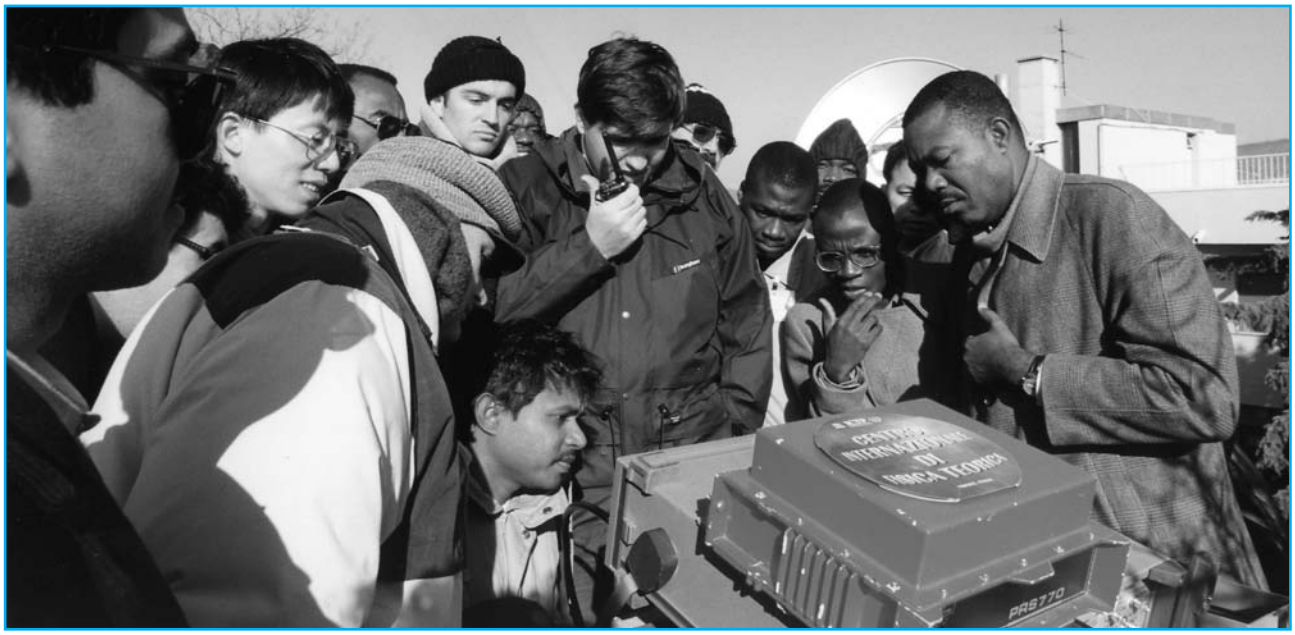


Peter Goddard

David Olive

Down Linking in Trieste

Participants in ICTP's School on the Use of Radio for Digital Communications, which was held last January, not only explored theories and concepts in the classroom but witnessed a down-to-earth field demonstration. The latter took place when the participants observed a computerised transfer of data and then viewed a videoconference over a microwave link set up between the Centre's Miramare campus and downtown Trieste. The demonstration was made possible with the help of ACEGAS, the local water, electricity and gas company. Some 40 students from 23 developing countries attended the School, which was cosponsored by the International Union of Radio Science in Gent, Belgium, and the International Telecommunications Union in Geneva, Switzerland.

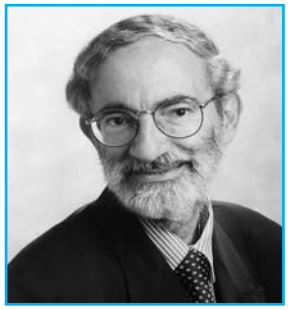


School on the Use of Radio for Digital Communications

NEWS FROM ASSOCIATES

Ram Man Shreshtha, Professor of Physics at Tribhuvan University in Kathmandu, has been elected a member of Nepal's national parliament. Shreshtha was an ICTP Regular Associate Member from 1982 to 1994. During that time, he visited the Centre on eight different occasions.

Chair for Chela-Flores



Julian Chela-Flores

In February, ICTP Staff Associate Julian Chela-Flores, a recipient of the UNESCO Chair of Philosophy, spoke about "man's place in the universe" at the University of Santiago in Chile. The UNESCO Chair sponsors presentations by noted scientists and intellectuals in effort to promote the sharing of knowledge among researchers, teachers and students. Specifically, the program seeks to apply "the rigours of philosophical thinking to the problems of the present-day world." UNESCO Chairs in Philosophy have been established in Caracas, Paris and Santiago. Chela-Flores, who is a biophysicist, spoke about the current state of astrobiology, a new avenue of scientific inquiry that examines the origins, evolution and prospects for life in near and distant places throughout the universe.

New "Chapter" in China

The ICTP Chapter in China recently published the first edition of its newsletter. The Chapter, established in 1996 by China's State Council (the government's executive branch), seeks to promote cooperation and academic exchange between Chinese scientists and the ICTP. Later this year, the Chapter will help sponsor the Ninth International Symposium on Physics of Materials. The meeting will take place in Guilin, in southern China. Other sponsors include the ICTP, National Science Foundation of China and Chinese Academy of Sciences. China's ICTP Chapter is the second of its kind. The first was established in India in 1993.

Statistical Profile

Training and Research in Italian Laboratories
1983-1997

TRIL by the numbers...

Applications	6365
Grants awarded	1109
Fellows	771
Person-years	843
Countries represented	67
Laboratories involved	312
Publications submitted	2155

Launched in 1983, the Abdus Salam ICTP Programme for Training and Research in Italian Laboratories (TRIL) offers a hands-on "experimental" counterpoint to the Centre's theoretical research and lecture-based training. TRIL enables ICTP-affiliated researchers from the developing world, who stay up to one year, to work side-by-side with scientists in universities, governmental agencies and industrial research centres located throughout Italy. Funding comes largely from the Italian government. Close cooperation exists between TRIL and Italian research institutions, including CNR (National Research Council), INFN (National Institute for Nuclear Physics), ENEA (Italian Agency for New Technologies, Energy and Environment) and ANPA (National Agency for Environmental Control). For additional information, please contact the TRIL secretariat at itlabs@ictp.trieste.it

Design: G. Gamboz/ICTP

REPORT ON REPORTS

ICTP-URSI-ITU/BDT SCHOOL ON THE USE OF RADIO FOR DIGITAL COMMUNICATIONS IN DEVELOPING COUNTRIES, INCLUDING SPECTRUM MANAGEMENT

12 - 30 January

Directors: S.M. Radicella (ICTP) and R. Struzak (International Telecommunication Union, Geneva).

Co-organizers: International Union of Radio Science (Gent, Belgium) and International Telecommunication Union.

The School consisted of two weeks of lectures and reports and one week of laboratory training. Lectures focused on such topics as the needs and potential for expanding modern communication networks in developing countries; challenges related to the building of information infrastructures in remote areas; and future developments in mobile and personal wireless communication systems. Lectures were followed by presentations, analyses and discussions concentrating on case studies. Participants were exposed to laboratory demonstrations and exercises in digital communications, which were made possible through a partnership between the ICTP and Swiss Telecom *(see more on Page 8).*

WINTER COLLEGE ON OPTICS

9 - 27 February

Co-sponsor: International Commission for Optics (ICO).

Directors: T. Asakura (Research Institute for Electronic Science, Hokkaido University, Hokkaido, Japan), P. Chavel (Institut d'Optique, Université Paris Sud, Orsay, France), G. Denardo (ICTP and University of Trieste), A.T. Friberg (Royal Institute of Technology, Stockholm) and A. Sona (CISE, Milan).

The College introduced participants to the rapidly growing fields of optics, photonics and optoelectronics. Lectures covered the theoretical aspects and basic principles behind optical physics. They also examined current applications in the field—for example, in informatics, nonlinear and ultrafast optics and advanced microscopy. Lecture topics included coherence and scattering; near field effects and propagation; holographic data storage; photorefractive materials; and pulse shaping and characterisations. The College also included demonstrations and hands-on laboratory activities.

SECOND REGIONAL COURSE ON ADVANCED VLSI DESIGN TECHNIQUES, Medellin, Colombia

9 - 27 February

Sponsors: United Nations University (UNU, Tokyo), Instituto Colombiano para el Desarrollo de la Ciencia y la Tecnologia "Francisco Jose de Caldas" (COLCIENCIAS) and Instituto Colombiano para el Fomento de la Educacion Superior (ICFES), in cooperation with Universidad de Antioquia (UDEA), Universidad Pontificia Bolivariana (UPB) and Universidad EAFIT, all in Medellin.

Directors: A.A. Colavita (ICTP) and J.M. Trujillo V. (UDEA).

Laboratory Head: A. Cicuttin (Universidad Nacional de la Plata, Argentina, and ICTP).

The Course introduced scientists and engineers to the latest VLSI (Very Large Scale Integrated System) design techniques. The goal was to provide hands-on exercises for advanced designers. About 75 percent of the course time was devoted to design work. The remaining 25 percent concentrated on theory. Conducted in both Spanish and English, the Course was open solely to Latin-American scientists.

Course on Advanced VLSI Design Techniques, Medellin, Colombia

WORKSHOP ON NUCLEAR REACTION DATA AND NUCLEAR REACTORS: PHYSICS, DESIGN AND SAFETY

23 February - 27 March

Directors: A. Gandini (ENEA and University of Rome), L. Fonda (ICTP and University of Trieste), J. Kupitz (IAEA, Vienna), P. Oblozinsky (IAEA, Vienna), G. Reffo (ENEA, Bologna, Italy) and A. Trkov (Institute Jozef Stefan, Ljubljana, Slovenia).

Co-organizer: International Atomic Energy Agency (IAEA, Vienna), in cooperation with Ente per le Nuove tecnologie, l'Energia e l'Ambiente (ENEA, Rome).

Worldwide, about 800 nuclear power and research reactors are in operation. Some 71 countries, including 45 countries in the developing world, have built—or are planning to build—reactors. In fact, about 70 percent of the nuclear power plants currently under construction are located in the developing world. The Workshop provided training for scientists and engineers from developing countries in nuclear reaction theory and data production and use. Emphasis was placed on applications of nuclear reactor physics to design and safety. Participants explored the most advanced nuclear power systems and information technologies used in the development of nuclear power and research reactors. The Workshop consisted of classroom lectures and computer laboratory exercises.

WORKSHOP ON THE STRUCTURE OF BIOLOGICAL MACROMOLECULES

16 - 27 March

Morton Bradbury

Co-sponsors: International Centre for Genetic Engineering and Biotechnology (ICGEB, Trieste) and Scuola Internazionale Superiore di Studi Avanzati (SISSA, Trieste).

Directors: P. Carloni (Chemistry Department, University of Florence), J. Chela-Flores (ICTP and Instituto Internacional de Estudios Avanzados, Caracas), S. Pongor (ICGEB) and V. Torre (SISSA).

The Workshop focused on the theoretical and experimental approaches that physical scientists have developed to understand the structure and function of biomolecules. Emphasis was placed on the applications of such techniques as nuclear magnetic resonance and X-ray diffraction to determine the structure of proteins and nucleic acids. The Workshop was designed for students and scientists with interdisciplinary backgrounds in physics, chemistry and biology, and for those from other fields planning to pursue research in molecular biophysics.

SOUTH-EAST ASIAN REGIONAL COLLEGE ON MICROPROCESSOR-BASED REAL-TIME SYSTEMS IN PHYSICS — THEORY AND APPLICATIONS, Hanoi, Viet Nam

16 March - 4 April

Sponsors: United Nations University (UNU, Tokyo) and National Centre for Science and Technology (NCST, Hanoi).

Directors: Phan Hong Khoi (Institute for Materials Science, Hanoi), A.S. Induruwa (presently University of Kent, Canterbury, UK) and C. Verkerk (ICTP, formerly CERN, Geneva).

Participants, mostly physicists and engineers, were taught how to make use of real-time operating systems in the design and implementation of computer-controlled experiments. Lectures, some 45 hours in all, focused on design methods and development of graphic user interfaces for connections to external equipment. Particular attention was paid to the real-world opportunities and obstacles associated with the creation of networks. Laboratory sessions, which totalled some 70 hours, familiarised participants with Linux and C programming languages. Participants were asked to write several small programs in these languages. The College was opened solely to researchers from South-East Asian countries.

Regional College on Microprocessor-Based Real-Time Systems, Hanoi, Viet Nam

SPRING SCHOOL ON NON-PERTURBATIVE ASPECTS OF STRING THEORY AND SUPERSYMMETRIC GAUGE THEORIES

23 - 31 March

Co-sponsors: Scuola Internazionale Superiore di Studi Avanzati (SISSA, Trieste) and Istituto Nazionale di Fisica Nucleare (INFN, Italy).

Directors: B. Greene (Columbia/Cornell University), R. Iengo (SISSA/ICTP), J. Louis (Halle University, Germany), K.S. Narain (ICTP), S. Randjbar-Daemi (ICTP).

The School's aim was to examine the most recent pedagogical developments dealing with duality in string theory, supersymmetric gauge theories and f-theory, d-branes and matrix models. The School was intended for theoretical physicists and mathematicians with knowledge of quantum field theory, general relativity and string theories. About 155 scientists, mainly from the developed world, attended.

PROFILE

Titilayo Adelaja Kuku's career in science and engineering likely would have been short-circuited if not for the help of others. Today, Titilayo—a former ICTP associate—continues to expand his career horizons through his participation in the Centre's Programme for Training and Research in Italian Laboratories (TRIL).

A TRIL-ing Experience

The journey from a remote school house in western Africa to a distinguished career in science and engineering has not been easy for Titilayo Adelaja Kuku, an associate professor in the Department of Electronic and Electrical Engineering at the Obafemi Awolowo University in Ile-Ife, Nigeria.

Since completing his schooling, Titilayo has travelled to northern Italy on five different occasions to conduct research at the universities of Trieste, Parma and Pavia. There, he has enjoyed access to excellent research facilities as part of the ICTP's Programme for Training and Research in Italian Laboratories (TRIL). When Titilayo comes to Italy, he has the added opportunity of visiting his older brother, Aderemi, a mathematics professor and researcher in ICTP's Math Group, who has played an instrumental role in his career.

"I would not have earned a doctorate in engineering without my brother's help," says the younger Kuku. "Then, when I needed access to sophisticated laboratory equipment for my post-doctorate research, the ICTP's TRIL programme gave me an opportunity to work in state-of-the art facilities."

Both Titilayo and Aderemi grew up in Ijebu Ode, a town of several hundred thousand people located about 100 kilometres from the Atlantic coast. Ijebu Ode serves as the capital city for the Ijebu language group.

"Nigeria has about 120 million people; only about 3 million are Ijebus. Yet, a large number of Nigeria's industrialists, businessmen and academics trace their roots to this small group," Titilayo notes.

At 13, Titilayo entered a five-year secondary school in Ibadan, a town some 80 kilometres from his home. State scholarships deferred some of the expense but his older brother also provided critical financial support.

Titilayo's talents in science and engineering, first displayed at the secondary school, blossomed at the University of Ife (now Obafemi Awolowo University) in the early 1970s. That's where he received his undergraduate degree in chemistry. From there, Titilayo left his native country to study in England at the University of Southampton, where he received a masters degree in electronics, and then at Imperial College, where he was awarded a doctorate in electrical engineering.

"From the earliest days of my university education," Titilayo explains, "I've always tried to straddle the worlds of basic and applied research. At the same time, I've always desired to apply my skills and talents in Nigeria."

Today, Titilayo, who advises Nigeria's Energy Commission on issues related to photovoltaics, is seeking to establish photovoltaic production facilities in Nigeria through joint ventures with several Italian companies.

Despite these initiatives, Titilayo has often been disappointed by events in his home country over the past 15 years. "Nigeria has been torn apart by political instability and undermined by severe economic difficulties. Both universities and researchers have found it extremely difficult to receive sufficient funding."

"The University of Ife was founded in 1962," Titilayo notes. "As an undergraduate student in the early 1970s, I found it a youthful, energetic place. The atmosphere proved extremely conducive to learning and research."

"When I returned to Nigeria in the early 1980s after receiving my doctorate in England, much had changed. A few numbers tell the story. The laboratory budget for the Semiconductor Programme at Imperial College exceeded US$5 million. At the University of Ife, the budget for a similar programme did not even reach US$500,000."

Titilayo Adelaja Kuku

That's why the ICTP's TRIL programme has been so crucial to his career. "Because of the economic difficulties in Nigeria, it has been impossible to maintain the university's facilities, let alone provide new ones. My research would have languished without the generous assistance provided by the Centre in cooperation with Italy's laboratories."

Beyond the key role that the Centre has played in his career, Titilayo appreciates how the ICTP nurtures an atmosphere in which scientists from the developing world can share their experiences. "It's always rewarding to come to Italy and meet people with similar backgrounds and problems."

"The daily treks that I took each day between my home and school so long ago remain fresh in my mind," Titilayo warmly recalls. "They remind me that with determination—and a helping hand—even a small boy from a small town in western Africa can follow his dream." □

Titilayo with his children

Aderemi Oluyomi Kuku

The Other Kuku

Titilayo is not the only member of the Kuku family with close ties to the ICTP.

Since 1995, his older brother, Aderemi, has been with the Centre's Mathematics Research Group, enjoying a wide range of responsibilities. He assists Group Head, Mudumbai Seshachalu Narasimhan, in overseeing the Centre's math activities. He teaches Diploma Programme students. He advises post docs. He conducts his own research. And he seeks to raise ICTP's visibility among math departments around the world.

There's no doubt that Aderemi enjoys working at the Centre. "There's an excellent library," he says, "you have an opportunity to meet all sorts of people and you're given the freedom to pursue new initiatives. The Centre is simply a good place to be."

Although sharing a common interest in science and math, the Kuku brothers arrived at the ICTP through different career paths. For Titilayo, who is 11 years younger than Aderemi, his participation in the ICTP's Programme for Training and Research in Italian Laboratories (TRIL) has enabled him to keep abreast of developments in his field. Aderemi, on the other hand, came to the ICTP as an internationally recognised mathematician who had given invited lectures at the University of California at Berkeley in the United States, Queens University in Canada, Max Planck Institute for Mathematics in Germany, and the Chinese Academy's Institute of Math and Sciences. At the time of his appointment, Aderemi was a professor of mathematics in the University of Ibadan in Nigeria, and president of African Mathematical Union.

"To my good fortune, the Kuku family is one of the most distinguished families in Nigeria," explains Aderemi. "Our standing dates back to my grandfather who served as a right hand man of the king at the turn of the century. Today, many of my grandfather's descendants hold top positions in government, business and academia."

"My immediate family—five brothers, one step brother and two step sisters—is a close-knit group. The moral and financial support we gave each other has been pivotal in our success. All of the siblings have held professional or technical positions."

"Both culture and family values were centred on respect for our elders and a willingness to assist one another in times of need," Aderemi recalls. "I remember the esteem I had for my elder brother and how he helped me during the early stages of my career. I developed the same relationship with Titilayo, especially when I realised that his interest in math and science paralleled my own."

Aderemi's four daughters, who live in Nigeria with his wife, have now built a similar support system. "My eldest daughter is a banker; the second oldest a medical doctor. My third daughter is studying economics at the University of Ibadan and the youngest is in her last year of high school."

"They support one another much like my brothers and sisters did. It's part of our family tradition and I'm glad that my daughters have made it a central feature of their lives. In the years to come, I expect that their stories will be similar to the ones my siblings and I can tell."

TRIBUTES and CHANGES

Gallieno Denardo, who retired last fall after heading ICTP's Office of External Activities for more than a decade, was awarded an honorary degree by the University of Cape Coast, in Ghana. Denardo received the honour for his efforts in helping to create and develop a laser laboratory for environmental applications in this African country. The laboratory is now an ICTP Affiliated Centre. This is the second honorary degree that Denardo has received. The first was awarded by the University of Pecs in Hungary last year.

The Council of the European Laboratory for Particles Physics (CERN), headquartered in Geneva, Switzerland, has announced that **Luciano Maiani** has been elected CERN's next Director General. Maiani will assume office on 1 January 1999. He will replace Christopher Llewellyn-Smith, who will have completed his 5 year-term. Maiani is a distinguished physics professor at the University of Rome. Since 1993, he has served as President of the *Istituto Nazionale di Fisica Nucleare* (INFN) and, for the past year, he has been President of the CERN Council. Maiani has visited the ICTP on several different occasions and has worked closely with a number of Centre scientists. He also served on the selection panel for ICTP's current director.

David N. Schramm, one of the world's leading astrophysicists, was killed on December 22, when the twin-engine plane he was piloting crashed outside of Denver, Colorado. Schramm had visited the Centre on two occasions: in 1988, he attended the Summer School in High Energy Physics and Cosmology and, in 1993, he presented a lecture at the Conference on Highlights of Particle and Condensed Matter Physics. Schramm, 52, was Vice President for Research and Professor of Physical Sciences at the University of Chicago. He was best known for his studies on the very early universe and his analyses of the connections among particle physics, nuclear physics and cosmology.

Slovenian Links

Lojze Marincek (*front right*), the Slovenian Minister for Science and Technology, recently visited ICTP to discuss ways to further strengthen the links between the Centre and Jozef Stefan Institute in Ljubljana, Slovenia's capital. Based on an earlier agreement with the Slovenian government, students enrolled in ICTP's Diploma Programme may receive a doctorate degree from the Jozef Stefan Institute. During his one-day visit, the Minister also met with officials from the University and other scientific institutions in Trieste.

Week of Physics

About 400 high schools students from Trieste and the surrounding area participated in the second edition of "Physics Week," held the last week in March. The event was highlighted by a series of lectures and discussions delivered by ICTP and SISSA scientists and consultants. Among the topics discussed were quantum mechanics, fractals and complexity, earthquake forecasting and astrobiology. Students enjoyed a unique opportunity to learn about what's new in science from some of the area's leading researchers. ICTP scientists GianCarlo Ghirardi, Alessandro Vespignani, Giuliano Francesco Panza and Julian Chela-Flores all gave presentations. "Physics Week" was part of the eighth annual *Settimana della cultura scientifica*, a nationwide week-long celebration of science sponsored by the Italian Ministry of University and Scientific & Technological Research.

Art Meets Science

Following last year's successful painting competition, the ICTP has established a permanent display area for works of art on the Lower Level of the Adriatico Guesthouse adjacent to the Main Lecture Room. "The Centre's Art Gallery" was formally opened on 9 December in a ceremony hosted by ICTP Director Miguel Virasoro. The gallery's inaugural exhibition featured the work of Carmelo Vranich, a local artist whose paintings have been shown in galleries throughout Europe. About four exhibitions are expected to be organized each year. The latest show, sponsored by the Italian Parkinsonians' Association, examined the expanding role of art in therapy.

WHAT'S NEXT

1 - 3 April
Trieste Conference on Superfivebranes and Physics in 5+1 Dimensions

14 - 30 April
College on Soil Physics

27 - 29 April
MECO 23 (Middle European Cooperation in Statistical Physics)

4 May - 5 June
Spring College on: Statistical Mechanics and Dynamics of Soft Condensed Matter

18 May - 5 June
Second Antonio Borsellino College on Neurophysics: 'Plasticity of Sensory-Motor Systems', including:

3 - 5 June
Mini-Symposium on: New Approaches to the Plasticity of Sensory-Motor Systems

8 - 19 June
Introductory School on String Theory

8 - 19 June
Summer Colloquium on the Physics of Weather and Climate "The Effect of Topography on the Atmospheric Circulation", and

22 - 26 June
Conference on "The Role of Topography in Modeling Regional Weather and Climate"

9 - 12 June
Adriatico Research Conference on "Complex Fluids Far From Equilibrium"

22 - 26 June
III Trieste Conference on Statistical Field Theory

22 June - 4 July
Workshop on "The Physics of the Electronic Behaviour in the Core Region: All-Electron LAPW Electronic Structure Calculations"

29 June - 10 July
Fifth School on "Non-Accelerator Particle Astrophysics"

29 June - 17 July
Summer School in High Energy Physics and Cosmology

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.trieste.it/`

ON E-MAIL
(1) For Yearly Calendar of Scientific Activities
Create a new e-mail message and type
To: `smr@ictp.trieste.it`
Subject: `get calendar 1998`
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 yearly 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.trieste.it`
Under the e-mail's subject, type
Subject: `get index`
Leave the body of the message blank and send it.
You will receive an automatic reply listing all documentation available on that particular activity—the `announcement` or `bulletin` and, in most cases, a separate `application_form`.
To receive the full text of the announcement and/or application form, you will need to send another e-mail message to the same smr code
To: `smr####@ictp.trieste.it`
Subject: `get announcement application_form`
Again, leave the body of the message blank, and send it.

NEWS from ICTP

The 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. Miguel Virasoro serves as the Centre's Director. On 21 November 1997, the ICTP changed its name to The Abdus Salam International Centre for Theoretical Physics to honour its founder.

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

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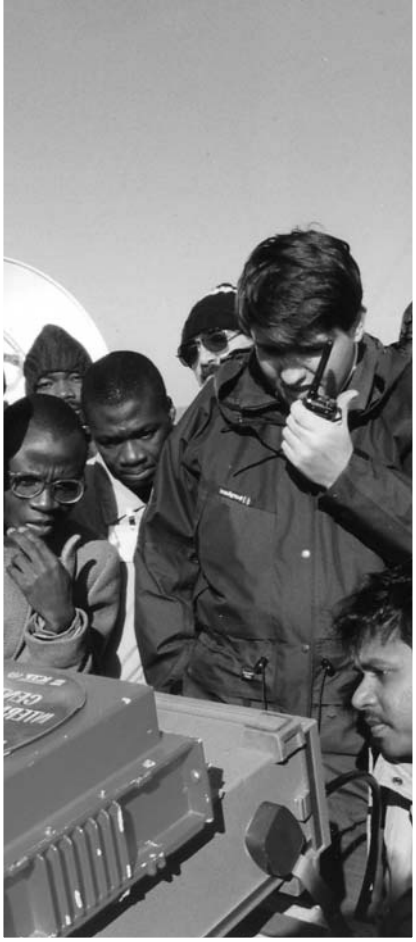

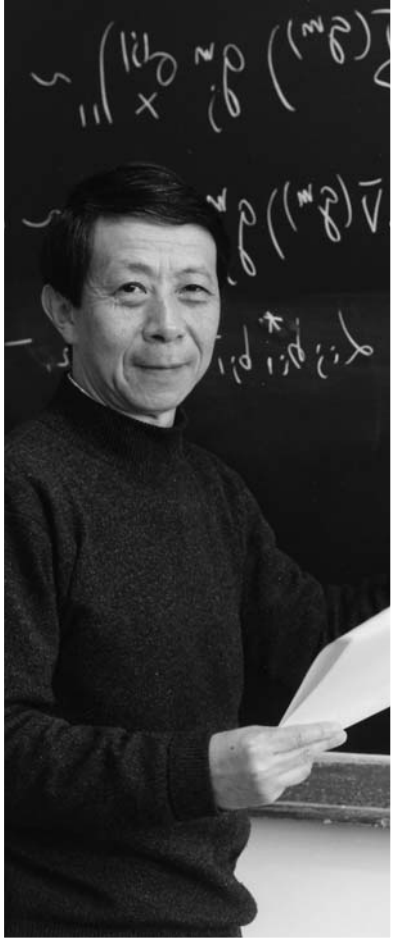


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