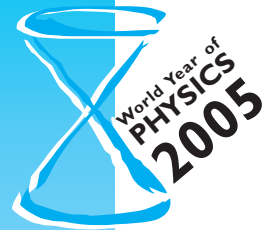




NEWS *from* ICTP



2 WHAT'S NEW
East

8 DATELINE
Tsunami Update
Speakers Corner
i-ROOMs

12 MONITOR
To and From

3 COMMENTARY
Farther East

10 ACTIVITIES
April-June 2005

14 PROFILE
Benoît Mandelbrot

4 FEATURES
Poincaré Conjecture

Physics for Health

**SUMMER
2005**

#113

15 WHAT'S NEXT
Conferences, Schools,
Workshops

Going East

ICTP's global reputation has been built on its contributions to the advancement of science, mainly in the South. Nevertheless, nurturing ties with its scientific neighbours in eastern and central Europe has always been a key aspect of the Centre's overall agenda.

Indeed over the past 40 years, no fewer than 14,000 scientists from eastern and central Europe have participated in ICTP research and training activities.

That's why it should come as no surprise to learn that ICTP has recently forged a partnership with the Central European Initiative (CEI) to help advance that region's scientific capabilities.

"CEI," explains Ambassador Harald W. Kreid, an Austrian diplomat who serves as the organisation's director general, "was created in November 1989 through an agreement between Austria, Hungary, Italy and the former Yugoslavia."

Today the organisation has 17 member states. The Italian government provides most of its funding and the secretariat is located in Trieste.

"CEI's 'founding' purpose," Kreid says, "was to promote a dialogue between systems and ideologies that usually viewed each other with suspicion and hostility."

But two days after the official formation of CEI, the Berlin Wall fell. A European continent that had been split in two for nearly half a century had become one again. As a result, CEI quickly refocused its mandate from one based on 'dialogue' to one based on 'action.'

During the organisation's first decade of existence, CEI largely funded 'feasibility studies' designed to outline potential projects for building and improving small- and medium-sized enterprises, agricultural cooperatives and other institutional structures that would help determine the success of the new political and economic order.

"CEI," Kreid notes, "wanted to help provide a strategic framework for critical investments among our member states." According to a recent study, the €4 million that CEI spent on these initiatives ultimately generated some €250 million in bank loans.

"Once those activities were underway, we began to focus directly on improving the region's overall infrastructure," says Kreid. "CEI is not a large organisation and therefore we have funded relatively small projects to upgrade, for example, local transportation and communication systems and to increase the reliability of local power networks. We have invested our limited funds in ways designed to leverage much larger investments from other organisations, including the European Commission."

"More recently," Kreid notes, "CEI has expanded its efforts to the role that knowledge—and particularly the mobility of knowledge—will undoubtedly play in the region's future well-being."

That's why the organisation has now turned to ICTP and the other international scientific institutions that belong to the Trieste System. "We are fortunate to have such a bright constellation of scientific institutions as our neighbours,"

observes Kreid. "We believe these institutions could help us attain our future goals."

To date, CEI has signed an agreement with ICTP that enables scientists from CEI member states to participate in ICTP workshops and conferences devoted, for example, to wireless communication, photonics and optics, and plasma physics.

The International Centre for Genetic Engineering and Biotechnology (ICGEB), *Elettra* Synchrotron Light Laboratory and International Centre for Science and High Technology (ICS), all located in Trieste, have signed similar agreements, leading to a steady stream of young scientists visiting the city from Bulgaria, Macedonia, Poland, and other nations across eastern and central Europe.

CEI's interaction with Trieste's international scientific institutions—largely through sponsoring the participation of scientists from member states in research and training activities held in Trieste—represents CEI's 'primary' science and technology network.

Now that the primary network is up-and-running, each Trieste-based scientific institution has been asked to forge contacts directly with scientific institutions in CEI member states. These arrangements will represent the 'secondary' network in the strategy.

As a first step towards this effort, ICTP will soon sign a memorandum of understanding with the Belarus Ministry of Education to build networks in material science and high energy physics and with the Romanian Academy of Science to forge networks in photonics and nuclear physics.

"These initial steps," adds Gallieno Denardo, long-time ICTP staff scientist and the Centre's contact person for the CEI-ICTP cooperative programme, "hold great promise for future collaboration. The nations of eastern and central Europe enjoy strong traditions of scientific excellence. For them, the networks should provide valuable opportunities to work in international settings that can take full advantage of their skills and talents."

"For ICTP," Denardo adds, "the programme offers a chance to build true partnerships with high-level scientists. It also improves the prospects for having our scientific neighbours work with us in efforts to assist our colleagues from the South."

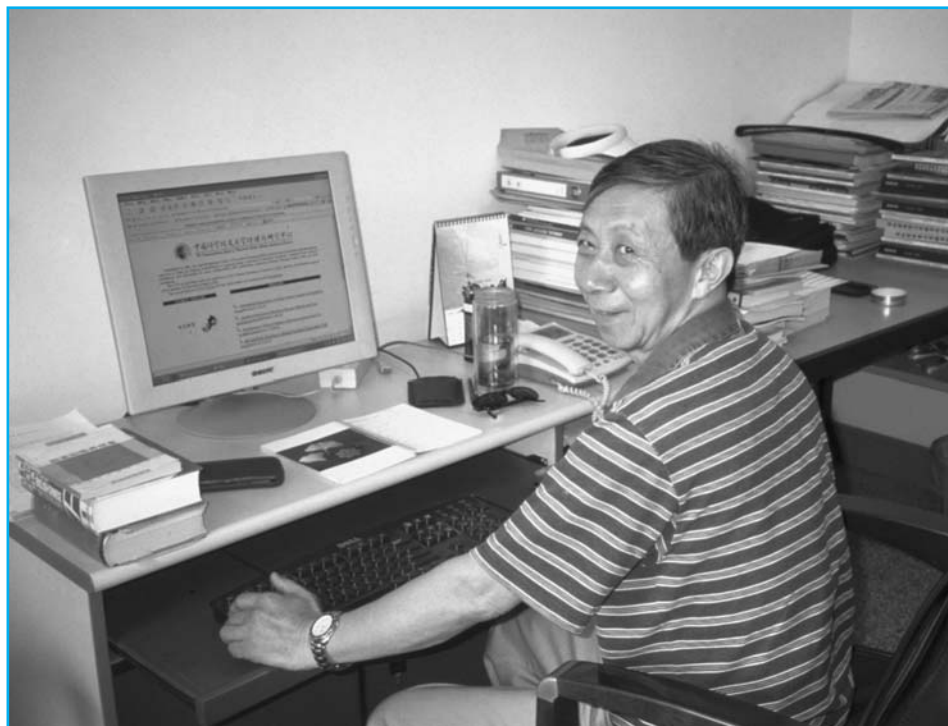
In other words, by going East, ICTP hopes that its focus on the South could ultimately be strengthened. The success of this initiative will provide yet another measure of the Centre's long-standing efforts to improve science across the globe through mutual cooperation and exchange. □



Harald Kreid

Going Farther East

Three years ago, when Yu Lu retired from ICTP, where he had served as long-time head of the Condensed Matter Physics group, he was eager to return to China to work with his native country's rapidly growing number of young researchers. And that's exactly what he's been able to do as the first director of the Interdisciplinary Center of Theoretical Studies (ICTS)



Yu Lu

in Beijing. The Center was created in 2002 by the Chinese Academy of Sciences (CAS), which has provided US\$3 million in funding to cover the Center's first four years of activity.

"ICTS's main aim," says Yu Lu, "is to promote research in the emerging interdisciplinary areas that lie between physics and other branches of science, including biology, chemistry, informatics, material science and mathematics."

"It is not a conventional initiative," he adds. "We don't have a faculty to speak of. Indeed we have very few people with full-time contracts. Most of our 'research tutors' come from Chinese or US universities and research institutes, spending only part

of their time with the Center. Post-doc fellows and long-term visiting scientists come for two to five years. ICTS represents an effort to explore new trends in science in a light but supportive bureaucratic structure. The Center is hosted by the Institute of Theoretical Physics (ITP), and hopefully we will move into a new building by the end of next year."

The Center has formed five teams: (1) computational studies and simulations of complex condensed matter systems; (2) strongly correlated systems and low-dimensional condensed matter physics; (3) physical and mathematical issues in superstring theory and applications to cosmology; (4) interactions and modelling in living systems; and (5) frontier topics in quantum information physics.

Yu Lu explains: "Every research team operates in its own way. For example, in strongly correlated systems, the meetings—dubbed 'journal clubs' and 'paper clinics'—are often held on weekends and involve discussions of articles before they are submitted to journals for formal review. Such discussions permit frank but friendly criticism of each other's work, which not only promotes collegiality but also improves the chances for getting the papers published in internationally renowned journals."

Thanks largely to Yu Lu's assistance, ICTP is lending a helping hand in the development of the new Center. For example, the two institutions held a joint school on Electronic Structure Methods and Applications in Beijing, China, in July 2004, which attracted more than 250 participants. "The lecturers were quite surprised both by the large number of young people and their enthusiasm," notes Yu Lu.

ICTP will continue its collaboration with ICTS next year when three joint schools focussing on string theory, nanosciences and statistical physics are scheduled to take place in Beijing. "We hope to be able to continue to develop excellent programmes and to draw outstanding lecturers and participants," says Yu Lu. "At some point, I hope that ICTS can assume the status of an Asian-Pacific branch of ICTP."

"The experience and inspiration I acquired during my 16-year tenure in Trieste," Yu Lu says, "now guides what I am doing in Beijing. So, in some measure, it's been nice to think that I have taken some of ICTP with me to China." □

The Poincaré Conjecture, one of the toughest problems in mathematics, has apparently been solved.

FEATURES

Poincaré

Shapes, Spaces and Spheres

Take a ball. Any ball. Hold it. Bounce it. Catch it. For most of us, a ball is a ball is a ball.

Now ask a mathematician to take a ball. For him or her, a ball—or more precisely, a sphere—remains a sphere even when it is deflated—even when its shape becomes unrecognisable, even when it resembles a pancake that becomes difficult to move, let alone bounce.

That is because for mathematicians a sphere (the ball's surface) is defined not only by its shape but also by the 'essence of its shape', and that ultimately means it doesn't even have to be round.

This seemingly odd definition, which mathematicians refer to as the topology of the sphere, is due to the fact that mathematicians aim to describe—or, perhaps more importantly, identify—an object such as a ball not only by its shape (or its 'essence of shape'), but also algebraically.

That is to say mathematicians move between the world of numbers and the world of physical shapes in elegant and seamless 'ways of equivalence' that enable the findings of one world to accurately represent the findings of the other world.

This is comparable in its dynamics to the simultaneous translation of different languages. Such thinking is especially important in mathematics because sometimes mathematicians can describe and identify objects algebraically or graphically without being able to see them in the physical world in which we all live—and sometimes we can all see objects in our physical world to which mathematicians cannot assign a mathematical or graphical equivalent. In short, objects often get lost in translation.

That brings us to the Poincaré Conjecture, a mathematical conundrum first stated by the great French mathematician and physicist Henri Poincaré in 1904, which focusses on the relationship of shapes, spaces and surfaces in spheres such as a ball—and a desire to express this relationship in equivalent ways whether the form of expression is algebraic or geometric.

With the Poincaré Conjecture in mind, let's take that ball in hand (or, more precisely, in mind) again, not in an effort

to bounce it but to understand how the surface of the ball (a sphere) can be perceived (translated, if you will) in all its possible configurations.

To successfully enter this world, we must suspend our conventional notion of what a ball is and instead define it abstractly as a set of points that are the same distance from a fixed point.

A ball (or, more precisely, a sphere) on the playing field of mathematics assumes the characteristics not just of a round object but also of mathematical equations and diverse geometric forms. Mathematicians, by turning to topology, can indeed have a sphere that is as flat as a pancake—and, even more unusual, a sphere that may indeed look flat even when round.

In Poincaré's world (and now ours), each point on the ball's surface, close up, looks like a two-dimensional plane. Mathematicians refer to the sphere as a 'two-dimensional manifold that is compact and connected.'

Now, returning from topology to reality, slide a rubber band around the ball holding a finger firmly on a single point. By pulling the rubber band around the ball, you can retract it to the point being held by your finger. Mathematicians call this property 'simple connectedness,' which applies to all two-dimensional spheres. It's for this reason that mathematicians view a two-dimensional sphere as a 'compact, connected *and* simply connected two-dimensional manifold.'

The Poincaré Conjecture characterises abstract three-dimensional spheres in the same way as described above for two-dimensional spheres—that is, it is locally like three-dimensional space (or, as mathematicians prefer to say, it is a 3-manifold); it is connected (you can find your way from one point to another); it is compact (the distance between points is confined); and it is *simply connected*.

However, since this abstract sphere resides in a dimension that is beyond our perceived reality, Poincaré forced himself and his colleagues to turn to algebra to state the conjecture—and that's where challenge has resided for more than a century.



Henri Poincaré

FEATURES

Indeed Poincaré first described this uncompromising, yet unproven, characteristic of a 3-manifold sphere in 1904. The conundrum—how to express algebraically what seemed irrefutable but impossible to prove geometrically—remained unsolved until the Russian mathematician, Grigori Perelman, first presented his proof in 2002.

And now Perelman's proof has been confirmed by an international group of mathematicians whose findings were presented to participants at a two-week conference, titled "Summer School and Conference on Geometry and Topology of 3-Manifolds," held at ICTP this past June. The 60 participants, more than half from the developing world, reaffirmed the judgement of Perelman through a rigorous assessment conducted by a team of reviewers worldwide who meticulously divided their labour to examine each specific aspect of Perelman's complex proof looking for flaws and shortcomings. They found none.

Putting to rest the Poincaré Conjecture, defined as one of the seven Millennium Prize Problems in mathematics by the US-based Clay Mathematics Institute in 2000, makes

Perelman eligible for a US\$1 million cash prize, which the reclusive mathematician has yet to say he will accept.

While riches may await Perelman, what does the Poincaré Conjecture mean for those of us who are not mathematicians? After all, the vast majority of people cannot even begin to understand the nature of the problem, let alone the proof. The best way to understand the importance of this mind-bending puzzle is not to think in terms of its utility but rather in terms of the intellectual challenge and the new perspectives that it provides on how we may live in the universe.

Think, for example, of the Earth's inhabitants 500 years ago. For them, with their close-up perspective, the Earth was flat. Today, astrophysicists, with their wide-angle views, augmented by telescopes that can see deep into space, have concluded that our universe may indeed be infinite.

In fact, the Poincaré Conjecture allows us to envision another possibility: that we live on a three-dimensional sphere that enables our perspective(s) to be both close-up and far away—in effect to be both myopic and infinite, thus laying equal claims to our ancestors and today's visionaries. □

WHO IS POINCARÉ?

French-born Henri Poincaré (1854-1912) is widely recognised as one of the world's greatest mathematicians and physicists, an ingenious scientist who made numerous contributions to mathematics, celestial and fluid mechanics, dynamical systems, the special theory of relativity and the philosophy of science. Much of his research involved interactions between different mathematical topics. Indeed his broad understanding of the full spectrum of knowledge allowed him to address problems from many different angles. He is perhaps best known as the father of algebraic topology. Yet Poincaré also contributed mightily to our understanding of algebraic geometry and number theory. In applied mathematics he studied optics, electricity and telegraphy, and in physics he made major contributions to thermodynamics, potential theory, quantum theory, theory of relativity and cosmology. The breadth of Poincaré's knowledge led him to be the only member of *Académie des Sciences* to be elected to each of the five sections of the Academy: geometry, mechanics, physics, geography and navigation. Much of this information is derived from www-groups.dcs.st-and.ac.uk/~history/Mathematicians/Poincare.html. For more details, consult this website.

WHO IS GRIGORI PERELMAN?

Russian-born Grigori Perelman, who has studiously avoided the public, works at the Steklov Institute of Mathematics in St. Petersburg, Russia. Perelman's proof of the Poincaré Conjecture allows him to claim credit for one of the most sought-after mathematical proofs of the past century, elevating him to the pinnacle of his profession. By all accounts, Perelman couldn't care less. His proof was quietly posted on the web as a 'preprint' three years ago and he's been heard from only occasionally ever since. He seldom attends conferences and he answers email only from fellow mathematicians. Indeed it is not even clear how old he is, which makes it impossible to determine whether he is eligible for the Fields Medal (winners must be younger than 40). There is also some indication, as yet unconfirmed, that he will not accept the US\$1 million prize from the Clay Mathematics Institute in Cambridge, Massachusetts, if it is offered. Indeed he has yet to officially publish his proof in a professional journal. Perelman is a mathematician obsessively dedicated to his work, and such devotion pays off in ways that only he and those who share his passion can understand.

AND WHAT IS MILLION DOLLAR MATH?

The Clay Mathematics Institute, a non-profit foundation established in 1998 by Boston, Massachusetts, businessman Landon T. Clay, is dedicated to increasing and disseminating mathematical knowledge. In 2000, the institute launched the Millennium Prize Problems. A cheque for US\$1 million dollars awaits anyone who can solve one of seven "classic questions that have resisted solution over the years." For additional information about the Clay Mathematics Institute, including a complete list of the Millennium Prize Problems, see www.claymath.org.

Physics for Health

When people think of the impact of science on medicine, they think of biology, they think of chemistry, they may even think of ecology.

But they rarely think of physics.

Yet a strong case can be made that advances in fundamental physics have been responsible for many of the most important breakthroughs in medical science over the past half century.

Think of magnetic resonance imaging; laser surgery; even chemotherapy. All have relied on dramatic breakthroughs in our knowledge of physics.

Indeed medical physicists are responsible for the design and development of much of the high-tech equipment used for the diagnosis and treatment of a broad range of diseases, including cancer and cardiovascular and neurological disorders.

Equally important, one of the primary gaps in advanced medical care between the developed and developing world lies in access to high-technology equipment and well-trained personnel who can operate the equipment.

ICTP recognised the relationship between physics and cutting-edge medical research and clinical applications more than two decades ago when it organised its first College of Medical Physics in 1983. Since then, more than 3000 participants have attended this biennial activity.

Making sure that scientists and technicians receive adequate training in both understanding the behaviour of ionising radionuclides and overseeing safe radiation treatments in clinics and hospitals were the primary goals of ICTP's early courses in medical physics.

"These goals have remained central to the Centre's training and research activities to this day," says Luciano Bertocchi, a long-time ICTP scientist and former acting director who played a central role in the launch and development of the medical physics programme.

"The key responsibility of medical physicists," adds Franco Milano, from the University of Florence, who has participated in many of ICTP's research and training activities in medical physics, "is to develop and apply radiation regimes that maximise the regime's therapeutic value while minimising any adverse health impact for patients. This requires knowledge and skills in such areas as dose optimisation and radiation protection."

"The governments of most nations have also passed strict laws and regulations designed to protect both the rights and health of patients," adds Milano. "Such international 'watch dog' agencies as the International Commission on Radiological Protection (ICRP), headquartered in Stockholm, Sweden, have similar mandates. Medical physicists," he notes, "must keep

abreast of these rules and regulations to be assured that their efforts conform to governmental and intergovernmental directives. Again ICTP's College on Medical Physics has been a critical source of information for these matters."

At a more technical level, ICTP has provided research and training for:

- *Diagnostic radiological physics* focussing on the use of x-rays, ultrasound, radiofrequency radiation and magnetic fields.
- *Radiotherapy physics* focussing on x-rays, gamma rays, electron particle beams and neutrons.
- *Nuclear medicine physics* focussing on the therapeutic and diagnostic applications of radionuclides.
- *Medical health physics* focussing on x-rays and gamma rays, electron and other charged particle beams, and radionuclides.

As Slavik Tabakov, medical physicist at King's College London, UK, who has also participated in many ICTP medical physics research and training activities, states: "The goal in each of these cases is the same—to increase the knowledge and skills of the participants in a broad range of areas related to medical physics and to enhance their abilities to safely and efficiently operate the high-tech equipment that is part and parcel of this field." To accomplish the latter goal, the Centre has partnered with universities, medical research centres and hospitals throughout Europe.

"With the help of its partners, ICTP's fundamental contribution," says Bertocchi, "has been to provide advanced training to scientists and technicians who often come from developing countries where classroom learning may be adequate but where access to equipment for the purposes of training is not." Many research institutions and hospitals in developing countries don't have such equipment and even for those that do, the equipment is simply too expensive to be used for anything other than the diagnosis and treatment of patients. Training is a luxury that they cannot afford. As a result, they choose to leave this critical challenge largely to institutions in the North.

The widespread public health challenge posed by issues related to medical physics led the European Union (EU) to launch the European Medical Radiation Learning Development (EMERALD) project in 1995 under its Leonardus Programme.

EMERALD seeks to provide training opportunities for medical radiation physicists via the new information technologies. Universities and hospitals in France, Italy, Sweden, and the United Kingdom joined the initiative as did ICTP. The result was the creation of a set of compact disk

(CD) training modules and related instructional materials in the fields of x-ray diagnostic radiology, nuclear medicine and radiotherapy. Previously such training material could only be found in bulky and expensive print volumes that were difficult to use and even more difficult to keep current in these rapidly changing fields.

"EMERALD's success," says Tabakov, "can be measured by its popularity. More than 250 hospitals and universities in some 60 countries have used this material."

In 2001, the EU decided to broaden the scope of its activities in medical physics by funding—again under its Leonardus Programme—the European Medical Imaging Technology (EMIT) project, a consortium of universities and hospitals from the same four European countries as EMERALD as well as several international organisations, including ICTP. EMIT provides work-linked training programmes to medical physics graduates and other health care professionals. The centrepiece of EMIT's efforts lie in the creation of internet- and computer-based instruction modules focussing on how to properly use ultrasound and magnetic resonance imaging technologies.

While the modules are no substitute for face-to-face classroom learning, they do have certain advantages. First, they can be updated quickly and inexpensively, which allows recipients to receive the most recent information. Secondly, they can be easily modified to address regional and national needs, which, as Milano, notes, "gives them enormous flexibility in meeting the requirements of a diverse group of learners. All we have to do is to add a segment to the electronic file (or disk) focussing on a set of issues that pertain only to a particular area. This provides added value at very little cost."

The modules' content was first put in place in November 2003 at the EuroConference hosted by ICTP and attended by representatives from EMIT's partner institutions. Following one year of preparation, coordinated by King's College, the 'draft' modules were tested at the 2004 ICTP College on Medical Physics, a two-week activity held in September and attended by more than 90 participants from 37 countries. Participants went through modules step-by-step at computer stations located in the Centre. They also received classroom instruction designed to enhance the learning process. The final stage of the review process entailed sending the modules to institutions in 65 countries that included 43 developing countries.

"The modules, now available in institutions in 79 countries, have become the most widely used training programmes of their kind," says Milano, "providing state-of-the-art instruction for scientists and technicians operating high-technology ultrasound and magnetic resonance imaging equipment."

The modules are both 'easy-to-access' (they are available

on the web) and 'easy-to-use' (all lessons are task-oriented, enabling users to know when they have successfully completed each assignment). In the past year, an 'image database' that contains more than 1100 'generic' images and a 'searchable' electronic medical physics dictionary that lists more than 25,000 terms, have become the two newest additions to the consortium's 'distant learning' strategy.

To celebrate the Leonardus Programme's tenth anniversary, the EU decided to award a series of prizes honouring the programme's best projects. Some 4000 projects were in the



Magnetic Resonance (MR) imaging of backbone

running. EMIT received the first-ever Leonardo da Vinci Award for their "pioneering e-learning materials." The ceremony took place in Maastricht, The Netherlands, in December 2004.

"The award," notes Bertocchi, "is an indication of how effective this initiative has been. This success is due to the energy, commitment, innovation and intelligence of the consortium's partners. ICTP is certainly delighted to have played a role in the development and testing of the modules and we look forward to continuing our participation in the years ahead serving as a valuable bridge between our colleagues in Europe and those in developing countries." □

For additional information about EMERALD and EMIT, see www.emerald2.net.

Tsunami Conference Update

A feature article in the Italian weekly *Panorama* (14 April 2005, p. 166-172), focussing on the role that Italy can play in training scientists from the South to mitigate the effects of earthquakes, highlighted the efforts of the ICTP Structure and Non-Linear Dynamics of the Earth (SAND) group. Relatedly, the recent ICTP conference on tsunami physics and preparedness, held on 24 March 2005, will soon be followed by conferences in Mauritius and Paris. ICTP is poised to play a central role not only in international efforts to train experts but also in the exchange of seismological information by scientists in both the developed and developing worlds.

Radionet

On 20 May 2005, the weekly magazine *Venerdì*, distributed each Friday in the Italian national newspaper *Repubblica*, published an article featuring ICTP's School on Radio Based Computer Networking for Research and Training in Developing Countries, which was organised at ICTP in February. The article examined ICTP's successful training efforts for creating satellite internet connections in developing countries through inexpensive radiowave technology.

Infectious Disease Impacts

ICTP's Workshop on Infectious Disease: Theoretical, Ecological and Economic Approach, 13-15 April 2005, organised by a diverse group of scientific experts working on three continents, sought to analyse the dynamics and epidemiology of infectious diseases. It addressed such issues as the economic impacts of infectious diseases on human and wildlife populations, adaptive response and antibiotic resistance, the cost and effectiveness of vaccination regimes and other control strategies, the relationship between poverty, malnutrition and diseases, the effect of habitat alteration and climate change on disease epidemics, and the emergence of new and resurgent diseases.

Speakers Corner

This spring, ICTP inaugurated its first-ever series of informal lectures by visiting scientists. **Michael Bate**, professor of developmental biology, University of Cambridge, UK, kicked-off the Centre's 'Speakers Corner' series with a talk entitled "From Embryos to Behaviour" in which he examined the emergence of behaviour as the most complex development process taking place in an embryo. The second informal lecture took place on 12 May, when **John Harte**, professor, Energy and Resources Group and Department of Environmental Sciences, Policy and Management, University of California, Berkeley, spoke on "Predicting Climate Change on a Green Planet." Harte examined recent ice-core studies that reveal strong feedback between the Earth's climate and terrestrial ecosystems. **Albert Barabasi**, University of Notre Dame, Indiana, USA, presented the third lecture on 20 May: "From the Cell to the Web." Barabasi described how organic and non-organic networks share the same complex topology and also examined how such complexity helps to shield the systems from failures and external attacks.



John Harte



Albert Barabasi

Geosciences

Eight ICTP scientists made presentations at the European Geosciences Union's second General Assembly in Vienna, Austria, on 24-29 April. Topics ranged from tsunami physics to regional climate modelling to earthquake prediction and the origin of the biosphere. The Assembly was attended by some 6000 scientists worldwide.

Scientific Council



Akito Arima and Jia'er Chen

The 34th meeting of the ICTP Scientific Council took place on 5-6 May in the Centre's Main Building. **Jacob Palis**, chairman of the Council and former director of the Institute of Pure and Applied Mathematics in Brazil, presided. Council members attending their first meeting included **Akito Arima**, chairman of the Japan Science Foundation's Science Museum; **Jia'er Chen**, former president of the National Natural Science Foundation of China; and **Paul Crutzen** (Nobel Laureate in Chemistry 1995), former director of the Atmospheric Chemistry Division at the Max Planck Institute for Chemistry in Germany. The Council reviewed ICTP's activities over the past year and discussed the Centre's future programmes and direction.



Paul Crutzen

Teleportation

"Teleportation—Beyond Star Trek" was the subject of a public lecture by **Francesco De Martini**, professor of quantum optics at the University of Rome "La Sapienza." The lecture took place at ICTP's Kastler Lecture Hall, Adriatico Guesthouse, on 29 April. De Martini's lecture was the second instalment of this year's Public Lecture Series, jointly organised by ICTP and *Immaginario Scientifico*.



Appointments and Awards

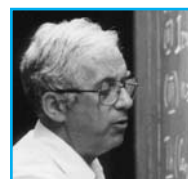
Simon Levin (see "When Maths Meets Ecology," *News from ICTP*, Spring 2000), professor of ecology at Princeton University and long-time director of ICTP mathematical ecology courses and workshops, was awarded the 2005 Kyoto Prize in basic sciences for establishing the field of 'spatial ecology' and expanding scientific understanding of the biosphere as a 'complex adaptive system.' The Kyoto Prize is awarded by the Inamori Foundation and includes a US\$465,000 cash prize.



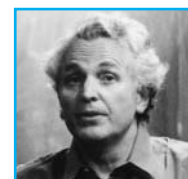
Simon Levin



Daniel Kleppner



Gregory Margulis



Alexander M. Polyakov

Two scientists who have participated in ICTP activities have won the Wolf Prize, which carries a US\$100,000 cash award. **Daniel Kleppner**, professor of physics at the Massachusetts Institute of Technology (MIT), received the 2005 Wolf Prize in physics. Kleppner lectured at the ICTP colleges on lasers in 1983 and 1985. **Gregory Margulis**, professor of mathematics at Yale University, and Sergei Novikov, distinguished professor at the University of Maryland's Institute for Physical Science and Technology and Department of Mathematics, shared the 2005 Wolf Prize in mathematics. Margulis spoke at the ICTP workshop on dynamical systems in 2001. The award ceremony took place at a special meeting of the Israeli Knesset on 22 May. Israeli President Moshe Katsav presided at the ceremony.

Alexander M. Polyakov, Joseph Henry professor of physics, Princeton University, has been elected to the US National Academy of Sciences (NAS). Polyakov, who won the ICTP Dirac Medal in 1986, was one of 72 eminent US scientists and 18 foreign associates elected to NAS in recognition of their distinguished achievements. Election to NAS is considered among the highest honours that can be accorded a scientist. The total number of members in NAS now stands at 1976. The number of foreign associates is 360.

i-ROOMs in Benin

The University of Abomey-Calavi, Benin, has become the first institute to receive a computer-based multimedia kit as part of a new ICTP-sponsored partnership called "i-ROOMs". The kit, developed by ICTP's Science Dissemination Unit (SDU), will link the two scientific institutions via internet for the purposes of exchanging information and broadcasting and archiving seminars and lectures. ICTP Associate **Yebeni Batidao Kouagou**, associate professor at the University of Abomey-Calavi, will serve as the local project's coordinator. Plans call for similar kits to be distributed to other ICTP federated institutes. For additional information, contact sdu@ictp.it.



Yebeni Batidao Kouagou and K.R. Sreenivasan



X-ray Imaging

ICTP recently organised the Workshop on "Advanced X-ray Imaging: Opportunities at ICTP" in collaboration with *Sincrotrone Trieste*, the Commonwealth Scientific and Industrial Research Organisation (CSIRO, Australia), the Italian National Institute of Nuclear Physics (INFN) and the University of Trieste. The workshop, which took place on 19-20 June, is a follow-up to a meeting held in February at ICTP (see *Dateline, News from ICTP*, Spring 2005). Organisers hope to establish an international consortium for advanced imaging physics.

Orsay's Top 100

Two articles co-authored by ICTP staff scientist **Riccardo Zecchina** have been cited as among the 100 best papers produced by scientists who have carried our research at Orsay. With more than 200 labs and 2000 researchers, Orsay is France's largest scientific institution. The listing was published in *Les 100 plus belles découvertes d'Orsay (1955-2005)*. Zecchina's co-authors included long-time ICTP visiting scientist **Marc Mezard**, *Université XI Paris-Sud*, and ICTP Dirac Medallist **Giorgio Parisi**, University of Rome "La Sapienza."

Riccardo Zecchina



Calendar 2006

The ICTP Calendar of events for 2006 is available online. It lists 47 training activities to be held at ICTP next year. New subjects include space weather and science for cultural heritage. Of the six activities to be held outside Trieste, five will be held in Asia and one in Africa. The calendar will be continually updated on the web. See www.ictp.it.

World Year of Physics Finale

As part of the celebration for the World Year of Physics 2005, ICTP, the International Union of Pure and Applied Physics (IUPAP), and the South African Institute of Physics (SAIP) are cosponsoring the World Conference on Physics and Sustainable Development. The conference is scheduled to take place in Durban, South Africa, from 31 October to 2 November 2005. Between 500 and 600 physicists from around the world are expected to attend. For additional information, see www.wcpsd.org.



ACTIVITIES

NUCLEAR STRUCTURE AND DECAY DATA: THEORY AND EVALUATION

4 - 15 April

Organisers: A.L. Nichols (International Atomic Energy Agency, IAEA, Vienna, Austria), J.K. Tuli (National Nuclear Data Center, NNDC, Upton, NY State, USA) and A. Ventura (Commission for New Technologies, Energy and the Environment, ENEA, Rome, Italy).

Local Organiser: B. Stewart (ICTP).



3RD WORKSHOP ON SPATIAL DYNAMIC MODELS OF ECONOMICS AND ECOSYSTEMS & WORKSHOP ON INFECTIOUS DISEASE: THEORETICAL, ECOLOGICAL AND ECONOMIC APPROACHES

11 - 15 April

Organisers: G. Canziani (*Universidad Nacional del Centro de La Provincia de Buenos Aires*, Tandil, Argentina), G. De Leo (University of Parma, Italy), A. Dobson (Princeton University, New Jersey, USA), J. Wilen (University of California at Davis, USA) and A. Xepapadeas (University of Crete, Rethymno, Crete, Greece).

Local Organisers: M. Eberle (*Fondazione ENI Enrico Mattei*, FEEM, Venice, Italy) and M. Marsili (ICTP).

SPRING COLLOQUIUM ON THE PHYSICS OF WEATHER AND CLIMATE: REGIONAL WEATHER PREDICTABILITY AND MODELLING

11 - 22 April

Organisers: F. Giorgi (ICTP), F. Mesinger (University of Maryland, College Park, USA) and Sin Chan Chou (*Centro de Previsão de Tempo e Estudos Climáticos, Instituto Nacional de Pesquisas Espaciais*, CPTEC/INPE, Cachoeira Paulista, Brazil).

WORKSHOP ON IWAP - INCLUSIVE WEALTH AND ACCOUNTING PRICES

13 - 15 April

Organisers: P. Dasgupta (University of Cambridge, UK) and K.-G. Mäler (The Beijer International Institute of Ecological Economics, Stockholm, Sweden).

Local Organisers: M. Eberle (*Fondazione ENI Enrico Mattei*, FEEM, Venice, Italy) and M. Marsili (ICTP).

WORKSHOP ON METHODS AND MATHEMATICAL MODELS FOR ESTIMATING ENVIRONMENTAL DAMAGE FROM ELECTRICITY GENERATION

18 - 22 April

Organiser: A.I. Jalal Ahmed (International Atomic Energy Agency, Vienna, Austria).

Local Organiser: B. Stewart (ICTP).

ICTP-INFM-DEMOCRITOS-ISMO-IUT SCHOOL ON: ELECTRONIC-STRUCTURE CALCULATIONS AND THEIR APPLICATIONS IN MATERIALS SCIENCE, Isfahan, Iran

25 April - 6 May

Cosponsors: DEMOCRITOS National Simulation Center (Trieste, Italy) of the Italian National Institute for the Physics of Matter (INFM), and Center for International Research and Collaboration (ISMO, Tehran, Iran). In collaboration with Isfahan University of Technology (IUT, Iran).

Organisers: S. Baroni (International School for Advanced Studies, SISSA, and DEMOCRITOS, Trieste, Italy), M. Peressi (University of Trieste and DEMOCRITOS, Trieste, Italy) and A. Qteish (Yarmouk University, Irbid, Jordan).

Local Organiser: H. Akbarzadeh (IUT).

WORKSHOP ON GENES, DEVELOPMENT AND THE EMERGENCE OF BEHAVIOUR

25 April - 13 May

Cosponsors: National Centre for Biological Sciences and Tata Institute of Fundamental Research (NCBS/TIFR, Bangalore, India).

Organisers: M. Bate (University of Cambridge, UK), V. Rodrigues (TIFR, Mumbai, India) and K. Vijayraghavan (NCBS/TIFR).



MEETING ON "NETWORK ON ENVIRONMENTAL ECONOMICS IN THE MIDDLE EAST"

2 - 4 May

Organisers: P. Dasgupta (University of Cambridge, UK) and K.-G. Mäler (The Beijer International Institute of Ecological Economics, Stockholm, Sweden).

Local Organisers: M. Eberle (*Fondazione ENI Enrico Mattei*, FEEM, Venice, Italy) and M. Marsili (ICTP).

NONLINEAR COSMOLOGY: TURBULENCE AND FIELDS

9 - 12 May

Organisers: A. Brandenburg (Nordic Institute for Theoretical Physics, NORDITA, Copenhagen, Denmark), A. Dolgov (Institute of Theoretical and Experimental Physics, ITEP, Moscow, Russian Federation) and K.R. Sreenivasan (ICTP).

Local Organiser: A. Bershadskii (Torah Center, Jerusalem, Israel, and ICTP).

WORKSHOP ON QUANTITATIVE ECOLOGY

9 - 20 May

Organisers: J.R. Banavar (Pennsylvania State University, University Park, Pennsylvania, USA), J.D. Damuth (University of California at Santa Barbara, USA), J. Harte (University of California at Berkeley, USA) and A. Maritan (University of Padua, Italy).

FIRST INTERNATIONAL WORKSHOP ON CLIMATE VARIABILITY OVER AFRICA, Alexandria, Egypt

15 - 26 May

In cooperation with: Egyptian Meteorological Authority and Cairo University (Egypt).

Organisers: M. Abdel-Wahab (Cairo University), A. Bracco (ICTP), F. Molteni (ICTP), A. Yousef (Egyptian Meteorological Authority) and A.S. Zakey (University of Gothenburg, Sweden).

SCHOOL AND WORKSHOP ON STRUCTURE AND FUNCTION OF COMPLEX NETWORKS

16 - 28 May

Organisers: A.-L. Barabasi (University of Notre Dame, Indiana, USA), M. Marsili (ICTP), F. Vega-Redondo (University of Alicante, Spain), A. Vespignani (Indiana University, Bloomington, Indiana, USA) and R. Zecchina (ICTP).

Local Organiser: G. Bianconi (ICTP).



PLANCK 05

23 - 28 May

Organisers: B. Bajc (*Josef Stefan Institut*, JSI, Ljubljana, Slovenia), G. Dvali (New York University, New York, USA), A. Melfo (*Universidad de Los Andes*, Mérida, Venezuela), G. Senjanovic (ICTP), Y. Takanishi (ICTP) and F. Vissani (Italian National Institute of Nuclear Physics, INFN, Gran Sasso National Laboratories, Assergi, Italy).

WORKSHOP ON BIOPOLYMERS: THERMODYNAMICS, KINETICS AND MECHANICS OF DNA, RNA AND PROTEINS

30 May - 3 June

Organisers: S.M. Bhattacharjee (Institute of Physics, Bhubaneswar, India) and A. Stasiak (University of Lausanne, Switzerland).

Local Organiser: C. Micheletti (International School for Advanced Studies, SISSA, Trieste, Italy).

CONFERENCE ON COMPUTATIONAL COSMOLOGY

31 May - 4 June

Organisers: A. Ferrara (International School for Advanced Studies, SISSA, Trieste, Italy), Y.P. Jing (Shanghai Observatory, China), U. Seljak (ICTP), D. Spergel (Princeton University, New Jersey, USA), Ue-Li Pen (Canadian Institute for Theoretical Astrophysics, CITA, Toronto, Canada) and S. White (*Max-Planck Institut für Astrophysik*, Garching, Germany).



CONFERENCE ON VORTEX RINGS AND FILAMENTS IN CLASSICAL AND QUANTUM SYSTEMS and WORKSHOP ON NEW EXPERIMENTAL TECHNIQUES FOR THE STUDY OF QUANTUM TURBULENCE

6 - 10 June

Organisers: R. Donnelly (University of Oregon, Eugene, Oregon, USA), M. Gharib (California Institute of Technology, Pasadena, California, USA), K. Moffatt (University of Cambridge, UK), T. Nickels (University of Cambridge, UK) and K. Shariff (National Aeronautics and Space Administration, NASA, Ames Research Center, California, USA).

Local Organiser: J. Niemela (ICTP).

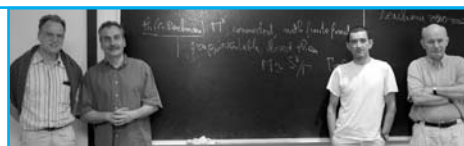
SUMMER SCHOOL AND CONFERENCE ON GEOMETRY AND TOPOLOGY OF 3-MANIFOLDS

6 - 24 June

Organisers: M. Boileau (*Université de Toulouse*, France), C. Petronio (University of Pisa, Italy) and B. Zimmermann (University of Trieste, Italy).

Local Organiser: L. Götsche (ICTP).

From left:
B. Zimmermann,
G. Besson,
L. Bessières and
M. Boileau



ICTP-ITU/BDT ADVANCED TRAINING ACTIVITY ON THE USE OF WIRELESS FOR CAMPUS NETWORKING

6 June - 1 July

Cosponsors: International Union of Radio Science (URSI) and Telecommunication Development Bureau of the International Telecommunication Union (ITU/BDT, Geneva, Switzerland).

Organisers: S.M. Radicella (ICTP) and R.G. Struzak (ITU).

SUMMER SCHOOL ON PARTICLE PHYSICS

13 - 24 June

Organisers: W. Buchmüller (*Deutsches Elektronen Synchrotron*, DESY, Hamburg, Germany), A. Masiero (Italian National Institute of Nuclear Physics, INFN, Padua, Italy) and A.Yu. Smirnov (ICTP).



CONFERENCE ON SINGLE MOLECULE MAGNETS AND HYBRID MAGNETIC NANOSTRUCTURES

27 June - 1 July

Cosponsors: National Science Foundation through the project on Molecular Nanomagnets at Texas A&M University, USA.

Organisers: A. Bhatnagar (Pondicherry University, India), I. Lyuksyutov (Texas A&M University, College Station, Texas, USA), D. Pescia (*Eidgenössische Technische Hochschule*, ETH, Zurich, Switzerland) and M. Sarachik (City University of New York, CUNY, USA).

UNESCO Director General at ICTP

The director general of the United Nations Educational, Scientific and Cultural Organization (UNESCO), **Koïchiro Matsuura**, visited ICTP on 17 May. Matsuura spoke in the Main Lecture Hall and presented the 2004 ICTP Prize to Bernardo Gabriel Mindlin. Other dignitaries who participated in the event included Asaf Hajiyev, secretary, Department of Physical, Mathematical and Technical Sciences, Azerbaijan Republic; C.N.R. Rao, president, Academy of Sciences for the Developing World (TWAS); Renato Angelo Ricci, honorary president, Italian Physical Society; and Victorio Maria José Taccetti, Argentina's ambassador in Rome. Following the ceremony, Matsuura met with ICTP's director and the heads of the Centre's scientific groups, as well as the president and executive director of TWAS, to learn more about the organisations' activities.



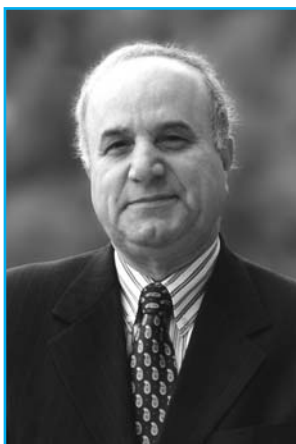
2004 ICTP Prize Lecture

ICTP Prize winner **Bernardo Gabriel Mindlin** presented the 2004 ICTP Prize Lecture on 17 May. Mindlin, an internationally recognised expert in bird physiology and vocalisation, spoke on "The Physics and Neural Control of Birdsong." A professor of physics at the University of Buenos Aires in Argentina and author of more than 50 peer-reviewed journal articles, Mindlin has made major contributions to our understanding of nonlinear dynamical systems in such diverse fields as solar activity, lasers, neural modelling, speech recognition and birdsongs. Mindlin's lecture examined the physical mechanisms at work in the melodious creation of a birdsong and the neural instructions needed to drive this tuneful process. The 2004 ICTP Prize was given in honour of Arthur Taylor Winfree, a distinguished professor of theoretical physics and Regents' professor at the University of Arizona, USA, who died of brain cancer on 5 November 2002.



Badran Appointed Prime Minister

Adnan Badran, former deputy director general of UNESCO, Paris, France, and former vice president of the Academy of Sciences for the Developing World (TWAS), has been named prime minister of Jordan. King Abdullah made the announcement on 5 April. Badran, who has visited ICTP and TWAS on numerous occasions, held the position of president of Philadelphia University, Amman, Jordan, prior to his appointment. He has also served as minister of agriculture, minister of education and secretary general of Jordan's Higher



Council for Science and Technology (HCST). *News from ICTP* published an extensive interview with Badran in 1998, when he was in Trieste to participate in the Abdus Salam Memorial Meeting. See "The ICTP in the Post-Salam Era," *News from ICTP*, Winter 1998, p. 4-5.

ICTP Director at Nathiagali College

ICTP director **K.R. Sreenivasan** travelled to Pakistan to help celebrate the 30th International Nathiagali Summer College on Physics and



Contemporary Needs, held from 27 June to 13 July. The event, which was launched by ICTP founding director Abdus Salam, is designed to promote scientific dialogue and provide opportunities for cooperation and joint research programmes. This year's activities, highlighted by the presence of Pakistan's president Pervez Musharraf at the opening ceremony, focussed on a broad range of fields, including general relativity, cosmology, particle physics, nanoscience, chemistry, biology and seismology.

UNU/IAS Director in Trieste

Abdul Hamid Zakri, director of the United Nations University's (UNU) Institute of Advanced Studies, headquartered in Yokohama, Japan, visited ICTP on 7 April to explore possible avenues of cooperation with ICTP. He was accompanied by Max Bond, executive officer, UNU Office of the Rector, and Caterina Casullo, head, UNU Office in Europe, Paris. It marked the first meeting between the two organisations. Zakri will soon sign a memorandum of understanding between ICTP and UNU designed to lead to joint activities and other cooperative ventures.

Chinese Delegation

A Chinese delegation, led by **Cheng Jinpei**, vice minister of China's Ministry of Science and Technology (MOST), met with the



director's special advisor, **Claudio Tuniz**, and other ICTP staff on 24 May. The group discussed possible areas of cooperation between China's scientific community and ICTP, especially in the area of nanotechnology.

UK Ambassador

The ambassador of the United Kingdom to Italy, Sir **Ivor Roberts**, visited ICTP on 28 April to learn more about Trieste and



From left: K.R. Sreenivasan, John Dodds and Sir Ivor Roberts

its scientific institutions. Accompanied by the honorary British consul in Trieste, **John Dodds**, he met ICTP director **K.R. Sreenivasan** who outlined ICTP's research and training activities.



Opecca Retires

Eleonora Opecca, head of ICTP's Passport and Visa Information Office (see "Monitor", *News from ICTP*, Autumn 2003, p. 12), has retired. Born in Rhodesia (now Zimbabwe), Eleonora began her career at ICTP in 1985 with the Office of Associate Members, Federated Institutes and Italian Laboratories. A decade later, she was appointed head of the ICTP Visa Office, where she remained until her retirement. Before coming to ICTP, Opecca held positions with South African Airways in Johannesburg and the US Consulate in Trieste. ICTP wishes her well in her retirement.

MOU with Azerbaijan

Asaf Hajiyev, secretary of the Department of Physical, Mathematical and Technical Sciences of the Azerbaijan Republic,



From left: K.R. Sreenivasan, Asaf Hajiye and Seifallah Randjbar-Daemi

signed an agreement with ICTP on 17 May 2005 intended to foster greater cooperation between the Centre and Azerbaijan's scientific community.

Onime SCS Acting Head

Clement Onime has been appointed acting head of the Scientific Computer Section, replacing **Alvise Nobile** who has stepped down after more than 20 years as the leader of the group. Onime, who was born in Ubiaja, Nigeria, obtained a master's of science degree in electronic and electrical engineering from Obafemi Awolowo University in Nigeria in 1998, where he also worked as a network system administrator and lecturer until 2000. From October 1998 to October 1999 he was a visiting scientist at ICTP. He joined ICTP in February 2000 as systems and network analyst.



Clement Onime (first from left) and Alvise Nobile (first from right) with IAEA director general Mohamed ElBaradei, September 1999



PROFILE

Benoît Mandelbrot, whose keen intellect has opened our eyes and minds to fractals, visited ICTP last autumn to share his insights into his unique world of shapes and images.

Mr. Fractal

Last November Benoît Mandelbrot, a maverick scientist and the 'father of fractals,' celebrated his 80th birthday at ICTP. It was his fifth visit to the Centre. Participating in the Conference on Practical Applications of Fractals, he brought with him copies of his latest book, *The (Mis)behavior of Markets* (Basic Books, 2004), written with Richard L. Hudson, former managing editor of the *Wall Street Journal European Edition*.

The application of fractal geometry to modern financial theory is just the latest and perhaps most provocative and controversial area in which fractals have been used. Indeed it's fair to say that Mandelbrot has been an intellectual provocateur virtually his entire life. Born in Poland and educated in France, he derived a deep interest in numbers, patterns and graphs from his uncle, a mathematician. Yet he describes his unique abilities as a 'mysterious gift' that has shaped his thinking since his youth: "I was 19 and when a professor described a mathematical problem, I saw pictures in my mind, and the pictures instantly suggested the solution to the problem."

After World War II, professors told him that abstract mathematics drove scientific understanding and that pictures had nothing to do with mathematics. "I was publicly insulted by people who said that what I was doing was an intellectual scandal," Mandelbrot now recalls with a sly smile.

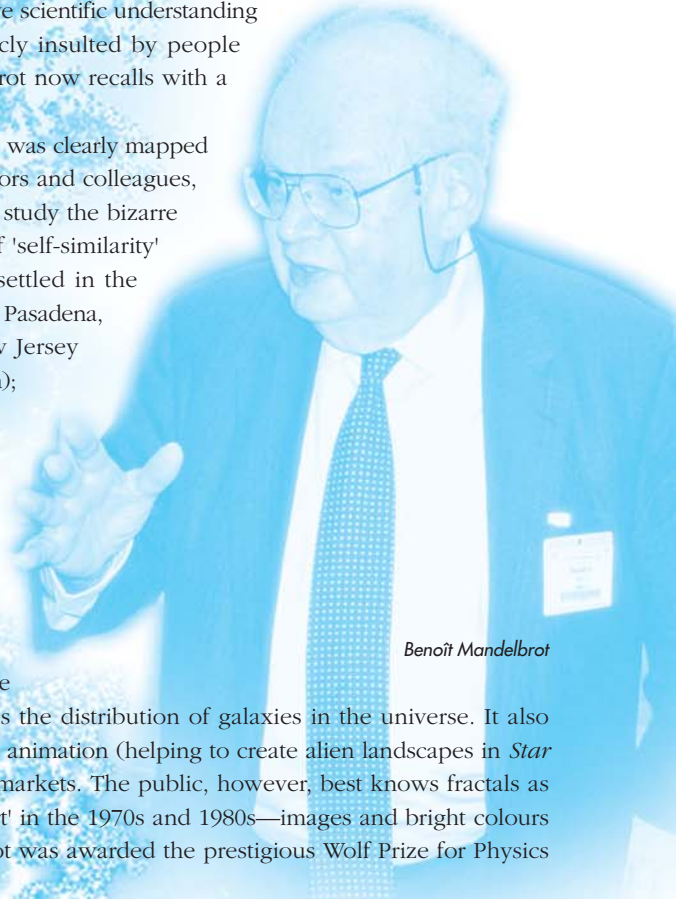
The journey from pictures to fractals and from fractals to mathematics was clearly mapped out in Mandelbrot's mind at an early age. Against the advice of professors and colleagues, he left *École Normale Supérieure* for *Polytechnique* and soon began to study the bizarre shapes of nature, whose parts often mimic the whole. This concept of 'self-similarity' can be applied to a coastline, a leaf, a cloud. In 1958, Mandelbrot settled in the United States where he has lived and worked ever since: first at Caltech in Pasadena, California; then at the Institute for Advanced Study in Princeton, New Jersey (where he studied with the renowned mathematician John von Neumann); the Massachusetts Institute of Technology (MIT); Harvard; and Yale. He eventually landed a job at IBM's Thomas J. Watson Research Center in Yorktown Heights, New York.

Mandelbrot coined the word 'fractal' from the Latin word 'fractus' ('broken') to describe his new geometry of nature. In 1975, he wrote his best-known book, *Les objets fractals*. The expanded English version was published in 1982 under the title *The Fractal Geometry of Nature*.

In 1987, Mandelbrot was appointed Sterling professor of mathematical sciences at Yale. By then, fractal geometry was recognised as a respectable branch of mathematics, explaining the shapes of the clouds as well as the distribution of galaxies in the universe. It also received notoriety in circles beyond science—for example, in computer animation (helping to create alien landscapes in *Star Wars* movies) and ultimately as a model of price changes in financial markets. The public, however, best knows fractals as a kaleidoscope of images and bright colours that helped define 'pop art' in the 1970s and 1980s—images and bright colours that are, in essence, pictures of the Mandelbrot set. In 1993, Mandelbrot was awarded the prestigious Wolf Prize for Physics for "having changed our view of nature."

Today Mandelbrot lives in the leafy suburb of Scarsdale, just north of New York City, where he continues to revel in his maverick ways as the world's 'hippest' mathematician. He remains as dedicated as ever to writing, speaking and travelling widely to explain his once iconoclast but now increasingly mainstream concepts. His friends say he is a living symbol of the richness of complexity and interdisciplinary thought. His critics assail the supreme confidence that lies behind his staunch defence of his work.

"I have been a lone rider so often and for so long that I'm not even bothered by it anymore," he says in the opening pages of his latest book. Adds his co-author Richard Hudson: "As a mathematically minded friend put it, he moves 'orthogonally' to every fashion." □



Benoît Mandelbrot

4 - 22 July

Summer School and Conference on Poisson Geometry

11 - 22 July

School on Quantum Phase Transitions and Non-Equilibrium Phenomena in Cold Atomic Gases

18 July - 12 August

First Regional Workshop on Distributed Laboratory Instrumentation Systems, Jakarta, Indonesia

25 July - 3 August

Summer School and Miniconference on Dynamical Mean-Field Theory for Correlated Electrons Applications to Real Materials, Extensions and Perspectives

25 July - 5 August

ICTP-INFN Microprocessor Laboratory ICTP-KNUST Regional Microelectronics Workshop on FPGA and VHDL for Research and Training in Africa, Kumasi, Ghana

25 July - 5 August

Summer School on Design and Control of Self-Organization in Physical, Chemical, and Biological Systems

8 - 12 August

Conference on Strongly Interacting Systems at the Nanoscale

8 - 26 August

Introduction to Microfluidics

15 August - 3 September

Advanced School and Workshop on Singularities in Geometry and Topology

5 - 30 September

Autumn College on Plasma Physics

12 - 30 September

College on Soil Physics



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.n.c.



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