

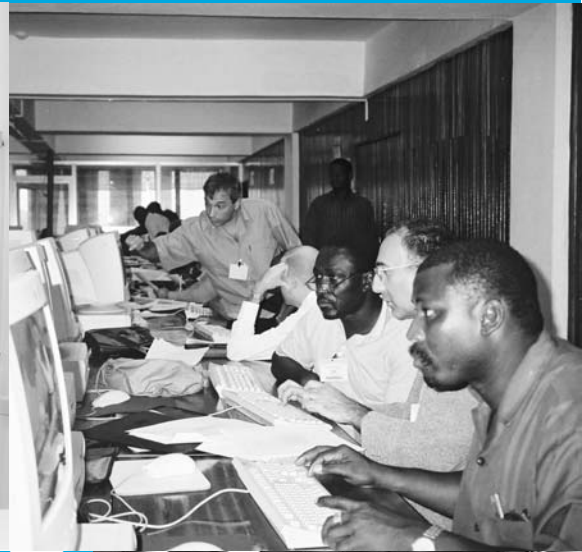


the

abdus salam

international centre for theoretical physics

1964
40th anniversary
2004



NEWS *from* ICTP

2 WHAT'S NEW

New Administrator

8 DATELINE

UN Day
TWAS, TRIL, 20
ICTP Prize Winner

12 MONITOR

ERA
Mail
Memoriam

3 COMMENTARY

Centre Turns 40

10 ACTIVITIES

October-December
2003

14 PROFILE

George Ellis

4 FEATURES

Core of the Matter

Birth of the Centre

WINTER
2003-2004

#107

15 WHAT'S NEXT

Conferences, Schools,
Workshops

ICTP's New Administrator

Here at ICTP, scientists are our customers. The staff's primary job is to provide our customers—our scientists—with the best services and products we possibly can."

That's the prevailing philosophy that Dag Harald Johannessen, the Centre's new senior administrative officer, brings to his position. Johannessen arrived in Trieste in mid October.

His management philosophy is based on his wide-ranging experience in sales, service and personnel.

He began his career as a sales area manager for Jøtul, an international corporation headquartered in his home country of Norway. At the time, Jøtul was the world's largest manufacturer of cast-iron wood-burning stoves and stone fireplaces.

From there, he worked with the Norwegian-based management consultant firm, AVANT, participating in a successful effort to 'turn around' an international firm that manufactured elegant 'facings'—in-laid wood, glass and composite material—for furniture wardrobes sold to hotels, corporate offices and upscale residential homes around the world.

"When I arrived, the firm we were hired to help was heavily indebted and overstaffed. Over a period of 6 to 8 months, we introduced budget and management controls that put the firm back on its feet. Its new-found profitability ultimately led a larger multinational corporation to purchase it for several million dollars. When the firm moved to a new location, I decided to move on too."

Taking on new challenges, he assumed a position with Informatics Engineering Company (INENCO), a licensed importer in Oslo, Norway, specialising in software databases. In addition to heading the company's administrative and accounts offices, Johannessen helped to develop a database designed for large accounting systems that is now used by most universities in the United Kingdom.

After spending nearly a decade in the private sector, Johannessen entered the second phase of his career not as entrepreneur and 'corporate change-agent' but as a civil servant with the Norwegian Space Centre, dividing his time

between a rocket launch facility in Andøya and satellite stations in Tromsø and Spitsbergen in northern Norway. He also served as Norway's delegate to the European Space

Agency (ESA) responsible for administrative and financial matters.

"Working for Norway's space agency," Johannessen notes, "provided a welcome introduction to the world of science, enabling me to learn first-hand the unique requirements of research institutions."

Moving from 'space' to 'trade,' Johannessen was hired by the European Free Trade Association's (EFTA) Surveillance Authority, a one-of-a-kind European organisation headquartered in Brussels and closely tied to the European Commission.

The Authority is responsible for ensuring that Iceland, Liechtenstein and Norway respect the full range of rules, regulations and rights stipulated under the 18-member European Economic Area—a political and geographic entity that includes the 15-

member European Union plus the three nations cited above. Johannessen oversaw administration and personnel for the organisation, which employs about 65 people.

"My responsibilities at the Authority were very similar to my responsibilities at ICTP. Like the Centre, it also has an international staff. In fact, I think every European language—except Portuguese—was spoken there. My family and I very much enjoyed our stay in Brussels, missing only the sea and sunny blue skies of Norway."

Arriving at ICTP just a few months ago, Johannessen has had "a favourable first impression of both the staff at ICTP and the city of Trieste."

"The staff is highly skilled and friendly and the beautiful surroundings in which we work certainly adds to the appeal of the job."

"As for Trieste, the sea and sun are indeed welcome. The city's steep terrain, hillside houses, squares and cafes, in fact, remind me of Bergen, Norway, where I went to university. Now, if I can learn to get by in Italian, I should feel right at home." □



Dag Harald Johannessen

Centre Turns Forty

When Abdus Salam presided over the Centre's inaugural workshop, the International Seminar on Plasma Physics, on 5 October 1964, it marked the successful end to a non-stop four-year journey characterised by intense personal commitment and resolve.

During this period, Salam had spent much of his time in the bureaucratic maze of international organisations trying to persuade those with the power and purse strings to create a global centre for theoretical physicists and mathematicians from the developing world.

At a time when most diplomats and international civil servants set their sites on East-West relations, Salam focussed on what was then an obscure notion: a potential North-South axis in science. His ability to get others to listen—and then act—served as a remarkable testimony both to his persuasiveness and persistence.

Forty years later, the Abdus Salam International Centre for Theoretical Physics (ICTP) is a shining example of the enduring value derived from international scientific cooperation in a troubled world. ICTP, in effect, has become a lasting reflection of Salam's vision.

Vision and persistence have been at the heart of the Centre's experience for the past four decades and represent the most enduring legacy that Abdus Salam has given to the institution that now bears his name.

More than 4000 scientists currently visit the Centre each year attending 40-plus conferences, workshops and seminars in a wide variety of fields related to physics and mathematics.

The Centre's pioneering efforts to forge strategies for the uplift of science in the South—its associateship scheme, diploma course, affiliated centres (through the Office of External Activities), the Training and Research in Italian

Laboratories (TRIL) programme, and long-standing efforts to provide access to scientific literature in the South (culminating with the creation of the *eJournal Delivery Service* in 2001) have blazed a path for scientific capacity building that other institutions and nations throughout the world have sought to follow.

Equally important, ICTP created a nurturing environment for the development of a constellation of institutions in Trieste, each of which is dedicated, in part, to the promotion of science and technology in the developing world.

These institutions include the Third World Academy of Sciences (TWAS), the Third World Network of Scientific Organizations (TWNISO), the Third World Organization for Women in Science (TWOWS), the International Centre for Genetic Engineering and Biotechnology (ICGEB), the International Centre for Science and High Technology (ICS), the International School for Advanced Studies (SISSA), the Synchrotron Light Laboratory *Elettra*, and the InterAcademy Panel on International Issues (IAP).

Collectively, this institutional constellation has given rise to the 'Trieste System,' a name that is gaining increasing resonance across the world as a symbol of global science. The city of Trieste itself has become a crossroads for the exchange of science—both North and South, East and West. The Italian government's willingness to generously support each of Trieste's scientific enterprises reflects the government's own vision—and willingness—to turn Abdus Salam's vision into a reality.

For all of these reasons, ICTP is both a place and an ideal, and on the occasion of our 40th anniversary, we plan to celebrate both.

As a small contribution to the celebration, the next several issues of *News from ICTP* will contain feature articles examining the development of the Centre's existence over the past four decades. The articles will be written in the first person by individuals who have been instrumental in making the Centre what it is today: One of the world's foremost examples of science both as a universal intellectual pursuit and an international forum for inquiry that helps to bring people of different cultures closer together.

We begin in this series with an article by André-Marie Hamende who will examine the events that led to the creation of ICTP in the 1960s. His article begins on page 6. □

Core of the Matter

The successful touchdown and subsequent exploration of the surface of Mars by the US National Aeronautics and Space Administration's (NASA) space rovers *Spirit* and *Opportunity* this past January is a breathtaking victory for both science and society—worthy of the world's attention and awe. Photos of Mars' sand-duned, crater-faced surface beamed through 200 million kilometres of space and onto television and computer screens across the globe represent a stirring triumph of human ingenuity and imagination.

The photos revealed a desert terrain pockmarked, creased and wrinkled by meteorites and long-dormant volcanoes. Yet, scientists believe that beneath Mars' sometimes rocky—sometimes sandy—crust lies a core of soupy, white-hot metallised liquid. It's a core not much different than that lying within our own planet Earth.

No space voyage, regardless of its scope, can delve beneath the surface of planets to tell us what lies within. Indeed the deepest explorations beneath the Earth's surface have probed no farther than 12 kilometres—half the distance from downtown London to Heathrow airport. Better to reach for the stars, so it seems, than to grovel in the bowels of the planets, including our own.

Such efforts—whether taking place here on Earth or through distant excursions to Mars—literally just scratch the surface, failing to shed light on the hidden world that comprises more than 99 percent of a planet's mass.

The good news is that we don't need complex and costly missions to 'explore' the Earth's or—for that matter—other planets' internal environments.

Indeed scientists have relied on such conventional scientific tools as the recording of seismic waves to learn a great deal about the Earth's internal structure. Such studies have shown, for example, that the Earth's core is substantially denser than the other segments of the planet. Similarly, measurements of mass, gravitational forces and magnetic fields, observed through standard methods of remote sensing, have allowed scientists to develop both comprehensive density profiles and a deeper understanding of the internal dynamics not only of the Earth but also of the other planets in the solar system from Mercury to Saturn and beyond.

But the most recent advances in our understanding of the interior environments of planets have come not from observations but from laboratory 'recreations' that enable scientists to imitate the torrid interiors of planets here on Earth. A decade-old revolution in compression techniques, made possible by diamond-tipped pincers, have allowed scientists to literally 'squeeze' micron-sized samples of planetary material into ever-smaller volumes. The study of these compressed samples, in turn, has shed revealing light on the large-scale composition, dynamics and indeed historical evolution of planets.

These 'diamond-squeezed' samples weigh just a millionth of a gramme, less than the weight of the ink-stained dot found at the end of this sentence. Yet, because the laws of nature remain constant to the atomic scale, there is no reason to believe that such experiments cannot be miniaturised even farther, until they are tapered to the size of a few atoms or molecules.

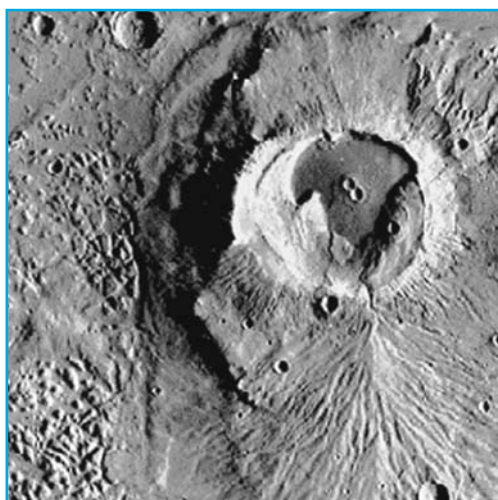
This would be the scale at which current theory and today's computing facilities would enable physicists and chemists to numerically determine the behaviour patterns of atoms and electrons in matter.

In other words, our minuscule laboratory simulations are on the threshold of uncovering the workings of the vast underbelly of our planets—a world that will long remain unseen and untouched.

Call it the computer exploration of inner space—scientific immaculate conception, if you will—devised through simulations where atoms can vibrate, collide and collapse under extraordinary 'programmed' replications of pressure and temperature.

For the past five years, a largely Trieste-based group of scientists, which includes Erio Tosatti who has been associated with the Centre for more than three decades and recently served as ICTP's acting director, has been at the forefront of 'bottom-up' simulated laboratory explorations that seek to understand how matter behaves in the forbidding environments found in the interior of planets.

Their analytical framework of choice has been the study of phase transitions in molecular dynamics. Their tool of choice has been high-speed parallel computers.



A crater on Mars

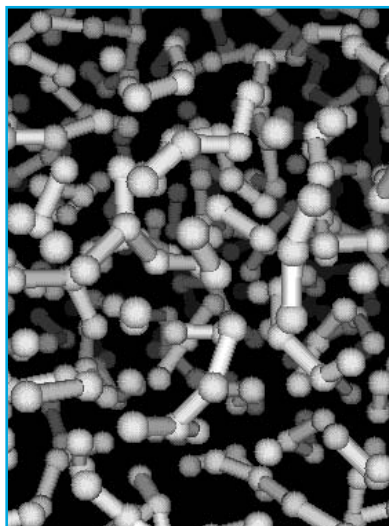
In 1997, the group, which in addition to Tosatti and myself included Francesco Ancilotto (University of Padua) and Guido Chiarotti (International School for Advanced Studies, Trieste), tried to predict the behaviour of methane (CH_4) in the interior of the giant planet Neptune.

About 15 years earlier, scientists at Lawrence Livermore National Laboratory in the United States had concluded that extreme pressure inside Neptune, the solar system's fourth largest planet (Jupiter, Saturn and Uranus are larger) causes methane molecules to completely dissociate, enabling carbon atoms to reassemble into carbon-only diamond clusters. Their analysis created this tantalising hypothesis: Could a giant diamond mine be hiding in the core of Neptune?

Simulations carried out at ICTP over the past seven years confirm that Neptune's central core could indeed be loaded with diamonds. But the vast majority of the planet's mass likely consists of hydrocarbon chains since less intense pressures found throughout most of the region would mean that the methane molecules only partially dissociate to create an endless series of carbon atom chains surrounded by hydrogen atoms.

Transforming methane into diamonds provides a dramatic story line. But like so many things in life (and perhaps beyond), the truth is often much more mundane.

Our studies at ICTP won't bring riches but they do suggest why methane has been eliminated from Neptune's current list of chemical constituents despite the fact that it had once been counted—along with water (H_2O) and ammonia (NH_3)—as one of the planet's three most abundant constituents. Similarly, the wafting of hydrocarbons from the interior into the atmosphere may also help explain why Neptune's life-denying atmosphere is laden with hydrocarbons.



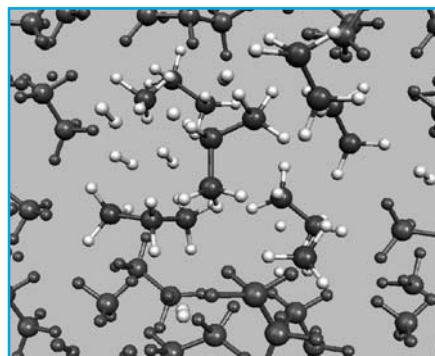
Computer simulation of dissociated hydrogen

accompanied by a large and sudden increase in the density of hydrogen.

In light of this finding, the current picture of Jupiter and Saturn as homogeneous fluid spheres will need to be dramatically modified to account for the sharp transition between a molecular fluid envelope and a dissociated fluid core. Is there any chance we will ever be able to verify this hypothesis? And, more generally speaking, how much trust should we place in the outcomes of numerical simulations?

For those who are impatient, the answer may be soon forthcoming. The spacecraft *Cassini*, launched by NASA in October 1997, will enter Saturn's orbit during the first week in July to begin a four-year tour of the 'ringed' planet. By monitoring Saturn's magnetic field and gravitational impulses, *Cassini* will provide a more detailed density profile of the planet that should help determine whether the atom clusters that my colleagues and I have 'virtually' squeezed in our computers are conveying the truth.

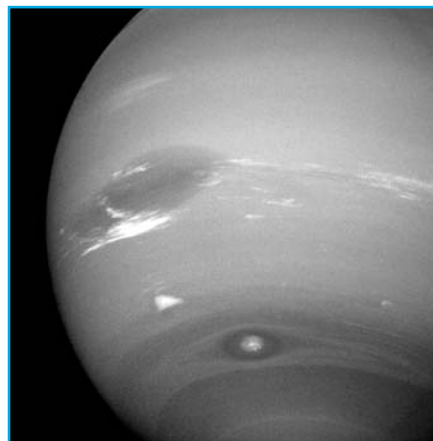
Like theoretical and experimental physicists of a quarter century ago who played their theories and experiments in a wonderfully synchronised intellectual duet (think of Abdus Salam and Carlo Rubbia in revealing and then confirming the existence of the W and Z particles), space scientists and computer modellers may often work in tandem in the future to advance the frontiers of the last frontier. Their efforts, it is hoped, will help us see the solar system's planets both in their outer and inner glory. □



Computer simulation of methane

Jupiter and Saturn are believed to be compositionally much simpler than Neptune. A single atomic species, hydrogen, makes up most of their mass, with traces of helium and other light elements. No experimental apparatus is presently able to recreate in the laboratory the extreme conditions found in the interiors of these two planets. Simulations are the only method available. And the picture that has emerged from our simulations, which we began in spring 2002, have proven quite interesting.

Extreme pressures and temperatures cause hydrogen to dissociate inside Jupiter and Saturn, much like methane in Neptune. But even more surprising is the observation that the pressure-induced transition from a molecular fluid to a dissociated fluid has been



View of Neptune from spacecraft Voyager 1

André-Marie Hamende
ICTP Senior Administrative and Scientific
Information Officer (1964-1990)

André-Marie Hamende, who served as the Centre's first senior administrator and is now its in-house historian, recalls the period that led up to ICTP's creation.

FEATURES

The Birth of the Centre



On 5 October 1964, a group of public officials, largely from Italy, joined eminent physicists from around the world at the Jolly Hotel in downtown Trieste for the inaugural meeting of the newly created International Centre for Theoretical Physics (ICTP). A seminar on plasma physics served as a platform from which to officially launch ICTP.

Sigvard Eklund, director general of the International Atomic Energy Agency (IAEA), was there. So, too, was Guido Gerin, the Italian government's representative to IAEA, as was Begum Liaquat Ali Khan, Pakistan's ambassador to Italy.

Science luminaries included one future Nobel Laureate—Abdus Salam—and Marshall N. Rosenbluth, a professor of physics at the University of California, San Diego, and a former student of Edward Teller.

In all, 73 participants attended the seminar, representing 14 countries in the West, five in the East, and 12 in the South.

At the centre of the event, not surprisingly, were the two founding fathers of ICTP: Abdus Salam and Paolo Budinich, both of whom had worked tirelessly to see this day come to pass.

Salam, a science prodigy born in Jhang, Pakistan, who had fulfilled his promise as professor of physics at Imperial College in London, and Budinich, who was born in Dalmatia and hailed from a family of sea-farers dating back to 17th century Venice (and who was an internationally recognised theoretical physicist in his own right), were an unusual pair—a mismatch that matched perfectly for the task at hand.

I can hardly believe it has been 40 years since that memorable day and I sometimes stand in wonder admiring how the Centre has grown into a world-renowned institution,

sponsoring 40 research and training activities each year that attract more than 4000 scientists from across the globe.

The story of ICTP begins not in 1964 but in autumn 1960 when Abdus Salam, then just 34 years old, outlined a proposal, first at the Tenth Annual International Conference on High Energy Physics in Rochester, New York, USA, and then before delegates attending the General Conference of IAEA in Vienna, Austria, to create an international centre dedicated to theoretical physics that would pay special attention to the needs of scientists from the developing world.

With support from several IAEA member states (mostly from the developing world), the IAEA general assembly agreed to conduct a feasibility study examining the 'pluses and minuses' of the proposed centre.

I first read about Abdus Salam's idea in the French science journal, *Revue de l'Energie Nucléaire*, while working as a researcher at the Nuclear Centre of Saclay in France. I had some recollection of Abdus Salam, but I thought he was from Algeria or Egypt. My knowledge of Trieste was more remote and unreliable. I needed to examine a map to determine where it was.

Who would have thought—least of all me—that within six months, I would be working at IAEA first and then at the Centre, or that I would spend more than 25 years—virtually my entire career—as a staff member of ICTP.

While Abdus Salam walked—and worked—the halls of IAEA seeking international support for the initiative, Budinich sought the backing of Italian authorities, convincing the president of *Cassa di Risparmio di Trieste*, a local bank, to provide 100 million lire (then about US\$160,000) to fund a campaign for having Trieste serve as the 'seat' for the proposed centre.

Budinich's prevailing argument was that the Centre could help ease East-West tensions chilled to the bone by the cold war. The money given by *Cassa di Risparmio di Trieste* led to the creation of a local committee, chaired by the city's mayor Mario Franzil, that proved instrumental in the IAEA's decision to choose Trieste.

Meanwhile, an external scientific panel appointed by IAEA in the spring of 1961, which included future Nobel Laureate Aage Bohr among its ranks, prepared a favourable response to the proposal. Panel members cited the role that such a centre could play in nurturing contacts between scientists in the East and West and in assisting physicists from developing countries—a reaffirmation of the intersecting axis between both North and South and East and West—that Abdus Salam and Budinich had envisioned 'independently together.'

The panel also recommended that the Centre's research and training activities should focus on the fields of nuclear physics, solid state physics, plasma physics and high energy physics. They forecast a scientific staff comprised of about 30 researchers and an annual budget in the neighbourhood of US\$500,000.

The slow but clear sailing that Abdus Salam had encountered through the first year of his ongoing effort to secure support for the Centre soon encountered a series of obstacles set in place by the IAEA's Scientific Advisory Committee (SAC).

The committee, which comprised its own 'heavy weight' scientists (including Nobel Laureate Isidor I. Rabi and Homi Bhabha, the father of nuclear energy in India), suggested that the creation of fellowship programmes at existing centres of theoretical physics (for example, the Institute for Advanced Study in Princeton, New Jersey, USA) could prove a more cost-effective and easier-to-implement response to the problems that the initiative was seeking to address. Committee members

also expressed concern that a centre for theoretical physics would have no practical applications for developing countries struggling to improve their living standards.

As the debate unfolded at IAEA between the panel's and committee's competing strategies, the Italian government publicly stated that it would provide land, buildings and US\$275,000 to cover the proposed centre's operating and programmatic costs—if Trieste was chosen as the Centre's 'seat.'

In Autumn 1961, Sigvard Eklund, a strong believer in Abdus Salam's vision, was appointed the director general of IAEA. With Eklund's steady hand steering the negotiations and with adequate funds on the table (thanks to the generosity of the Italian government), support tilted in favour of Trieste. Still two years of additional discussions and preparation were needed before ICTP became a reality in Trieste. Ultimately, 57 IAEA member states voted for the proposal and four member states abstained. No country voted against it.

Yet, over the next two years before successfully reaching the finish line, Trieste had to contend with proposals emanating from the cities of Copenhagen, Lahore and Vienna to host the Centre, as well as continued suggestions that the issues raised by the proposal could be better addressed by bolstering existing centres rather than creating a new one.

Indeed Eklund bowed to these latter concerns by requesting another assessment of the proposal in the spring of 1963—the third comprehensive review conducted since Abdus Salam first floated the idea in 1960. Robert E. Marshak (University of Rochester, New York, USA), Jaime Tiomno (*Centro Brasileiro de Pesquisas Físicas*, Rio de Janeiro, Brazil), and Léon van Hove (CERN, European Organisation for Nuclear Research, Geneva, Switzerland)—eminent physicists who had worked at the Institute for Advanced Study in Princeton under J. Robert Oppenheimer—were asked to come to Vienna to prepare the study.

Their unwavering, enthusiastic endorsement proved critical for Trieste as the decision-making process headed into the home stretch. Emphasising that training for research at the Centre would be as important as the research that would take place there, the reviewers contended that the Centre could indeed help promote the advancement of theoretical physics in developing countries by enabling scientists to continue their work and interact with colleagues from around the world.

On 13 June 1963, the IAEA board of governors approved the proposal for the creation of an International Centre for Theoretical Physics (ICTP) in Trieste and on 19 September 1963 the board adopted the draft agreement with the Italian government.

The launching pad for the Centre, meticulously constructed over the past several years, was finally in place. The official take-off for ICTP would occur one year later at the Jolly Hotel in downtown Trieste. The rest, as they say, is history. □



DATELINE



TWAS at 20

More than 3000 people attended the opening session of the 9th General Conference of the Third World Academy of Sciences (TWAS), held in the Great Hall of the People in Beijing, China, on 16 October. China's President, **Hu Jintao**, addressed the audience, which included representatives from 77 countries. The conference marked the 20th anniversary of TWAS, which is headquartered at ICTP's campus in Trieste. The four-day event ended with the Beijing Declaration which, among other action items, called on developing countries to forge even stronger programmes for South-South cooperation as a primary strategy for promoting science-based development. At the conference, Brazil, China and Mexico each announced that they would provide 50 fellowships for promising young students in the South under a grant programme administered by TWAS. For additional information about the conference, see www.twas.org.



TRIL's 20th Anniversary

Autumn 2003 marks the 20th anniversary of ICTP's Training and Research in Italian Laboratories (TRIL) programme. The programme enables scientists from the developing world to work in research laboratories throughout Italy. Over the past two decades, TRIL has awarded some 1500 grants to more than 900 fellows from 73 countries. Over 335 Italian laboratories have participated in the programme. For additional information, see www.ictp.trieste.it. For a more detailed account of the TRIL programme, see *News from ICTP*, Spring 1998, pages 12-13.

ICTP Prize Winner

Manindra Agrawal, a mathematician with the Indian Institute of Technology, Kanpur, India, who is currently conducting research at the Institute for Advanced Study in Princeton, New Jersey, USA, is the winner of the 2003 ICTP Prize. With the help of two undergraduate students (Neeraj Kayal and Nitin Saxena), Agrawal recently deciphered the polynomial-time algorithm for testing whether a given number is a prime number (solving the so-called 'primality problem'). In addition to its importance in number theory, 'primality' plays a key role in computational complexity and is also a fundamental tool of analysis in modern cryptography. The award ceremony will take place later this year in Trieste.

Nobel Prize 2003

Three scientists, who have participated in ICTP Condensed Matter Physics group's activities, have been awarded the Nobel Prize in Physics for 2003. **Alexei A. Abrikosov**, Argonne National Laboratory, Argonne, Illinois, USA; **Vitaly L. Ginzburg**, P.N. Lebedev Physical Institute, Moscow, Russia; and **Anthony J. Leggett**, University of Illinois, Urbana, Illinois, USA, have been honoured "for pioneering contributions to the theory of superconductors and superfluids." Abrikosov and Ginzburg lectured at the Adriatico Research Conference in High Temperature Superconductors in 1987. Leggett visited ICTP four times between 1987 and 1996. During his most recent visit, Leggett served as course director of the Workshop on Quantum Dissipation and Applications. For additional information, see www.nobel.se.

Master's Students

The academic year for the 2003-2004 class of the ICTP/SISSA Joint Master's Degree Programme in Modeling and Simulation of Complex Realities officially began on 22 October. The class is comprised of 21 students from 16 countries. The programme was launched in 2001 and graduated its first 'master's' at the end of September.



Alexei A. Abrikosov



Vitaly L. Ginzburg



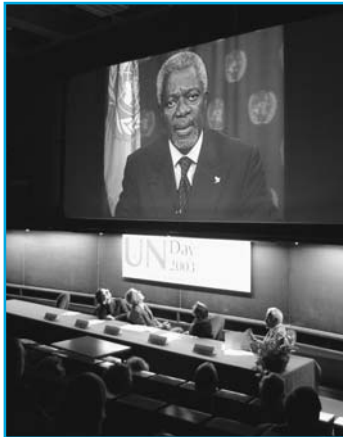
Anthony J. Leggett



Incoming students of the Joint Master's Degree Programme with ICTP director and teachers

UN Day

ICTP director Katepalli R. Sreenivasan hosted the ceremonies for United Nations Day 2003 in the Main Lecture Hall. The event was held on 24 October. More than 300 distinguished guests, scientists and staff were in attendance. The celebration took place just two months after the suicide attack to the UN compound in Baghdad, which killed more than 20 United Nations staff members, including special representative Sergio Vieira de Mello. Their sacrifice was remembered in a video message by UN Secretary General Kofi Annan. During the ceremony, remarks were given by Ana María Cetto, IAEA deputy director general; Arturo Falaschi, director, International Centre for Genetic Engineering and Biotechnology (ICGEB); Graziano Bertogli, deputy managing director, International Centre for Science and High Technology (ICS); and Mohamed Hassan, executive director, Third World Academy of Sciences (TWAS). At the event, five fellowships, sponsored by companies in Trieste and the surrounding region, were given to local high school and university students. There was also an official ceremony honouring Centre employees who have worked with the Centre for more than 20 years, a concert by *Quartetto d'archi Tergeste*, and the opening of the exhibition "Art for Peace".



On Display Abroad

Egypt. To celebrate the centennial anniversary of Egypt's National Research Institute of Astronomy and Geophysics, the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Cairo office organised an international symposium, "Living with Risk: Seismic Hazard, Insurance Sector and Sustainability in the Mediterranean Region," in Egypt's capital city from 6-8 December 2003. ICTP's Office of Structure and Non-Linear Dynamics of the Earth (SAND) group, led by Giuliano F. Panza, served as one of the collaborating institutions. The symposium's concluding resolution recommended that innovative methodologies, such as those developed jointly by the SAND group and University of Trieste seismologists, be used to assess seismic hazards throughout the region and that institutions throughout the Mediterranean basin take advantage of the excellent research and training faculties in Trieste.



Japan. At an exhibition held in conjunction with the 2003 International Symposium on GPS/GNSS, which took place in Tokyo between 15-18 November 2003, ICTP Aeronomy and Radiopropagation Laboratory (ARPL) scientists, led by laboratory head Sandro M. Radicella, displayed and demonstrated ARPL's ionosphere model. The model, which was developed in partnership with the University of Graz, Austria, has been used in the development of the European Space Agency's satellite-based navigation and positioning systems—EGNOS and GALILEO—scheduled for operation later this decade.

Switzerland. At the World Summit of the Information Society (WSIS), held in Geneva on 7-12 December, ICTP Director Katepalli R. Sreenivasan gave a plenary talk and staff members of ICTP's *eJournals Delivery Service* (eJDS), led by Hilda Cerdeira, illustrated the broad-ranging research and training initiatives taking place at the Centre to ensure electronic access to up-to-date scientific information for researchers in the developing countries, especially those in the least developed countries.



ACTIVITIES

CONFERENCE ON HIERARCHY PROBLEMS IN FOUR AND MORE DIMENSIONS

1 - 4 October

Directors: B. Bajc (*Institut Jozef Stefan*, Ljubljana, Slovenia), R. Barbieri (*Scuola Normale Superiore*, Pisa, Italy), G. Dvali (New York University, New York, USA), G. Senjanovic (ICTP) and F. Vissani (Gran Sasso National Laboratories, Italy).

Local Organiser: G. Senjanovic.

AUTUMN COLLEGE ON PLASMA PHYSICS: LONG-LIVED STRUCTURES AND SELF ORGANIZATION IN PLASMAS

13 October - 7 November

Directors: B. Buti (Buti Foundation, New Delhi, India), S.M. Mahajan (Institute for Fusion Studies, University of Texas at Austin, USA), P.H. Sakanaka (*Universidade Estadual de Campinas*, Brazil) and Z. Yoshida (University of Tokyo, Graduate School of Frontier Sciences, Japan).

WORKSHOP ON MODELLING OF PREFRONTAL FUNCTION

15 - 18 October

Directors: J. Grafman (National Institute of Neurological Disorders and Stroke, NINDS, Bethesda, Maryland, USA), T. Shallice (Institute of Cognitive Neuroscience, University of London, UK, and International School for Advanced Studies, SISSA, Trieste, Italy) and T. Zalla (*Institut des Sciences Cognitives*, Paris, France, and ICTP).

Local Organiser: S. Franz (ICTP).

SECOND WORKSHOP ON DISTRIBUTED LABORATORY INSTRUMENTATION SYSTEMS

20 October - 14 November

Co-sponsor: Central European Initiative (CEI, Trieste, Italy).

Directors: A. Induruwa (Christ Church University College, Canterbury, UK), U. Raich (European Organization for Nuclear Research, CERN, Geneva, Switzerland) and C. Verkerk (formerly CERN).



Second Workshop on Distributed Laboratory Instrumentation Systems



Open Discussion at the end of the Round Table on Developing Countries Access to Scientific Knowledge

ROUND TABLE ON DEVELOPING COUNTRIES ACCESS TO SCIENTIFIC KNOWLEDGE: QUANTIFYING THE DIGITAL DIVIDE

23 - 24 October

International Advisory Committee: M. Alarcon (United Nations Educational, Scientific and Cultural Organization, UNESCO, Paris, France), L. Cottrell (Stanford Linear Accelerator Center, SLAC, Menlo Park, California, USA), H.B. Newman (California Institute of Technology, CALTECH, Pasadena, California, USA) and C. Priestley (International Network for the Availability of Scientific Publications, INASP, Oxford, UK).

Directors: H. Cerdeira and E. Canessa (ICTP).

REGIONAL SCHOOL IN HIGH PERFORMANCE COMPUTING ON LINUX CLUSTERS, Mérida, Venezuela

27 October - 7 November

Directors: S. Cozzini (National Institute for the Physics of Matter, INFN, Italy), G. Díaz (*Centro Nacional de Cálculo Científico Universidad de los Andes*, CeCalCULA, Mérida, Venezuela) and H. Hoeger (CeCalCULA).

Regional School in High Performance Computing on Linux Clusters



WORKSHOP ON PLASMA PHYSICS

10 - 15 November

Co-sponsors: International Atomic Energy Agency (IAEA, Vienna, Austria) and Central European Initiative (CEI, Trieste, Italy).

Directors: R. Amrollahi (K.N. Toosi University of Technology, Tehran, Iran) and P.I. John (IAEA).

Local Organiser: B. Stewart (IAEA and ICTP).

COLLEGE ON EVALUATION OF ENERGY TECHNOLOGIES AND POLICIES FOR IMPLEMENTATION OF AGENDA-21

10 - 28 November

Director: A.I. Jalal (International Atomic Energy Agency, IAEA, Vienna, Austria).

Local Organiser: N. Paver (National Institute of Nuclear Physics, INFN, Italy, and ICTP).

College on Evaluation of Energy Technologies and Policies for Implementation of Agenda-21



MICROPROCESSOR LABORATORY AFRICAN REGIONAL COURSE ON ADVANCED VLSI DESIGN TECHNIQUES, Kumasi, Ghana

24 November - 12 December

Directors: A.A. Colavita (ICTP) and F.K.A. Allotey (Kwame Nkrumah University of Technology, Kumasi, Ghana).

Local Organiser: F.K.A. Allotey.

Microprocessor Laboratory African Regional Course on Advanced VLSI Design Techniques



WORKSHOP ON COMPUTATIONAL GENERAL EQUILIBRIUM MODELS

1 - 12 December

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

Local Organiser: M. Marsili (ICTP).

THIRD LATIN AMERICAN SCHOOL IN STRING THEORY, São Paulo, Brazil

1 - 20 December

Organising Committee: N. Berkovits (*Universidade Estadual Paulista*, São Paulo, Brazil), A. Cabo (Institute of Cybernetics, Mathematics and Physics, ICIMAF, Havana, Cuba), A. Font (*Universidad Central de Venezuela*, Caracas, Venezuela), K. Narain (ICTP), C. Núñez (*Instituto de Astronomía y Física del Espacio*, IAFE, Buenos Aires, Argentina), H. Ocampo (*Universidad del Valle*, Cali, Colombia), F. Quevedo (University of Cambridge, UK), S. Randjbar-Daemi (ICTP), V. Rivelles (*Universidade de São Paulo*, Brazil), M. Ruiz-Altaba (*Universidad Nacional Autónoma de México*, Mexico City) and J. Zanelli (*Centro de Estudios Científicos de Santiago*, Chile).

We've Got Mail



From left: Edoardo Nattelli, Marco Sineri, Roberto Cappella, Sandro Pastore, Alessandro Bulzani, Tiziana Dorni and Marina Generutti

When people think of the ICTP Mail Office, not surprisingly, they usually think of the daily distributions of letters, journals and packages.

Well, mail *is* the Mail Office's core responsibility. In fact, the Office handles more than 100,000 pieces of mail each year, including 84,000 science-activity posters and bulletins, 10,000 letters sent by scientists and staff, and 3000 express mail packages. In addition, the office annually distributes about 25,000 pieces of internal mail via its twice-daily rounds on the ICTP campus.

But the fact is that there is much more to the Mail Office than the mail counters found in the Main and Fermi buildings.

As Alessandro Bulzani, head of the office, explains: "Our staff also oversees the Centre's archives, takes the photos for ICTP badges, purchases and distributes the Centre's stationery, helps prepare the folders and placards for the seminars, records

the arrival of all incoming packages, and sells CD ROMs, pens, pencils and stamps."

When Bulzani first arrived at the mail office in the early 1980s, it was a two-person operation. Today, the office's broad-ranging responsibilities require a full-time staff of seven and its facilities take up a large portion of the lower level of the Fermi Building.

"Just as our responsibilities have evolved and expanded over time," Bulzani notes, "so too have the options for mail service. Twenty years ago, we worked with just one company—*Poste Italiane*. Our customers could use only surface or air mail."

"Today," Bulzani says, "we have a variety of options. There is conventional mail delivery with *Poste Italiane*, which has improved a great deal over the past few years. The Italian postal service, for instance, now offers express mail that ensures delivery in two or three days in Europe and a week or so throughout the rest of the world." Then there are private couriers like DHL and TNT that deliver letters and packages virtually anywhere in the world in two to three days.

Bulzani also observes that the widespread use of email and internet creates additional competition for traditional mail-delivery services. "It has certainly had an impact," he says, "but there will always be a place both for surface and air mail. Email and the internet will not eliminate conventional and courier mail services in the same way that television has not eliminated movie theatres. There will be room for both."

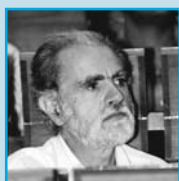
For ICTP scientists and staff that just means more options for exchanging information and news to their colleagues, family and friends. For the mail office, that means keeping abreast of rapid changes in mail delivery services that have come a long way from the 'stamp, slot and send' days of the recent past.

IN MEMORIAM



Marshall N. Rosenbluth, a pioneer in the studies on nuclear fusion who played a central role in the development of ICTP, died on 28 September in San Diego, California, USA. He was 76. Born in Albany, New York, USA, he attended Harvard University and received his doctorate from the University of Chicago in 1949. The following year, Edward Teller (his thesis adviser) recruited him to work on the top secret hydrogen bomb project in Los Alamos, New Mexico. Rosenbluth witnessed the first tests for the hydrogen bomb in the South Pacific. He taught physics at the University of California at San Diego, the University of Texas at Austin, and the Institute for Advanced Study in Princeton, New Jersey. As *The New York Times* wrote on 30 September 2003, Rosenbluth "was a central figure in the ICTP in Trieste," where he served as one of the directors of

ICTP's inaugural activity in October 1964 devoted to plasma physics; headed the research group in plasma physics in 1965-1966; and was a member of the Scientific Council from 1975 to 1982. Rosenbluth was the recipient of numerous honours, including the Albert Einstein Award, the Enrico Fermi Award, and the 1997 National Medal of Science, the highest scientific honour in the United States.



Luis Másperi, a long-time associate of ICTP and director of the *Centro Latinoamericano de Física* (CLAF), died on 2 December in Bariloche, Argentina, after a brief illness. He was 63. Másperi, who was born in Spoleto, Italy, and raised in Argentina, was an internationally renowned theoretical physicist with broad-ranging research interests in particle physics, astrophysics and topology. He was also widely recognised for his dedication to world peace, having served as a member of the Pugwash council from 1999 to 2002. In addition, he shared the 1992 American Physical Society Forum Award with four other Argentinean and Brazilian physicists for their efforts in persuading Argentina and Brazil to abandon their nuclear weapons programmes. Másperi first visited ICTP in 1966 as a young student and retained close ties with the Centre for nearly 40

years. Since 1999, Másperi had served as director of CLAF where, working in concert with the ICTP Office of External Activities (OEA), he helped to strengthen physics research and training throughout Central and South America.

Science Matters

On 21 November, *Sincrotrone Trieste*, in co-operation with the European Strategy Forum on Research Infrastructures (ESFRD) and AREA Science Park, hosted the International Conference on Research Infrastructures in Europe (INFRA/ERA 2003), which was held at *Stazione Marittima* congress centre in downtown Trieste. **Philippe Busquin**, European science commissioner and **Letizia Moratti**, Italian minister of education, university and research, spoke at the event.

ERA

The 2003 edition of ERA—*Esposizione di ricerca avanzata*—was held from 22 November through 5 December at *Stazione Marittima* congress centre in downtown Trieste. This year's theme focussed on 'fire.' ICTP shared a stand with *Laboratorio dell'Immaginario Scientifico* (IS) that included several exhibits examining the 'physics of fire.' Launched in 1991, ERA is a biennial exhibition designed to showcase the work of scientific institutions in Trieste and the surrounding area.



ICTP/IS interactive exhibits at ERA 2003

Genoa Science Festival

A number of scientists associated with ICTP participated in the first edition of *Festival della Scienza*. The event, which took place in Genoa (Italy) from 23 October to 3 November, attracted several thousand visitors. **Riccardo Zecchina**, a scientist with ICTP's Condensed Matter Physics group, participated in a roundtable discussion examining the philosophical and psychological forces that often drive scientific investigations. **Tullio Regge**, winner of the ICTP Dirac Medal in 1996, presented a lecture, "Beyond Physics: Conquests and Questions of Contemporary Physics." **Stefano Fantoni**, a consultant with ICTP's Condensed Matter Physics group and director of the Master in Science Communication at the International School for Advanced Studies (SISSA), explored recent communications strategies in science.

Nasir Iqbal Returns Home

Nasir Iqbal, employed by the ICTP/TWAS Donation Programme since 1990, has left the Centre to return to his home country of Pakistan. ICTP and TWAS staff members will miss his warm and kindly presence, and wish him and his family well in their future endeavours.





PROFILE

World-renowned cosmologist George Ellis, who spent nearly a decade in Trieste, proves that you can go home again.

Going Home

When George F.R. Ellis returned to Trieste last November to deliver the second Dennis Sciama Memorial Lecture at the International School for Advanced Studies (SISSA), it was a voyage back in time. In fact, Ellis—who is now professor of applied mathematics at the University of Cape Town, South Africa, and one of the world’s leading theoretical cosmologists—spent several years (1987-1994) at SISSA as professor of cosmic physics during the darkest period of the apartheid regime in South Africa, the country where he was born.

Dennis Sciama, who headed SISSA’s Astrophysics Sector from 1982 to 1998, had created similar groups in England, first at Cambridge and then Oxford, where he taught a remarkable succession of gifted students who became eminent scientists: world-famous cosmologists and science writers Stephen Hawking and John Barrow, the UK’s Astronomer Royal Martin Rees, and George Ellis.

“My time in Trieste was a happy time,” Ellis recalls. “Dennis had many good people in the group, including John Miller, Antonio Lanza and Marek Abramowicz. He ran the group in a way that maximised its energy and output—concentrating on significant astrophysics problems, on the one hand, and the development of promising students, on the other. We had an excellent interaction with ICTP and I enjoyed teaching students enrolled in the High Energy Physics Diploma Course.”



George Ellis with Nelson Mandela

Ellis studied mathematics and physics at the University of Cape Town, earning a bachelor of science degree in 1961. Three years later he received his Ph.D. at the University of Cambridge, where he was Sciama’s first research student.

At Cambridge, Ellis also had the good fortune of collaborating with Stephen Hawking on the development of modern mathematical approaches to general relativity. Their partnership is described in the widely used textbook that they co-authored: *The Large-Scale Structure of Space-Time* (Cambridge University Press, 1973).

After several years as a visiting professor in the United States, Europe and Canada, “finally,” Ellis says, “in 1973 I came back to South Africa, partly for personal reasons (home is home, after all!) and partly to see what I could do to improve the situation here. In addition to my research, I became involved in economic development projects and housing policy, and later in science policy.”

Ellis has published more than 200 scientific papers—most of them focussing on general relativity theory and its application to the large-scale structure of the universe.

He has also written eight books, not only on pure science but on science policy, economic development issues, science education, and science and religion. Among them: *Flat and Curved Space Times*; *Before the Beginning: On the Moral Nature of the Universe: Cosmology, Theology, and Ethics* (with Nancey Murphy); and *Is the Universe Open or Closed? The Density of Matter in the Universe* (with Peter Coles). In 2002, Ellis edited *The Far-Future Universe. Eschatology from a Cosmic Perspective*, a collection of 18 provocative essays published by Templeton Foundation Press, which was based on a symposium that took place in Rome in November 2000.

“I am still working on cosmology,” Ellis says. “For example, I have just developed a completely singularity free inflationary universe, called the ‘emergence universe.’ It’s a universe that starts static in the past, then expands and becomes a standard inflationary universe. Apart from this, I am working on understanding the way that physics can underlie the existence of complex systems.”

In 1999 Ellis was awarded the Star of South Africa Medal, presented to him by president Nelson Mandela. He expresses high praise for his home country’s peaceful transition from apartheid to democracy. “The Mandela government was amazing, and I think my country was truly blessed by the presence of Nelson Mandela and Desmond Tutu at this critical time in its history.” □

WHAT'S NEXT

5 - 16 January

Teaching Workshop on "Accounting for Urban Environment", Ethiopia

12 - 23 January

Joint DEMOCRITOS-ICTP School on Continuum Quantum Monte Carlo Methods

2 - 13 February

Winter College on Interferometry and Applications in Modern Physics

9 - 27 February

School on Digital Radio Communications for Research and Training in Developing Countries

16 February - 12 March

Workshop on Nuclear Reaction Data and Nuclear Reactors - Physics, Design and Safety

8 - 12 March

Workshop on Safety Significance of Near Field Earthquakes

8 March - 2 April

Workshop on Modeling in Life and Material Sciences and in Technology

15 - 23 March

Spring School on Superstring Theory and Related Topics

22 - 26 March

Follow-up of the First School on Ecological Economics



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/>

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 Yearly Calendar of Scientific Activities

Create a new e-mail message and type

To: smr@ictp.trieste.it

Subject: get calendar 2004

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 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.trieste.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.trieste.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

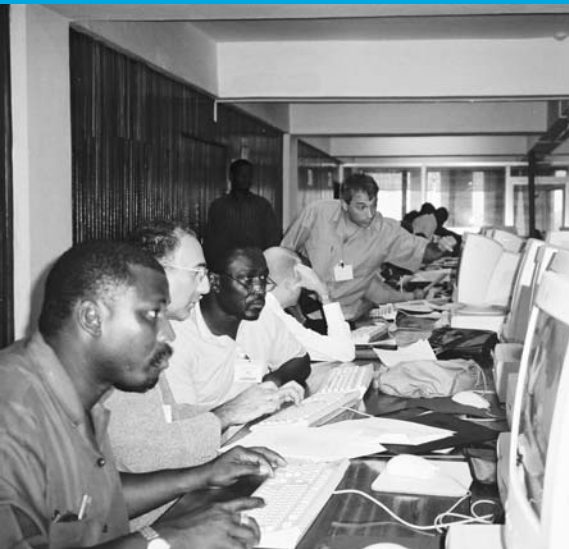
Associazione Progettisti Grafici

Printed by

Arti Grafiche Friulane



1964
40th anniversary
2004



public information office

the
abdus salam
international centre for theoretical physics

strada costiera, 11
34014 trieste
italy

sci_info@ictp.trieste.it
fax: (+39) 0402240565
www.ictp.trieste.it