

# NEWS *from* ICTP



## INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

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## WHAT'S NEW

**W**elcome to *News from ICTP*, the Centre's quarterly publication. It's been a while but we're glad to be back—so glad, in fact, that we've given ourselves a new look.

To help serve your needs, we've decided to divide each issue into a variety of sections or departments. *What's New*, a brief descriptive summary of the contents, will open each issue. A *Commentary*, a bylined essay with a point of view, will follow.

*Features* will highlight important Centre and Centre-related activities; *Dateline* will describe international events of importance to the ICTP; and *Monitor* will examine recent "comings and goings" within Miramare's scientific community.

Our *Report on Reports* section will summarise the results of recent ICTP workshops and conferences, while our *Profile* section will present brief portraits of ICTP scientists and support staff. We'll offer a preview of upcoming Centre activities in our concluding section, *What's Next*. And, on the back page, we'll provide quick references on how to contact us through fax, e-mail and the Internet.

Teamwork is critical to the success of any publication. So I'm delighted to let you know that we have an excellent editorial team. Fabio Pagan, a veteran science writer and journalist who knows the Centre first hand, is our staff writer; Anna Triolo, who has worked for the Centre's Scientific Information Office (SIO) for more than a decade, will serve as our managing editor; and Giuliana Gamboz, SIO's statistician, will help us transmit the latest and most accurate data about the Centre. I will serve as the newsletter's editor, having recently joined the ICTP as its Communications Director. I come to the Centre via The University of Tennessee and Tennessee Valley Authority in Knoxville, Tennessee, USA, where I was a science writer and editor for the past 15 years.

We'll be working hard on *News from ICTP*, but we won't be able to do the job alone. That's why we're asking for your help. If you're participating in a project that you think others would like to hear about, please let us know; if you're involved in an upcoming event that you think others would find of interest, don't neglect to tell us; if you recently published an essay or report, please send us a copy; and if you would like to write an article for us, we're here to help.

The ultimate goal of *News from ICTP* is to give readers a broader understanding of this unique scientific facility, which has served the needs of researchers for more than three decades and continues to play a critical role in the advancement of science throughout the developing world. We think it's a worthwhile goal. We hope you do too.

Daniel Schaffer

## A Dedication...

It's hard to believe that we are approaching the first-year anniversary of the death of Abdus Salam. But, as many of you know, Salam died on 21 November 1996, after a long and difficult illness.

Those of us fortunate enough to have been touched by his life will never forget him. He was an imposing figure, who was as comfortable discussing global diplomacy with heads of state as he was debating gauge theory with his fellow physicists. His scientific prowess—he received the Nobel Prize in 1979—did not undermine his deep religious convictions. And his worldly excursions only strengthened his commitment to his native land of Pakistan.

Salam may be gone but his spirit remains ever-present within the ICTP. Thousands of researchers, largely from the developing world, have benefited from studying at the Centre that Salam created and then guided throughout his enormously productive career. In a life marked by many successes, Salam cherished the success of the ICTP perhaps more than any of his other achievements.

These are some of the reasons why we have decided to rename the ICTP The Abdus Salam International Centre for Theoretical Physics. The memorial meeting at which the official renaming ceremony will take place, will be held at the ICTP headquarters in Trieste, Italy, between 19 and 22 November 1997.

Salam often said that "scientific thought and its creation is the common and shared heritage of mankind." Thanks in part to his efforts, that observation is truer today than at any time in the 20th century. When Salam first suggested the idea of a research centre dedicated to the needs and aspirations of scientists in developing countries, many scoffed at the

idea. As one critic sarcastically noted, "a centre for underdeveloped countries...will remain an underdeveloped centre."

Yet, today, some of the most sophisticated scientific research in the world is taking place in nations that critics said were incapable of such pursuits: Argentina, Brazil, China,

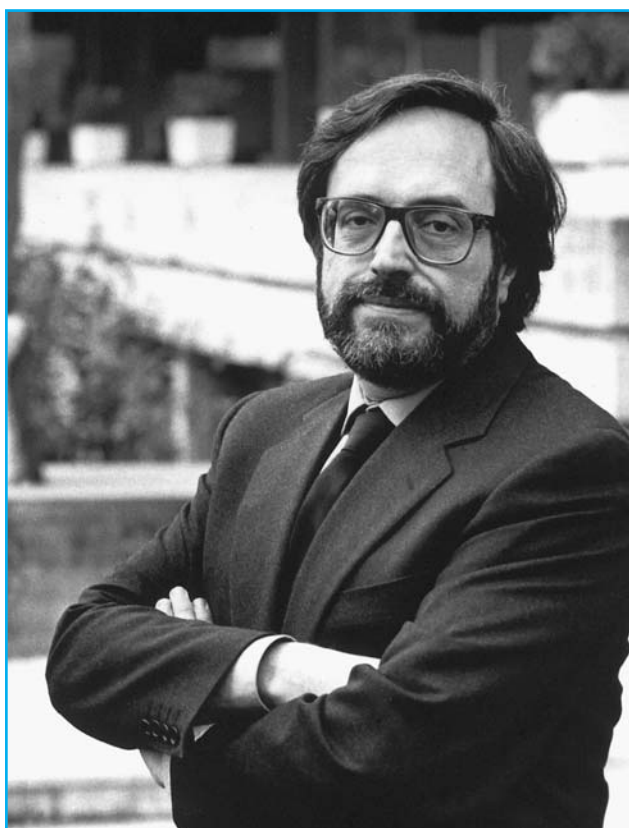
India and Korea now have facilities and scientists that rival those of Europe and North America.

That's not to say problems don't persist. Indeed if Salam were alive today he would be diligently searching for ways to advance the cause of science in the Third World and improve the plight of the billions of impoverished people in developing countries who have yet to share in the world's growing material wealth.

How can we ensure that the next generation of scientists in the Third World enjoy the same opportunities as their predecessors? How can we increase public understanding and appreciation for science in the developing world? How can we narrow the gap between those nations in the Third World that have made significant progress in

establishing viable research agendas and those that have witnessed a deterioration in their scientific expertise?

These are critical issues that demand our attention. But on the occasion of the first-year anniversary of the death of Abdus Salam, let us celebrate the accomplishments of this extraordinary man and let us honour his memory by renaming the institution to which he devoted so much of his intelligence and energy, The Abdus Salam International Centre for Theoretical Physics. It's the right thing to do for both the man and the institution.



Miguel Virasoro

# Abdus Salam: The Man and The Mission

ICTP's founder and Nobel Laureate Abdus Salam died one year ago, on 21 November 1996, in Oxford, England. He had been unable to communicate for the previous three years as a result of a debilitating disease.

In the West, Salam was honoured as one of the foremost theoretical physicists of his generation. In the East, he was praised as the first Muslim to win a Nobel Prize in science.

Salam's reputation was also built on the success of the ICTP, which he often stated was his most prized accomplishment. The institution that he devoted 30 years of his life to—and which he loved dearly—will soon bear his name. After 21 November 1997, the ICTP will be called The Abdus Salam International Centre for Theoretical Physics.

To honour Salam's rich and complex legacy, *News from ICTP* asked two ICTP staff members, Seifallah Randjbar-Daemi and Faheem Hussain, to offer their views on the accomplishments of this charismatic man.

"As a scientist, Salam always had a wide range of interests," says Seifallah Randjbar-Daemi, an Iranian scientist who heads the ICTP's High Energy Physics Section. Randjbar-Daemi first met Salam in 1976 and worked closely with him from the early 1980s until Salam's death.

"His name, however, will forever be tied to the theory that has come to be known as the Standard Model, which is one of the greatest intellectual achievements of this century. The theory represents the cumulative effort of many imaginative thinkers who sought to discover what the physical world is made of and how it works."

"This endeavour," Randjbar-Daemi observes, "is very much in the European tradition. As a result, much of the work was carried out in the wealthy universities of Europe and North America."

"But among the creators of this intellectual system are representatives from other, less wealthy parts of the world."

Together with John Strathdee of the ICTP, Salam in the mid 1970s invented a mathematical framework of supersymmetry known as superspace.

And, in 1979, Salam shared the Nobel Prize with Sheldon Glashow and Stephen Weinberg for the mathematical and conceptual unification of the electromagnetic and the weak forces—concepts later proven to be correct by accelerator experiments in Europe and the United States. Then, during the 1980s and the early 1990s, Salam worked on various aspects of supersymmetry and superstrings.

As Randjbar notes, "Unification was the guiding principle of Salam's scientific thought. He was confident that the new theories of supersymmetry, developed during the 1970s,

would permit the ultimate unification of all the forces of nature."

Ranjbar still marvels at the speed at which Salam could join an entirely new field of research. He recalls, for example, that "In 1984, Michael Green of Queen Mary College in London and John Schwarz of Caltech in the United States circulated a preprint that launched the first superstring revolution." Their work made substantial use of the 10-dimensional supergravity theories.

"Salam asked us to examine the same quantum mechanical consistency problems in models of less than 10-dimensions. We soon constructed a 6-dimensional model and we sent our findings to the editors of *Physics Letters B* less than 10 weeks after they had received Green and Schwarz's breakthrough essay."

"This gives you some idea of the speed with which Salam—and the ICTP—would enter new fields," Randjbar observes. "He was always fired by an intense enthusiasm towards everything that was new and challenging."

Unification and speed characterised Salam's work as a promoter of science in the developing world as well.

Faheem Hussain, a Pakistani who is the coordinator of the ICTP Diploma Course in High Energy Physics, first met Salam at London's Imperial College, where he began his postgraduate studies in 1963.

"I don't know whether at the time of his formulation of the Standard Model, Salam felt he was close to the truth," Hussain recalls. "Salam was always enthusiastic and adventurous in his theories. Some of his ideas, of course, turned out to be great successes. But Salam also had some

failures, some of them quite big," Hussain notes. "This was the mark of the man: to speculate, to go to the edge."

"Salam was very enthusiastic about supersymmetry and especially about superstrings. When superstring theory really took off with the work of Green and Schwarz in the mid 1980s, he wanted everybody to work on it. I think he felt that superstring theory would lead towards further unification."

By then, Salam had certainly come a long way. After receiving his Ph.D. in Cambridge, in 1951, Salam had decided to return to Pakistan to work in his native country. But he was soon frustrated by the environment in which he found himself.

Within three years after his arrival, Salam realised that he faced an unwelcome choice between remaining in his native country and pursuing his professional career. He rationalised his decision to return to England by claiming he would be of no use to Pakistan if his work failed to progress because of the obstacles he faced.

"When Salam returned to Pakistan from Cambridge, he found that he simply could not do physics there," Hussain notes. "There was no structure, no tradition of research and no one to talk to."

As Hussain also observes, there's no doubt that Salam remained deeply troubled by his decision to turn his back on his home land. In fact, that very personal decision subsequently prompted Salam to propose the creation of the ICTP. In his mind, such a centre would help other young scientists avoid the difficult choice that he had to make.

Salam's journey, in fact, eased the way for others who followed in his path. "After I returned to Pakistan in 1968, upon receiving my Ph.D. from Imperial College in London and working as a postdoctoral student at the University of Chicago in the United States, I faced an entirely different situation," Hussain says.

"Thanks to his example, 10 particle theorists returned together to Pakistan to set up a group. We also received support from the ICTP through its Associateship Programme and Federation Scheme."

"We were not so isolated and could continue to do research in our home country, although with difficulty because we were not at one of the main centres of research. Periodic visits to the ICTP during my 20 years in Islamabad, before I left again, kept me alive as a physicist."

"Salam pursued realistic dreams," Hussain says. "He succeeded in implanting science in some developing countries, but not as much as he or others would have liked."

"Science, in fact, has flourished in countries like India, where the government has shown the political will to patronise science. There, the ICTP's help has been crucial. However, science is stagnating in countries like Pakistan, where successive governments have refused to support education and science."

"I think Salam's belief that there can be no economic and social development without scientific development remains as valid today as it was 20 years ago. Unless developing countries grasp this fact, they will remain impoverished."

As a religious man, Salam insisted that the Holy Koran encourages its followers to seek knowledge about nature. But he wrote many times that religious people in Islamic countries often boycott science, despite the

magnificent accomplishments of Muslim scientists and philosophers in past centuries.

Hussain concurs that "Science is often ignored by many religious scholars and mullahs in some Islamic countries like Pakistan." However, he believes the Islamic world is not inherently opposed to science.

"Most people in the Islamic world," Hussain says, "adapt to modern science very well and are hungry for knowledge. Except for a misguided minority, who oppose modern science in the name of so-called indigenous non-Western knowledge, most people welcome scientific knowledge and the benefits it brings."

That, too, is one of the enduring legacies of Salam, another example of his relentless desire for unification.



*Abdus Salam*

When Rexhep Mejdani visited the ICTP in the summer of 1996, he was a Professor of Physics. He returns to the ICTP this November as Albania's Head of State. The new President talks about the dramatic changes both in his life and the life of his nation that have occurred in one short year.

## The Physicist President

On July 24, 1997, Albania's newly formed Parliament elected Rexhep Mejdani, 53, as its President. Mejdani, a Professor of Physics at the University of Tirana, is a long-time friend of the ICTP. In fact, during the past 10 years, he has visited Trieste on 10 different occasions to attend workshops, seminars and conferences on condensed matter, high-energy and computational physics. His resume lists more than 50 publications, including several articles published in *Science*. Mejdani was kind enough to take time from his busy schedule to give *News from ICTP* an exclusive interview. Here are the new President's views on science, politics, and the key role that the ICTP has played in his career.

*President Mejdani, could you briefly outline the situation faced by universities in general and the scientific community in particular in Albania during the 1960s and 1970s? How have things changed since then?*

The University of Tirana was founded in 1957. So, it was a young and, in many ways, an immature institution during the 1960s and 1970s. Yet, both professors and students retained a passion for learning, which made the University an interesting place to be. More recently, however, political uncertainties and financial difficulties have subdued the passion that once existed. Albania must find a way to reinstall the passion of the past so that our scientists again feel that they are engaged in worthy and exciting fields of endeavour. In addition, some of Albania's best scientists and most promising students left Albania during the recent period of uncertainty. In my first speech as President, I invited them to come back and contribute directly to the building of a "new" Albania.

*What role did the ICTP play in your career? And why have so few Albanian scientists taken advantage of the opportunities afforded by the ICTP during the Centre's early years? According to our records, before 1990, only 7 Albanians visited the Centre. Since then, an additional 80 scientists have come. Do you anticipate that number to increase in the future?*

In my scientific career, two moments stand out. The first took place during my postgraduate studies at CEN-Saclay in France, which allowed me to collaborate with a team of superb French scientists—N. Boccara, G. Sarma, R. Bidaux, L. de Seze, who were led by the institution's spiritual leader, Nobel Laureate P.G. de Gennes. During this time, I not only gained valuable knowledge but I developed warm and lasting

friendships. The second moment came when I arrived in 1987 at ICTP in Trieste and came to know Abdus Salam, a great and generous man. I had learned about ICTP from officials at the International Atomic Energy Agency (IAEA) the year before. Since 1987, I have spent a year's time in Trieste, participating in ICTP's courses, conferences, workshops and seminars. The Centre proved instrumental to my career during my years on the physics faculty at the University of Tirana and then as the Dean of Faculty of Natural Sciences. I know the ICTP worked for me and I would be delighted if the level of cooperation between ICTP and Albania's universities and research centres became even stronger in the years ahead.

**Albania's President Mejdani will attend the Abdus Salam Memorial Meeting in Trieste this November.**

*What role do you think basic scientific research should play in the future development of Albania?*

Efforts to achieve immediate concrete results through basic scientific research can often be a heart-breaking exercise. Yet, given the level of intellectual capacity now found among Albanian researchers, both here and abroad, I am certain that basic scientific research will play an important role in the long term. That role will find expression not only in the acquisition of new knowledge but in the transfer of technology that will have positive impacts on the nation's social and economic well-being. To meet these challenges, Albanian universities—and, more specifically, departments of

science—will seek to increase cooperation with academic and research institutions in developed countries. Among the initiatives we plan to pursue are joint conferences, seminars and courses that will help keep our researchers and students up-to-date on global scientific findings.

*Has the environment for basic science in Albania been different from the environment in other countries in Central and Eastern Europe?*

I don't think the environment here has been much different from the environment in other countries in Central and Eastern Europe, especially when you consider the constraints imposed by the small size and limited financial resources of our country. Such constraints make it impossible to create a critical mass of researchers and facilities in all scientific fields. Albania's Academy of Sciences, which includes many institutes of research, functions like many other scientific academies and compares favourably with similar institutions in Eastern Europe. One trend that is particularly encouraging has been the development of cooperative teaching and research among academic departments within Albania's universities and scientific units within Albania's Academy of Sciences. Today, we are studying ways to make our research facilities more dynamic and flexible. We are also trying to develop strategies that will help reduce the isolation of these institutions and integrate them more closely into the larger economy and society.

Rexhep Mejdani

*You are one of the few physicists ever to have been elected president of a nation. Do you think your training will effect the way that you govern? Should other scientists in Albania become more politically active?*

It's true that politicians rarely choose physics as their major area of study. Nevertheless, I think that science—and particularly physics—offer a kind of training that fits well with the intellectual and spiritual demands associated with effective governance. It may be ironic but many scientists in Albania responded to the conditions that our nation faced during the past year or so, and became actively involved in efforts to rebuild the nation's democratic institutions. I hope that their participation continues in the months and years ahead. Albania can certainly use the knowledge and skills that our scientists have to offer.



**The APCTP**

Three years ago, at the first meeting of the International Planning Committee for the Asia Pacific Centre for Theoretical Physics (APCTP), Y.M. Cho, who had spent many years spearheading the effort for the Centre's creation, jotted down what he viewed as its two major responsibilities.

APCTP, he said, should be "A centre of excellence for research in theoretical physics and a centre for the training of theoretical physicists at the post-doctoral and doctoral levels."

That proposal became a reality last June when the newly formed APCTP hosted its first official research activity: an international conference on particles and cosmology.

completely independent of one another, although both hope to eventually work together on specific research projects of mutual interest.

The APCTP's Science Council met in Seoul, Korea, in September to discuss the Centre's 1998 calendar. Next year's activities include a school on string theory and a workshop on condensed matter.

At the September meeting, it was also announced that Nobel Laureate C.N. Yang, Professor of Physics at the State University of New York (SUNY) at Stony Brook and another driving force behind the APCTP, will be the Centre's first President. Y.M. Cho will serve as first Secretary General. He will be responsible for the Centre's day-to-day activities.



*The International Planning Committee of APCTP. Nobel Laureate C.N. Yang stands in the center of the back row; Y.M. Cho is the second person to his left.*

The administrative offices for APCTP, which is modelled after the International Centre for Theoretical Physics (ICTP), will be headquartered in Seoul, Korea. The 10 members of the planning committee—Australia, China, Japan, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, and Vietnam—subsequently became founding members of the Centre.

"We are delighted to have participated in the inaugural conference of the APCTP," says Miguel Virasoro, ICTP's Director. "It's been heartening to see the ICTP concept spread to other parts of the world."

The two institutions—ICTP and APCTP—will remain

**Nigeria on the Net**

Thanks largely to the ICTP, Nigerian scientists will soon be able to communicate with their colleagues worldwide via the Internet. In fact, computers at five Nigerian universities are now "wired".

The project, launched in November 1995 in cooperation with the Obafemi Awolowo University, has grown into a nationwide initiative.



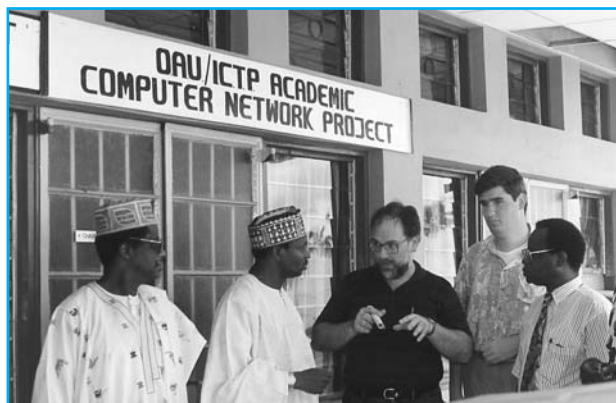
The National Universities Commission of Nigeria has been instrumental in this effort. The World Bank has invested US\$130,000 in the project, and the United Nations University and the ICTP each have provided another US\$50,000.

Nigerian universities will be linked to the Internet through the National Academic Network, which in the initial phase will use the ICTP as its gateway to cyberspace. For now, the ICTP provides the link via electronic mail. The Centre has also provided Internet training for Nigerian personnel.

This marks the first time that the ICTP has offered assistance and support for the establishment of computer networks on university campuses in developing countries.

"The initiative helps broaden the reach of the ICTP without extending its physical boundaries," says Alvise Nobile, Head of the Scientific Computer Section, who coordinates the project along with Sandro Radicella, ICTP's Head of the Aeronomy and Radiopropation Laboratory. "It gives us an opportunity to use our facilities in ways that help overcome the problems of professional isolation, which plague many scientists in the developing world, particularly those in Africa".

The ICTP will now seek to replicate the "networking" success it has achieved in Nigeria in other African nations. The Centre, in cooperation with the Cape Coast University and the Council for Scientific and Industrial Research of Ghana, is presently organizing training activities. The goal is to establish a permanent training system in the future.



*Alvise Nobile at Obafemi Awolowo University in Ile-Ife, Nigeria.*

## ICTP Connections in Latin America

The ICTP's regional colleges and workshops are on the road again. Last spring, the ICTP organized its second Latin American Course on Data Acquisition and Filtering in San Luis, Argentina. The World Bank, United Nations University and National University of San Luis (UNSL) funded the activity. Alberto Colavita, Head of the ICTP's Microprocessor Laboratory and a Professor of Physics at UNSL, directed the course; Andres Cicuttin, ICTP Research Scientist, supervised the laboratory work.

The activity attracted 30 young researchers. Most came from Argentina—about 20 in all. But youthful scientists from

Bolivia, Colombia, Cuba, Ecuador, Mexico and Peru were also in attendance.

Latin America plans to call on the ICTP again next autumn when F. Cino Maticotta, a researcher at the Spectroscopy Institute of the Italian Research Council in Bologna, Italy, heads an ICTP Experimental Workshop on High Temperature Superconductors in San Carlos de Bariloche, Argentina. The workshop will be co-sponsored by Argentina's National Atomic Energy Commission and the Universidad de Cuyo.



*Alberto Colavita at the University of San Luis, Argentina.*

## NEWS FROM ASSOCIATES

**Hari Prakash Garg**, President of the Indian Chapter of the ICTP, has been named a Senior Associate. Garg, a pioneer researcher in the field of renewable energies, is Professor and Coordinator of the Solar Energy Programme at the Indian Institute of Technology in New Delhi. His areas of specialization include photovoltaics, thermal and solar energy, and energy education and curricular development. Garg has authored or co-authored a number of books, including *Renewable Energy Engineering Education*, *Renewable Energy Technologies*, and *Solar Energy: Fundamentals and Applications*. Garg's tenure as Senior Associate will continue until 1999.

**Nguyen Ai Viet**, a Regular Associate working in the field of condensed matter physics, has been appointed Director of the Institute of Physics in Hanoi, Vietnam. The Institute, one of Vietnam's most respected research centres, employs 100 scientists. Nguyen will remain a Regular Associate until 2000.

**Etienne Desquith**, a Regular Associate specialising in algebraic studies, has been named the new Director of the Institut de Recherches Mathématiques (IRMA) in Abidjan, capital city of Côte d'Ivoire. Desquith has taught at IRMA's Math Department and Engineering School. His term as a Regular Associate ends in December.



## REPORT ON REPORTS

### RESEARCH WORKSHOP ON CONDENSED MATTER PHYSICS

30 June - 22 August

**Co-sponsor:** Istituto Nazionale per la Fisica della Materia (INFM).

**Organizers:** G. Baskaran, P.N. Butcher, H. Cerdeira, S. Fantoni, L. Glazman, V. Kravtsov, S. Lundqvist, C.-W. Lung, P. Main, E. Molinari, A. Mookerjee, F.S. Persico, L. Reatto, S. Shenoy, E. Tosatti, M. Tosi, D. Walgraef, H. Wio, Yu Lu. *For the first time, the Condensed Matter Workshop was divided into 4 consecutive topical miniworkshops. This new, more formal, structure is designed to help ICTP visitors gain broader exposure to the latest advances in their fields.*

**Miniworkshop on Quantum Monte Carlo Simulations of Liquids and Solids**, 30 June - 11 July, incorporating a 3-day conference on **Quantum Solids and Polarized Systems**, 3 - 5 July  
**Directors:** S. Fantoni (SISSA), L. Reatto (Milano).

*The miniworkshop brought together scientists working in the field of Monte Carlo simulations to review both the progress and the obstacles that stand in the way of future developments.*

**Miniworkshop on Superconducting Mesoscopic Structures**, 14 - 25 July  
**Directors:** L. Glazman (Minneapolis), V. Kravtsov (ICTP).

*On the one hand, recent technological breakthroughs in mesoscopic systems, including normal metal-superconductor junctions, superconductor-semiconductor junctions and ultra-small superconducting grains, have led to new phenomena that call for theoretical interpretation. On the other hand, recent advances in the theory of quantum coherent phenomena, mesoscopic fluctuations and electron-electron interactions have sparked new theories*

*that may ultimately be applied to various technologies. This miniworkshop explored the technological and theoretical challenges faced by mesoscopic structures and systems.*

**Miniworkshop on Pattern Formation and Spatio-Temporal Chaos**, 28 July - 8 August

**Directors:** H. Cerdeira (ICTP), D. Walgraef (Bruxelles), H.S. Wio (Bariloche).

*Lectures covered areas in which pattern formation plays a relevant role, including fluids and hydrodynamics; chemical systems; biology and medicine; material sciences; and lasers and quantum optics.*

**Miniworkshop on Quantum Wells, Dots, Wires and Self-Organizing Nanostructures**, 11 - 22 August  
**Directors:** P.N. Butcher (Warwick), P. Main (Nottingham), E. Molinari (Modena).

*The physics of semiconductors continues to expand at rapid pace. As a follow-up to previous miniworkshops on quantum dots in 1995 and wells in 1996, this workshop explored recent advances in quantum dots and wells and examined self-organising nanostructures.*

### ADRIATICO RESEARCH CONFERENCE ON SIMPLE SYSTEMS AT HIGH PRESSURES AND TEMPERATURES: THEORY AND EXPERIMENT

1 - 4 July

**Co-sponsor:** SISSA.

**Directors:** P. Loubeyre (Paris VI), J. Kohanoff (ICTP), E. Tosatti (SISSA/ICTP). *Ultra-high pressure physics has emerged as a "hot" topic, largely due to the discovery of diamond anvil cells that permit unprecedented levels of*

*compression. At such extreme pressures, matter behaves in unique ways that spur new chemical reactions and materials. Ultra-high levels of compression also create powerful synchrotron radiation sources that permit scientists to conduct spectroscopical measurements on samples inside the diamond anvil cells. The conference focused on the current state of ultra-high pressure physics.*

### ADRIATICO RESEARCH CONFERENCE ON SUPERCONDUCTIVITY, ANDREEV REFLECTIONS AND PROXIMITY EFFECT IN MESOSCOPIC STRUCTURES

8 - 11 July

**Co-sponsor:** U.S. Air Force European Office of Aerospace Research and Development.

**Directors:** E. Burstein (Philadelphia), L. Glazman (Minneapolis), T. Klapwijk (Groningen). Local Organizer: S. Shenoy (ICTP).

*Mesoscopic conducting structures exist at a scale between nanometers and micrometers. At low temperatures, electrons in such tiny grains and channels are governed by quantum mechanics and influenced by the geometry of the structures. That makes their flow or transport properties particularly interesting. The conference focused on transport phenomena at the interface between normal conductors and superconductors. Specific topics included the Josephson effect (tunnelling of electron pairs between superconductors); proximity effect (superconductor electron-pairs leaking into normal metal); and Andreev reflection at normal and superconductor interfaces. Participants examined the synergies between theoretical and experimental advances in the field.*

## IX TRIESTE WORKSHOP ON OPEN PROBLEMS IN STRONGLY CORRELATED SYSTEMS

14 - 25 July



Philip Anderson

**Organizers:** G. Baskaran (IMS, Madras), P. Coleman (Rutgers), A. Georges (ENS, Paris), E. Tosatti (SISSA/ICTP), A. Tsvelik (Oxford), Yu Lu (ICTP).

*The workshop drew one of the largest groups of theorists and experimentalists dealing with solids in which electronic processes are dominated by strong electron-electron repulsions. The ICTP has become a leading international centre in this field.*

## ADRIATICO RESEARCH CONFERENCE ON STM-BASED LITHOGRAPHY AND ATOMIC ELECTRONICS

15 - 18 July

**Directors:** M.H. Nayfeh (Urbana - Champaign), A.L. de Lozanne (Austin), H.-J. Guntherodt (Basel), M. Aono (Institute of Physical and Chemical Research, Saitama, Japan), P. Avouris (IBM). Local Organizer: E. Tosatti (SISSA/ICTP).

*Fabrication of micro-circuits, which use nano-scale techniques derived from scanning tunnelling microscopy, is an area of growing technological interest. Conference topics included the scanning tunnelling microscope; atomic force microscope; nanometer-scale*

*fabrication; atomic manipulation; applications of nanoelectronic devices; new materials and methods for nanofabrication; optical properties of silicon nanostructures; advances in probe microscopy; and industrial applications of scanning probe microscopy.*

## SUMMER COLLEGE IN CONDENSED MATTER ON STATISTICAL PHYSICS OF FRUSTRATED SYSTEMS

28 July - 15 August

**Co-sponsor:** European Commission.  
**Organizers:** S. Franz (ICTP), M. Mézard (ENS, Paris), D. Sherrington (Oxford).

*The college consisted of a series of lectures designed for post-doctoral and advanced Ph.D. students focusing on recent developments in the field of frustrated systems.*

## SUMMER SCHOOL ON ELLIPTIC CURVES

11 - 29 August

**Co-sponsor:** European Commission.  
**Directors:** S. Edixhoven (Rennes I), G. Frey (Essen) and J. Oesterlé (Institut Henri Poincaré, Paris). Local Organizers: M.S. Narasimhan (ICTP), G. Vidossich (SISSA/ICTP).



Stuart Kauffman

*Elliptic curves defined over algebraic number fields play a key role in "number theory" and other areas of mathematics. The summer school focused on Merel's proof and conjectures concerning the number of torsion points on an elliptic curve. The first two weeks were devoted to instructional lectures in several different fields, including elliptic curves and modular symbols. In the last week, proofs were presented, together with lectures by experts on recent developments in the arithmetic of elliptic curves and modular symbols.*

## EXTENDED RESEARCH WORKSHOP ON STATISTICAL PHYSICS OF FRUSTRATED SYSTEMS

18 August - 7 November

*This workshop brought together a diverse group of scientists working in the field of frustrated systems in an effort to create an environment that would foster interaction and spark new ideas. It sought to nurture a cross-fertilisation of intellectual concepts among scientists working in a broad area of inquiry related to the same general subject matter.*

## ADRIATICO RESEARCH CONFERENCE ON NONLINEAR COOPERATIVE PHENOMENA IN BIOLOGICAL SYSTEMS

19 - 22 August

**Directors:** G. Careri ("La Sapienza", Rome), S.A. Kauffman (Santa Fe), L. Matsson (Gothenburg). Local Organizer: H.A. Cerdeira (ICTP).

*Interest in nonlinear modelling of biological systems has expanded from a few biological phenomena (such as protein folding and neural networks) to studies of integrated processes in which cooperativity plays a role. The conference sought to discuss the origins and driving forces behind biological events. It also sought to draw nonlinear modelling into more direct contact with "real" life phenomena.*

## ADRIATICO RESEARCH CONFERENCE ON THE DYNAMICS OF COMPLEXITY

26 - 29 August

**Director:** L. Pietronero ("La Sapienza", Rome).

**Co-organizers:** P. Bak (Niels Bohr Institute, Copenhagen), B.B. Mandelbrot (IBM and Yale).

*Leading scientists from different but related fields presented a broad overview of the theoretical progress that has been made during the past decade in understanding both the art and science of physical phenomena.*

## SCHOOL ON ALGEBRAIC K-THEORY AND APPLICATIONS

1 - 19 September

**Co-sponsor:** European Commission.

**Directors:** H. Bass (Columbia Univ., NY), A.O. Kuku (ICTP) and C. Pedrini (Genoa).

*The school emphasised the multidisciplinary nature of Algebraic K-Theory in mathematics in light of its*

*phenomenal growth over the past three decades. Topics included an overview of basic constructions, definitions, computations, and concepts in various mathematical areas; K-Theory and Algebraic Geometry; K-Theory and Arithmetic; and K-Theory and Cyclic Homology.*

## WORKSHOP ON TELECOMMUNICATIONS: SCIENCE, TECHNOLOGY AND APPLICATIONS

15 September - 3 October

**Co-sponsor:** United Nations University.

**Directors:** M.V. Pitke (TIFR, Mumbai, India) and S.M. Radicella (ICTP). Director of Laboratory: M. Periasamy.

*As we approach the next millennium, telecommunications is a key factor behind economic and social development. The workshop, which drew experts from academia, research institutes and private industry, examined the rapid advances both in technology and services that have propelled this growth. Several practical exercises were*

*designed to supplement theoretical discussions. Among the topics covered were digital transmissions and switching, signalling systems, wireless technologies, narrow- and broad-bands, intelligent networks, and digital-signal processing.*

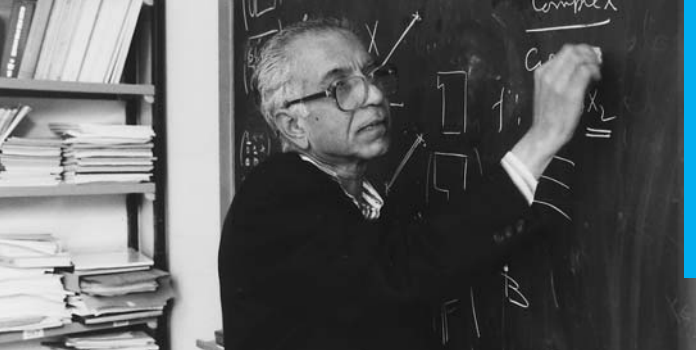
## TRIESTE CONFERENCE ON CHEMICAL EVOLUTION - V. EXOBIOLGY: MATTER, ENERGY AND INFORMATION IN THE ORIGIN AND EVOLUTION OF LIFE IN THE UNIVERSE

22-26 September

**Co-sponsors:** International Centre for Theoretical Physics, International Centre for Genetic Engineering and Biotechnology, European Commission DG XII, Consiglio Nazionale delle Ricerche, UNESCO, European Space Agency, National Aeronautics and Space Administration, Weizmann Institute Genome Project, Universités Paris VII and Paris XII, Instituto de Ciencias Nucleares, Universidad Nacional Autónoma de México, Assicurazioni Generali.

**Directors:** J. Chela-Flores (ICTP, and IDEA, Caracas) and F. Raulin (LISA, Universités Paris VII and Paris XII). *The conference explored the endlessly intriguing topic of the possibility of life beyond Earth. The programme, which included some of the world's foremost experts both in radiosatellite technology and the chemical origins of life, covered the following topics: inert and living matter; the evolution of genetic information; and the search for extrasolar planets and extraterrestrial intelligence. For the first time, an ICTP conference also included a public lecture that was open to the non-scientific community in Trieste and the surrounding area.*





## PROFILE

From an early age, M.S. Narasimhan was fascinated by geometry. ICTP's Head of the Mathematics Section has turned this passion into a distinguished career.

# Counting on Math at the Centre

**A**s a small child growing up in a rural village in southern India, I remember spending hours drawing diagrams on the walls of my house. My parents appreciated my enthusiasm but they wanted me to express my interest in geometry in a different, more conventional, way. So, they bought me a blackboard and some chalk."

That's how Mudumbai Seshachalu Narasimhan, Head of ICTP's Mathematics Research Group, recalls his earliest explorations into the world of geometry.

His childhood delight has turned into a lifelong pursuit of teaching and research that has taken him to universities and institutes in the United States, England, Japan, France and Germany.

For more than 25 years, between the mid 1960s and early 1990s, Narasimhan served as Professor of Mathematics at Tata Institute of Fundamental Research in Bombay (recently renamed Mumbai), India, one of that nation's pre-eminent research institutions. Then, in 1992, he was lured to the ICTP by the late Abdus Salam, the Centre's founder.

Since his arrival at the Centre, Narasimhan has sought to provide a stronger thematic focus for the activities of the Math Group.

"Each year, we choose a particular theme—for example, last year the theme was algebraic and arithmetic groups. We then invite about 50 young researchers and students who are interested in the theme. We also invite two or three of the world's top experts to come to Trieste so that the visitors can interact with them. For instance, Armand Borel of Princeton University and Israel Gelfand of Rutgers University visited the ICTP last year."

"The goal," Narasimhan says, "is to create a critical mass of activity that allows researchers with similar interests to exchange ideas and learn from one another. We also hope those who attend profit from the presence of well-known experts."

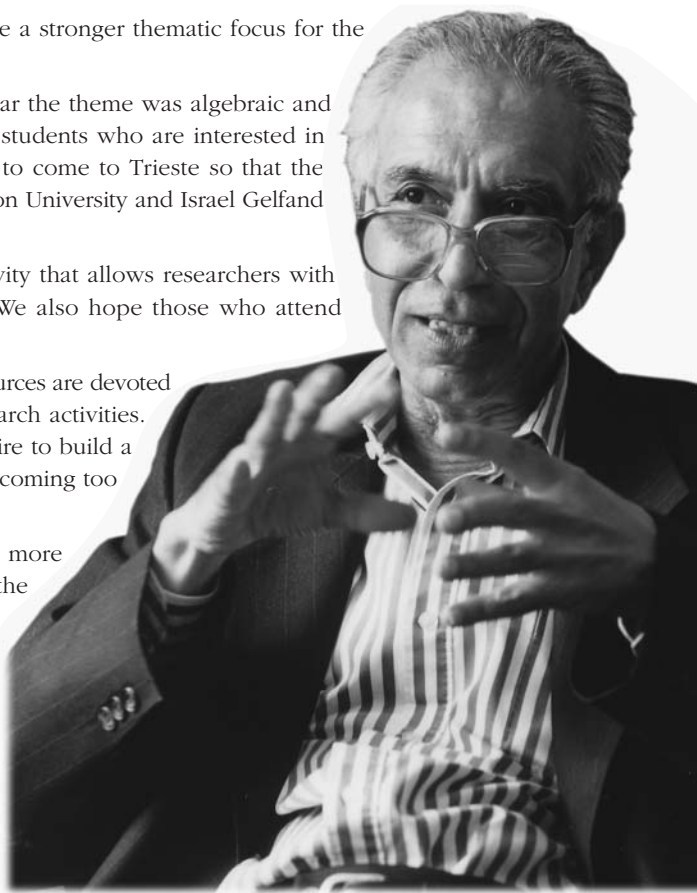
"Right now," notes Narasimhan, "about 50 to 60 percent of our resources are devoted to a particular theme. The rest of our budget is spent on other research activities. We believe this approach provides a good balance between our desire to build a more structured environment at the ICTP and our concerns about becoming too specialised."

The strategy seems to be paying off. Over the past three years, more than 400 researchers from around the world have participated in the activities of the Math Group. Some participants have garnered impressive awards at home. For example, Li Jiayu, a Centre post-doc between 1992 and 1994, recently received a three-year, \$125,000 fellowship from the Chinese government.

Narasimhan, who was elected a Fellow of the prestigious Royal Society of London last year, believes that the ICTP's Math Programme should continue to build a global reputation for itself in the fields of differential and algebraic geometry. "It's not enough for the Centre to be known as a place where young scientists come to study. The ICTP also needs to be recognised as a world-class research centre in select fields."

"We think that geometry is a field where the staff has already established a level of expertise that we can build on," Narasimhan adds. "We also think that its close relationship to quantum physics makes geometry a natural choice for our area of in-house concentration."

The blackboard that Narasimhan's parents gave him years ago has long-since been discarded. But the diagrams he drew on that blackboard helped to build a strong foundation for his career as a mathematician. Now, through the ICTP, he's hoping to provide opportunities for others who will follow in his footsteps.

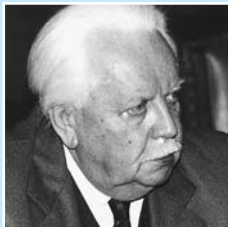


M.S. Narasimhan

## TRIBUTES

### Juan Jose Giambiagi

passed away in Rio de Janeiro on January 8, 1996. Giambiagi, who was a Professor of Theoretical Physics at the University of Buenos Aires at the time of his death, is best known as the guiding light behind Argentina's "golden age" of science, which prevailed from the late 1950s through the mid 1960s. A charismatic leader, Giambiagi helped an entire generation of young physicists in Argentina, including ICTP's current Director, Miguel Virasoro, gain international recognition for their work. Giambiagi was an early Associate of the ICTP and later served as a member of the Centre's Scientific Council.



### Claudio Villi,

a theoretical physicist and former President of the Italian National Institute of Nuclear Physics (INFN), died on December 18, 1996. Born in Trieste, Villi was Professor of Physics at

the University of Padua. He was a strong proponent of nuclear physics research in Italy, a senator in the Italian Parliament and a key figure both in the creation of the ICTP and the decision to house the Centre in Trieste.

### Maurizio Zifferero,

former Deputy Director General of the International Atomic Energy Agency (IAEA), died in Rome on June 20, 1997. He was a long-time point of contact for the ICTP at IAEA. Zifferero gained worldwide recognition as leader of a United Nations team of experts who were responsible for inspecting Iraq's nuclear and biological facilities after the Gulf War in 1991.



### Two String Theorists Awarded Dirac Medal

Two British researchers, Peter Goddard of the University of Cambridge and David Ian Olive of University College of Swansea (United Kingdom), have won the 1997 ICTP Dirac Medal. The award, established in 1985, carries a \$5,000 cash prize.

The Dirac award has again been granted to scientists who have conducted pioneer research in string theory. Goddard and Olive were nominated for the Dirac Award by Edward Witten of Princeton University, a 1985 Dirac Medal winner and now a member of the selection committee. Last year, *Time* named Witten as one of America's 25 most influential people.

### And the Winner Is...

Arun M. Jayannavar, Research Fellow and Assistant Professor at the Indian Institute of Physics in Bhubaneswar, India, is the winner of the 1996 ICTP Prize. His field is solid state physics. This year, the ICTP Prize was given in honour of the late Sir Nevill Mott, who won the Nobel Prize in 1979 for his work on "glassy" semiconducting materials.



Jayannavar received his bachelor and master of science degrees from Kamatak University in Dharwar, India, in the mid 1970s, and his doctorate degree from the Indian Institute of Science in Bangalore, India, in 1982.

### New Home for ICTP Staff

About 70 of ICTP's staff members moved into the Centre's newest facility, the Enrico Fermi Building (EFB), last January. The two-storey, cement-cast building, with a copper-coloured aluminium façade, sits just above the Centre's Main Building. The structure houses ICTP's main administrative services, including personnel and visa offices, as well as a bank, travel agency and insurance facility. Staff from the Third World Academy of Sciences (TWAS) and ICTP's Physics of Weather and Climate Laboratory also reside at EFB. The move has opened additional space in the ICTP's Main Building for scientists and research support staff.



## 2 - 4 October

Trieste Conference on Phenomenological Aspects of Superstring Theories

## 6 - 24 October

4th Workshop on Non-Linear Dynamics and Earthquake Prediction

## 13 October - 7 November

Autumn College on Plasma Physics

## 15 October - 15 December

Extended Workshop on Highlights in Astroparticle Physics

## 3 November - 5 December

School on the Use of Synchrotron Radiation in Science and Technology: "John Fuggle Memorial"

## 10 - 14 November

International Topical Conference on Plasma Physics: New Perspectives of Collective Effects

## 19 - 22 November

Abdus Salam Memorial Meeting

## 12 - 16 December

European Women in Mathematics 8th General Meeting

## 12 - 30 January 1998

School on the Use of Radio for Digital Communications in Developing Countries



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

### ON THE WORLD WIDE WEB (WWW)

Our address is <http://www.ictp.trieste.it/>

### ON E-MAIL

#### (1) For Yearly Calendar of Scientific Activities

Create a new e-mail message and type

**To:** [smr@ictp.trieste.it](mailto:smr@ictp.trieste.it)

**Subject:** get calendar 1998

Leave the body of the message blank. Send it.

Your e-mail will generate an automatic reply from the ICTP server containing the most updated version of the yearly Calendar.

#### (2) For Information on a Specific ICTP Activity

Each activity in the Calendar has its own 'smr' code number, which is located on the last line of each activity description. The 'smr' number will enable you to obtain more information—if available—on those activities you are interested in. To receive this more detailed information, create a new e-mail message and type the smr code number that you found on the calendar:

**To:** [smr####@ictp.trieste.it](mailto:smr####@ictp.trieste.it)

Under the e-mail's subject, type

**Subject:** get index

Leave the body of the message blank and send it.

You will receive an automatic reply listing all documentation available on that particular activity—the announcement or bulletin and, in most cases, a separate `application_form`.

To receive the full text of the announcement and/or application form, you will need to send another e-mail message to the same smr code

**To:** [smr####@ictp.trieste.it](mailto:smr####@ictp.trieste.it)

**Subject:** get announcement `application_form`

Again, leave the body of the message blank, and send it.

## NEWS from ICTP

The ICTP is administered by two United Nations Agencies—the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Atomic Energy Agency (IAEA)—under an agreement with the Government of Italy. Miguel Virasoro serves as the Centre's Director.

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

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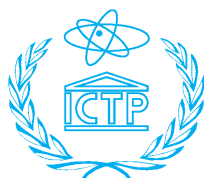
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