

NEW DIRECTOR TAKES OVER AT ICTP

June 1995 saw the end of one era and the beginning of a new one at the International Centre for Theoretical Physics when Prof. Miguel Angel Virasoro, 55, took over as Director. The post of the Director was vacant since January 1994, when the Founding Director, Prof. Abdus Salam, retired due to ill health, after guiding the institution for thirty eventful years.

The difficult task of finding a suitable replacement for Prof. Abdus Salam was entrusted, by the International Atomic Energy Agency and UNESCO, to a distinguished Search Party consisting of eight representatives of the sponsoring agencies, the Italian Government, and ICTP itself. Finding a successor for Abdus Salam was not easy. What was required was a distinguished physicist, reasonably young and active, politically agile, preferably from one of the developing countries, who was familiar with the working of the Centre and sympathetic with its philosophy, and also one who would have the support of the physics community. This was a tall order. The Search Party initially selected Dr. Praveen Chaudhari, then Vice-President of IBM T.J. Watson Research Center, in April 1994. However, Dr. Chaudhari declined the offer in December 1994 due to reasons of ill health. The Committee went back to work again, interviewed several candidates and finally suggested Prof. Virasoro as the person most suited to this arduous task, of inheriting Salam's noble vision and work and carrying it forward to the 21st Century.

This choice was subsequently confirmed by the Directors General of IAEA and UNESCO.



Professor Miguel Angel Virasoro is the new Director of the ICTP.

On 27 March 1995, Dr. Hans Blix, Director General of the International Atomic Energy Agency, made the announcement in his statement to the Board of Governors of the IAEA in Vienna, Austria. He said, "We interviewed the candidates on the Search Party's short list and came to the conclusion that Dr. Miguel Angel Virasoro is well qualified to take over the directorship of the Centre. Dr. Virasoro has been associated with the work of the Trieste Centre and thus has a thorough understanding of its scientific mission and administrative functioning. He is universally respected for his scientific achievements in theoretical physics and is thoroughly familiar with the problems faced by Third World countries. I have consulted the Director General of UNESCO, Mr. Mayor, on this matter and he shares my view that Dr. Virasoro will bring to the post the quality of leadership needed to ensure the continued vitality and scientific success of the Centre. The Italian Government, which is the major donor of the Centre,



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INTERNATIONAL
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PHYSICS

NEWS FROM ICTP

No. 81
SEPTEMBER 1995

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has also been consulted.”

Born in Buenos Aires (Argentina), Prof. Virasoro obtained both his first degree (in 1962) and Ph.D. (in 1967) in physics from the University of Buenos Aires. His first postdoctoral appointment was at the Weizmann Institute, Israel, from 1967 to 1968. From 1968 to 1971 he worked as a postdoctoral fellow in the United States, first in Wisconsin and then later at Berkeley. He returned to his native Argentina in 1971 as Associate Professor in the Department of Physics at the University of Buenos Aires. It is worth recalling that, at about that time, Prof. Abdus Salam had just instituted the Associate Scheme to encourage young physicists to go back and work in their own countries. Prof. Virasoro was one of the first Associates of the ICTP. In 1973 he was appointed as “Delegado Interventor” of the Faculty of Exact Physical and Natural Sciences at the University. In his own words, “This was a rather atypical appointment by a freshly elected Government after 7 years of military dictatorship”. Many Argentinian professors, who were exiled in Europe and the USA, went back to Argentina to re-organise the University after years of military rule. Here is how Prof. Virasoro himself describes that period: “With them we launched new research programmes. It was an extremely challenging experience, with continuous urge to innovate. Unfortunately, the political turmoil was very strong and the situation deteriorated, ending in a new period of military rule and forced exile for many of us.” This initial period of wandering exile first took him to the Institute of Advanced Studies, Princeton, then to the Ecole Normale Supérieure, Paris, on to the Italian National Institute of Nuclear Physics in Turin, and finally to CERN. He settled permanently in Italy in 1981 when he was appointed as Professor of Physics in Lecce. Since 1982, he has been Professor of Theoretical Physics at “La Sapienza” University in Rome. He has acquired Italian citizenship, while still maintaining his Argentinian citizenship.

Prof. Virasoro’s scientific work is characterized by the breadth of his interests. He has made significant contributions in several different fields. His initial scientific work was in elementary particle physics where he made extremely important contributions in the late 60’s. Along with Gabriele Veneziano he was one of the founders of what was known as the dual theory of elementary particles which later proved to be the precursor of string theory. During this time, he discovered the algebra which justly bears his name and which plays a crucial role in modern string theory. On his return to Argentina he took up research in Oceanography. Later Prof. Virasoro took up statistical mechanics and complex systems, and applied the

methodologies of theoretical physics to biological systems. In particular, he has studied models of neural networks which try to simulate some working mechanisms of the brain.

In 1994 he was awarded the Medaille Rammal de la Societé Française de Physique.

As his first official duty at the ICTP, Prof. Virasoro presided over the opening ceremony of the Conference on S-Duality and Mirror Symmetry on 5 June 1995.

It is clear that Prof. Virasoro has taken on a tough job of guiding the Centre in its transition from the IAEA to UNESCO. In talking to him we have been impressed by his concern for the development of science in the Third World. Prof. Salam has left us, the scientists of the Third World, and Prof. Virasoro a precious legacy. We would like to take this opportunity to thank Prof. Salam for all he has done for the Centre and to wish him good health. At the same time we wish Prof. Virasoro good luck in the job ahead and a bright new future for the Centre.

A CONVERSATION WITH PROFESSOR MIGUEL ANGEL VIRASORO

by Faheem Hussain

In spite of a very heavy schedule on his first full day of work at the ICTP on June 5 1995 when he presided over the opening ceremony of the Workshop on S-Duality and Mirror Symmetry, Prof. Virasoro found time to talk to us about his career, his work, his philosophy and his plans for the ICTP. Below we present extracts from the interview. We believe that our readers will find this interview very interesting. We started off by asking Prof. Virasoro about his background and the reasons why he left his home country and how and why he came to live in Italy.

Virasoro: I was born in Argentina and I did all of my education there, including my Ph.D. with Professors J.J. Giambiagi* and C.G. Bollini. As you know, Argentina has gone through a very difficult political situation with episodic, periodic military governments. I had to leave the country for the first time after the military coup in 1967, essentially not because of any danger to my person, but because all of the University Professors had left. I decided to go abroad and complete my education, so I went first to Israel, to the Weizmann

* Prof. J.J. Giambiagi has been an ICTP Associate Member and a Member of the ICTP Scientific Council.

Institute, and then to the United States. From the United States in 1971, we decided to go back to Argentina; I say 'we' because there was a group of people involved. It was the end of that particular military regime. The military dictatorship had already decided to call for elections and so we went back and got involved in politics; perhaps a bit too much, as I realized later. In 1973 the elections took place, and I was immediately nominated "interventor" of the Faculty of Science, a kind of political position — a very powerful position, because it was the end of the military government. That was a very stimulating period, and an extremely politicized one. Looking back on it, today I would do things a bit differently. We were over-optimistic. In fact, the situation deteriorated very, very fast. By 1976 there was a new military coup. Already in August-September 1975 I felt that a new period of dictatorship was coming, so I left Argentina again, planning to go back after a while. But the new military regime was very repressive and harsh, so I could not go back. In my first period of exile in the United States, I had changed my field of research. I switched from Elementary Particle Physics to Oceanography, thinking of going back to Argentina and applying there what could be useful for a country like that. But, as I said, the situation changed in such a way that I decided to try and settle in Europe. I went for one year to Paris, and then I came to Italy. And from then on, I have stayed in Italy, first in Turin and then in Rome.

Hussain: Did you do the work for which you are famous, which led to String Theory and the algebra that is named after you, in Argentina or the United States?

Virasoro: I was in the United States, in Wisconsin at that time. I was working with Bunji Sakita and C. Goebel. It was at the beginning of the dual models. One could not even talk about String Theory at that moment, but only of the dual models. We had already worked on what could be a precursor of the dual model in Israel in 1968. In fact, in July 1968 we did a piece of work that led to the Veneziano formula. In August-September 1968, I went to the United States and from then on until '71, I worked almost exclusively on this subject. It was a very exciting moment and it was rather easy to do important things. It is not such a big deal to do important things, when you are there at the right moment. However in '71, as I have already said, I decided to go back to Argentina and I changed my philosophy; I had realized that even if that subject, dual models, was very fruitful, what I had to do was almost 'given' to me. I realized at that moment that there are two kinds of scientific situations: there is an area in which the problem may be very difficult, but everybody knows what the problem is.

And that is a technical situation; if you are very able technically, then you succeed. But, perhaps, if you do not succeed, then someone else succeeds, perhaps one month later. It's very clear what is the direction to proceed in. It is as if the road is very much constrained. Now I prefer to work in situations where the direction is not clear, that is in fields where the road is not constrained at all.

Hussain: That means you do not work in particle physics any more.

Virasoro: That is right. I am working now in complexity theory, in which you try to find order where it is not given, or where there is no order. You try to find patterns of behaviour. It is not given what these patterns of behaviour should be. It is not clear what the strategy should be.

Hussain: Let us move away from physics questions and go back to the ICTP. How does it feel to come here as the Director, after 30 years of directorship by Professor Abdus Salam?

Virasoro: I can honestly say that it is a very difficult and challenging heritage. Abdus Salam has been one of the most creative minds, not only in science but also in politics. Therefore, I think it will be very difficult to try to follow his road as he drew it. I will try and do my best. My idea now is that we should try to consolidate the various activities at the Centre. We should prune some of the many efforts that have been made in the past, in order to retain the best parts and allow them to push much faster and better.

Hussain: Do you mean that the ICTP expanded too quickly in too many different directions?

Virasoro: That is correct, although I will reserve my judgment until I see all the aspects more clearly. But I do believe that now we should choose some directions rather than others. The other point is that the relations between the Third World and the first world have changed somewhat. In a sense, now it is more reasonable to talk about a dialogue, rather than assistance. I mean that it is very important to insist that the voices of scientists in the Third World be heard. It seems to me that one of the serious problems that we have, particularly in theoretical physics, is that people in the developed countries tend to ignore what is being done in the Third World. So we should stress that it is not a question of just helping; it is a question of real respect and dialogue between both communities. Then, we should also distinguish the different levels of development in the Third World, because there are countries which are obviously much behind than others. I think that countries like India, Argentina and Brazil are countries for which we should not simply talk any more about helping. We

should talk about really integrating them in the whole system and that they should be considered partners with equal rights and equal duties.

Hussain: In fact, also China can be included in the list. Countries like these could reciprocate co-operation with the ICTP.

Virasoro: Absolutely. What the ICTP has to do with them is to go for some kind of mutual co-operation, rather than just one-way assistance. I also believe that the Centre can help to mobilize human resources. Scientists from Third World countries resident in the West could enormously help in this cooperation. Do you know that it is claimed that 75% of the scientists in the United States are from the Third World? We should mobilize this tremendous human capital so that these scientists can help their own countries, instead of perpetuating the division between those who have left and those who have stayed, which in the long run is a losing attitude. You cannot prevent people from leaving, but I think that those who have left their countries and gone somehow to the first world, still keep an interest and want to help their native countries. They can do tremendous things for the Third World countries. They can orient them. They can go back from time to time to work in institutes in their home countries. They can give them counselling and advice, if requested. They can be part of the boards that more or less govern the scientific groups in these countries. There are dozens of ways of integrating these people, and I think that the best thing to do is to forget about this division and try to bring them together.

Hussain: Nevertheless, the brain-drain is still a worry. The ICTP has helped with programmes like the Associate Scheme, Federation Agreements, in trying to keep physicists in their home countries with the opportunity to come here every once in a while. I think the ICTP has done a good job. What do you think about these schemes?

Virasoro: The point is that, in many cases, people who have left their countries of origin would be very happy to go back if certain conditions were met. But many times these conditions cannot be met, for instance, because of the economic situation of the country. The ICTP has helped enormously to combat the brain-drain, and it will continue to do so. And that is extremely important. The Associate Scheme has been one of the big successes and we will continue with it. In fact when I went back to Argentina in 1971, I went back as an Associate Member of the ICTP. Therefore, I am absolutely adamant about the idea that we should give scientists this possibility. Also right now there are so many scientists, natives from Third

World countries, working in senior positions in the USA, France, UK, Germany, and so on, who they themselves can try to develop some kind of Associateship scheme for someone who comes from a Third World country to study with them and would like to go back to work in his own country. They could promise: "If you want to come back to work in this country, you can do so for so many months each year for so many years and we will provide the financial support." We should try to go ahead and organize the scientists from the Third World who are working in the first world. For instance, organize those who have passed through the ICTP by finally materializing the idea of 'Friends of the ICTP', or even launch a new programme. For example, we are thinking of running special programmes with some countries in the Mediterranean basin. We could ask people from those countries, who are now working in the West, to help us in implementing these programmes. They would then work together with the scientists who are present in the countries themselves.

Hussain: We have generally covered the relationship the ICTP has had with the Third World. What else do you think the ICTP can do — in other words, what other plans do you have for helping science in the Third World?

Virasoro: I believe one of the important things today is communication. We are at such a level that it is unacceptable that scientists in any country should not be able to reach us via e-mail. This is something very specific in which the ICTP can help a lot. It may be somewhat complicated from the point of view of political and economic considerations, because if you create the network, how can you prevent it from being used by someone who is not from the academic community? Still, I believe we could do with an e-mail that is an ASCII kind of pure text transmission, a simple e-mail connection. This is a pure text transmission, a simple e-mail connection. This is a simple way to beat isolation. I think that this is just the right thing to do to further our aim of helping the dialogue. There is also the problem of helping to develop research in countries which are still at the initial stage. That we will continue to do in the traditional way, by bringing people here for training courses, post-doctorates, diplomas, etc. All of that is very useful at the initial stage of scientific development. Then, when 2, 3 or 4 persons in these countries have achieved a certain level of training, a certain ability to do research, we would like them to have privileged access, and I think that here communication is very important. We cannot do anything today if we do not count on these new ways of communication.

Hussain: How do you see the relationship of the ICTP, apart from its connection with the Third World, with scientific

institutions in Italy and Europe?

Virasoro: This is a very crucial question. I would like Italy to realize what kind of thing they have in their territory. I think Trieste is much better known in Saudi Arabia than in the rest of Italy. This is unbelievable but, in fact, the other day I was talking to Professor H. Schopper* who said he had just been to Saudi Arabia and that the two international institutions they knew there, were CERN and the ICTP. I think this is something to be really proud of. Unfortunately, we have not been able to transmit this pride to the Italian people, although the Italian Government has been very generous. In fact, enlightened. As far as our relations to Europe are concerned, I believe that we have to make a big effort to address European concerns, for example concentrating on regions in which Europe feels that more urgent action is required. For this reason, we will try to do something in the Mediterranean basin with a specific project. In classical times, the Mediterranean was the bridge through which all of culture was transmitted. It was like a freeway of communication. Nowadays it is a real barrier. You change cultures completely when you cross the Mediterranean. One of our first priorities therefore is to make a specific project for the Mediterranean basin. We will be doing more or less the same kind of things that we do in the rest of the world, but with more concentration. In particular, I will try to develop three projects. One is to help the reconstruction of Lebanon, which is in a very delicate phase at this moment. The city, the old buildings that were destroyed are being re-built, but the university system still has to start, and research in particular needs to begin from zero. Secondly we will also help Professor Fubini to organize a Palestine-Israeli conference. And then there is the idea of developing some affiliated centres in Northern Africa.

Hussain: One of the things you mentioned on the first day

Hussain: One of the things you mentioned on the first day you came to talk to us at the ICTP was about how to improve the funding.

Virasoro: This is one of the first priorities. If you ask me what is a summary of my ideas in this regard, I would say it is to make the ICTP truly international and I mean that the funding should be more international than it is now. We are really very, very happy with the Italian support, but we should not rely on one single country, so we have to develop other sources of funding. Now it seems to me that one way of doing that is an analytical continuation of something that has been done before, that is, to ask for funding for specific programmes. This is another reason why we are going to try and launch more specific

programmes, to submit these programmes to governments and see whether we can get support from them. Eventually, some of these countries may realize that what we are doing is reasonable and in their own interest. Then they might wish to get more involved, and for that our offer could be to become members of our Steering Committee and thus our partners.

Hussain: In fact, the total budget of the ICTP is not at all high, in terms of dollars. It comes to between US\$15 to 20 million per year. As you said, the ICTP should be financed internationally. If many of the Third World countries would only give half or 1 million dollars per year, we could have a large amount of money. Could we not set up a permanent fund of this sort?

Virasoro: Yes, we could. Incidentally, the Third World Academy of Sciences has developed this modality which has proved successful. We are going to request countries that are already half-way to development, like India, Argentina, Brazil and China, to give us financial support, because that would be the proof that they are really doing their own part. But then we could also discuss whether this money should go to some kind of affiliated centres somewhere around the world or whether it should be brought here. That's a completely open problem. Perhaps we should not concentrate all of the administration here. If these countries want to develop some regional centres, we could help them to start such centres which would be affiliated with the ICTP.

Hussain: Many people and many administrators in the Third World have been asking: What is the use of theoretical physics and basic sciences in the Third World? There has always been doubt put on that, because the Third World has been regarded as needing only engineering and technology. What is your view on this?

Hussain: What is your view on this?

Virasoro: This question does not have a simple answer, but it does have an answer. And the answer is positive; I do believe that theoretical physics plays a positive role in the developing countries. First of all, I am always surprised that people who ask this question never doubt the importance of having theatres. And this is one aspect of the answer — culture. This is not just a way of escaping the question; it means that the kind of culture that you see developing in Third World countries is very 'a-scientific', with no contact with science. The absence of this contact with science has a tremendous influence on the way people think and act politically. For instance, one of the things that every natural scientist knows is that something that is not 100% right is not necessarily wrong. If something is not 100%

* Former Director General of CERN.

STIG LUNDQVIST 70 FESTSCHRIFT

by Yu Lu

Head, Condensed Matter Research Group, ICTP

At 8 p.m. on 19 August 1995, at the Hjortviken Conference Centre at Hindås, near Göteborg, surrounded by beautiful woods and lakes, a very special session started. Former students of Stig Lundqvist's 'at large' were on 'parade'. Each one of them gave a short presentation, combining scientific reports with personal recollections of their supervisor. The audience responded with explosions of friendly, unrestrained laughter to the vivid descriptions presented by the speakers with great Swedish humour.

This was the second day of the Symposium on Contemporary Concepts in Condensed Matter Physics (an Adriatico Research Conference), dedicated to Stig Lundqvist's 70th birthday. The Symposium was a great success. The highlights of Condensed Matter concepts of the last half-century were provided by some of the major contributors in the field. A very impressive insightful summary of these concepts was given by Bob Schrieffer (Nobel Laureate) and Eli Burstein, two of Stig's closest friends. The studies of electronic structures of condensed matter were reviewed by Marvin Cohen (Berkeley), the initiator of the *ab initio* calculations, Michele Parrinello, one of the inventors of the "Car-Parrinello" technology, Ole Anderson (both the latter at MPI Stuttgart) and others. The disordered and mesoscopic systems, another exciting area of research in condensed matter, were presented by such leading experts as B. Altshuler (NEC), Rolf Landauer (IBM), Joe Imry (Weizmann) Altshuler (NEC), Rolf Landauer (IBM), Joe Imry (Weizmann) and Doug Stone (Yale). Other major 'players' in current condensed matter research such as Walter Kohn (Santa Barbara), Neil Ashcroft (Cornell), Doug Scalapino (Santa Barbara), Lu Sham (La Jolla) and many others, also gave very instructive talks. Moreover, there were lively in-depth discussions among the participants.

The success of this Symposium was eloquent evidence of the high reputation and great respect enjoyed by Stig among condensed matter physicists. Of course, all the participants sincerely appreciated the excellent work done by Mats Jonson and Bengt Lundqvist, the two main organizers of the Symposium, both of them Stig's former students 'at large'.

Stig Lundqvist's career is quite unique among physicists. Born on 9 August 1925 in Kranifors, a small town of northern

Sweden, he had shown great talent in music very early. At the age of 14, he created a jazz band, and then made a living for many years as a trumpet player. Driven by curiosity, he started physics as a hobby. He entered the University of Uppsala in 1945, after his military service, and obtained his Ph.D. there in 1955. In 1961 he moved to Chalmers University in Göteborg where, in 1963, he became a full professor in theoretical physics. During that period the 'many-body theory' was blossoming in condensed matter, and Stig was deeply involved in its development due to a large extent to his association with Jerry Brown and Keith Brueckner. In 1971 Stig became a member of the Nobel Committee in physics and, in 1980, was appointed its Chairman.

It is not only due to his professional duties but also because of his exceptional personality that Stig has made very many close friends among physicists world-wide. As Bob Schrieffer put it, "Stig has done so much for all of us, that we cannot reciprocate it fully". Stig is well known for his own contributions to physics, but even to a greater extent for his tireless efforts in promoting physics all over the world, especially in developing countries.



At the dinner in his honour, Prof. Lundqvist surrounded by friends — among them, Dr. P. Chaudhari, Mrs. E. Burstein and, in front, Prof. M.A. Virasoro.

Another highlight of the Festschrift event was the banquet, when Stig was congratulated by his colleagues, former students and friends from all over. He was especially honoured by the ICTP's new Director, Prof. Miguel Virasoro:

"In recognition of and nurturing his outstanding role in setting up the Condensed Matter programme at ICTP, of his leadership over the years and of his Chairmanship of the Scientific Council of ICTP, Stig Olov Lundqvist is honoured by the ICTP."

The 1999 ICTP Prize in the field of Solid State, Atomic and Molecular Physics will be named in his honour.

In order to provide for his continued guidance to the research programmes, Stig Lundqvist is hereby appointed Distinguished Condensed Matter Scientist Emeritus.

We look forward to his active involvement in inspiring and fostering the future of the ICTP."

This was unanimously acclaimed by long applause and Stig was deeply moved by this high appreciation of his efforts, since ICTP is so dear to his heart.

Stig has been the major driving force for the Condensed Matter programme at ICTP for many years. His involvement started in 1967, when he was one of the directors of the Winter College in Condensed Matter, which introduced a new discipline at the Centre. Starting in 1970, with the help of N.H. March, P.N. Butcher, F. Garcia-Moliner, M.P. Tosi and others, he has been organizing condensed matter summer workshops every year. In the early days, with great enthusiasm, he patiently taught young people from the least developed countries, starting from scratch. Stig is very sensitive to the latest developments in Condensed Matter and has been making every effort to include the best of them in the ICTP programme. In the early 70s, he organized a very successful Workshop on Renormalization Group Theory, and in the early 80s he proposed a Spring College on Order and Chaos in Condensed Matter, when not so many condensed matter physicists appreciated the importance of these concepts. In 1985 he created the Adriatico Research Conferences programme. This consists of a series of about 6 conferences every year, which have attracted to ICTP the best people in fast moving research frontiers in condensed matter and related areas.

The establishment of a high-level research group in Condensed Matter in the Trieste area around E. Tosatti and M. Tosi in the late 70s was an important step in strengthening the Condensed Matter programme at ICTP. Stig was one of the major promoters of this initiative. In 1985, when the possibility appeared of hiring resident scientific staff at ICTP, he immediately took up this opportunity to create a research group at ICTP itself. This now includes 3 resident members along with short- and long-term visitors and post-doctoral fellows.

Stig's commitment and dedication to the growth of science in developing countries was the main reason he was appointed member of the ICTP Scientific Council in 1982 and elected its Chairman from 1984 to 1992.

All of us, his friends and colleagues, wish him good health and long-lasting involvement in inspiring and fostering the Condensed Matter programme at ICTP.

THE ROLE OF BASIC SCIENCES IN VIETNAM

Prof. Nguyen van Hieu,

*President of the National Centre for Science and
Technology of Vietnam*

During the last five years, Vietnam started the economy development with a good increase of GNP due to the improvement of the economy management in the country and the increase in the international exchange and foreign investment. The country has achieved remarkable progress also in high technologies. The main working staff of the joint ventures and foreign factories with high technologies, including the chief technical staff and the engineers, are Vietnamese. Many scientists in different fields of basic sciences with their good background knowledge became the experienced engineers in high technologies after a brief retraining. This is an advantage for Vietnam at this beginning period of the technology transfer. The long-term development of basic sciences since 1960 was developed under very difficult circumstances, before the technological advancement of the country was proved to be the right decision of the Government and the scientific community. The research in basic sciences for training talented young people and having the deep understanding of the world's technological progress was an indispensable component of the national education programme. Due to this long-time preparation process, at present, when the economy development requires many specialists in high technologies, there exists already in the country a large number of experienced scientists who can be easily re-qualified to become good engineers. At the present time of technological advancement, we are happy that we have had the technological advancement, we are happy that we have had the preparation of the manpower for the current progress for thirty years.

After five years of foreign investment and technology transfer, we have learned also the following lesson: for the needs of the social and economic development of the country, the technology transfer from industrialized developed countries is not enough. In particular, in the development of the rural areas, where the majority of the population is living, and in the domain of biosciences — the fields of agriculture and forestry — the technologies already existing in other countries are not applicable because either the natural conditions are quite different or the prices are not acceptable for the local people. For example, one of the great problems of the country is the pollution of the

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The ICTP Arab Friends Society (SARF) was founded in 1983 with the objective of assisting the ICTP in achieving its aims, and to reinforce all efforts for its support.

The Society also aims at promoting effective scientific contacts and co-operation among Arab scientists, and at strengthening scientific research in the Arab World through the ICTP programmes.

Membership of the Society, which now amounts to over 600 members, is open to any scientist who has participated in any of the scientific activities of the ICTP.

A Directory of SARF Members was published in 1992 with the aim of facilitating and fostering collaboration among them.

Every Summer, a SARF meeting convenes at ICTP.

Activities During Summer 1995

1. Two meetings on 20 and 27 July 1995 resulting in the appointment of a new Executive Committee supported by an Advisory one.
2. Numerous meetings for the Executive Committee to implement the Society's objectives.
3. SARF Dinner in Trieste on Friday 25 August 1995.
4. A series of seminars the titles and abstracts of which are:
 - a. Algebra of Quacroms. Ali Awin, University of Alfateh, Libya, 18 July 1995.

Abstract: Quacroms of dimension $2 \times n$ are reviewed along with their applications of taking the product of two polynomials, their use in representations and the use of linear quacrom their use in representations and the use of linear quacrom equations to get recurrence relations for certain polynomials. They are then generalized to quacroms of dimension $3 \times n$.

b. Hamilton-Jacobi Formulations of Singular Systems. Eqab Rabei, Mutah University, Jordan, 25 July 1995.

Abstract: A singular system of the first kind and a singular system of the second kind are investigated using the Hamilton-Jacobi approach. Besides, the electromagnetic theory is treated as a singular system and studied by the Hamilton-Jacobi formulation of constrained systems.

c. On Fractional Spin Symmetries. Elhassane Saidi, University Mohammed V, Morocco, 1 August 1995.

Abstract: The quantum distribution of systems of identical fractional spin particles, of spin $s=1/k \pmod 1$, generalizing the well-known Bose and Fermi distributions is derived. Other

EDITORIAL NOTE

The ICTP Newsletter aims to keep its readers informed about the activities of the ICTP and the scientists associated with it. As the readers know, the activities of the ICTP are not all concentrated in Trieste, and in fact many activities organised and/or supported by it are held throughout the developing countries. Also by the very nature of its function the Centre has friends and supporters throughout the world. Through the Newsletter we try to project not only what is going on in Trieste but also what all our friends abroad are doing to develop science in their own countries and regions by carrying reports and articles about such activities. Our friends from the Arab world have suggested that this should be done on a more regular basis with reports from different regions. We think that this is a very good idea. We would like to invite all our readers, collaborators and friends to contribute articles highlighting scientific achievements in their home countries and the role of the ICTP in developing science in the Third World. In the current issue we carry a report by the ICTP Arab Friends Society about their activities. We hope that in the future we will be able to carry more such reports from other regions.

features are also discussed.

features are also discussed.

d. On the Evolution of Physics and Astronomy during the Islamic Civilization. Ali Awin, University of Alfateh, Libya, 3 August 1995.

Abstract: Lots of scientific contributions, due to Arab and Muslim scholars during the islamic civilization period which extends from the 8th to the 14th centuries, in physics and astronomy are presented. The works of two particular scientists, Ibn Alhaytham and Albayruni, are studied in some detail and comparison with nowadays' achievements are made whenever possible. Some light is shed, also, on the impact of the islamic civilization on science progress and human advancement. Moreover, the main causes behind this civilization and the surrounding atmosphere the old muslim scientists lived in are discussed.

e. Perturbation and Beyond in the Field of Optics. A. Shafi Obada, Al-Azhar University, Egypt, 17 August 1995.

Abstract: We kick off from the Maxwell's equations for the electromagnetic field; then we develop the polarization field and introduce the harmonic oscillator model with linear phenomena. In order to deal with non-linear phenomena, nonlinearities have to be introduced and perturbation techniques have to be employed. Non-perturbative methods can be introduced through models. One of the famous models in the field of quantum optics is the Jaynes-Cumming model. The semiclassical solutions as well as quantum solutions are presented and phenomena discussed.

Important Announcements

- IV Pan African Congress of Mathematics, Ifrane, Morocco, 18-26 September 1995. PACOM 95, Fax: 212-7775471.
- Second Symposium in Computational Solid State Physics, Irbid, Yarmouk University, Jordan, 16-18 November 1995.
- Sinai Meeting on High Energy, Condensed Matter and Environmental Physics, Dahab, Sinai Peninsula, Egypt, 19-26 November 1995.
- XVIII Conference on Solid State Science and Applications, Ismailia, Egypt, 7-22 March 1996.
- Fifth Meeting on Statistical Physics, Ibn Tofail University, Kenitra, Morocco, 4-7 July 1996. Fax: 212-7778973.

SARF Committee Report

A new Executive Committee has been elected with the following objectives to achieve:

1. Establishing an Arab fund in the ICTP to be directed for the Arab scholars, visiting the ICTP, in the various fields and supporting their scientific activities.
2. Organizing scientific schools, as a part of the ICTP programmes, so as to support the ICTP to achieve its goals.
3. Organizing scientific schools and conferences in different Arab countries and in the various related fields.
4. Preparing a guide for the scientific departments in the Arab universities which includes researchers' names and their fields of specialization; this in order to prepare for a data bank or network in the near future.
5. Supporting and strengthening the related scientific societies and unions at the Arab national level to help them to achieve their goals.
6. Co-operating with other representatives from the developing countries to help the ICTP to fulfill its policy to support these countries.

Other duties of the SARF Executive Committee are:

First: The evaluation of SARF activities done in the past; including seminars, conferences, symposiums and other aids.

Second: Details concerning future plans, i.e.

1. Stressing the importance of SARF existence and its continuity.
2. Seeking support from the ICTP and its programs.
3. Seeking financial support from the Arab countries and writing a thanking letter to the Government of Kuwait for their support.
4. Writing a future five-years plan of scientific activities including conferences and schools in the different areas of physics and mathematics.
5. Getting in touch with various Arab institutions and unions such as Arab Universities League and Arab Atomic Energy Commission in order to have their support.
6. Issuing a periodical newsletter which includes scientific research achievements of Arab scholars. All SARF members are most welcome to submit their contributions for the forthcoming newsletters regarding scientific news in their home institutions. Contributions can be sent directly to any member of the Executive Committee.
7. Adopting other non-scientific activities such as honoring distinguished scientists from the Arab region, and inviting important Arab figures to become honorary SARF members.

Executive Committee

El Hassane Saidi (Coordinator), Section de Physique des Hautes Energies, LMPHE, Faculty of Science, Avenue Ibn Batota, P.O. Box 1014, Rabat, Morocco;

Ali Awin, Department of Physics, University of Alfateh, P.O. Box 13217, Tripoli, Libya;

Ali Awin, Department of Physics, University of Tripoli, P.O. Box 13217, Tripoli, Libya;

Marwan El Kawni, Quds Open University, P.O. Box 893, West Bank, Palestine;

Sayed Abboudy, Department of Physics, Faculty of Science, Alexandria University, Alexandria, Egypt;

Noureddine Chair, Department of Physics, University of Alfateh, P.O. Box 13147, Tripoli, Libya.

Advisory Committee

Adnan Hamoui, Department of Mathematics, Kuwait University, Khaldiya, Kuwait;

Mohamed Hassan, School of Mathematical Sciences, University of Khartoum, Khartoum, Sudan;

Mamdouh El Mously, Department of Physics, Faculty of Science, Ain Shams University, Cairo, Egypt.

QUANTUM BLACK HOLES

by Gordon Fraser
Editor, CERN Courier

Courtesy of CERN Courier (to be published in October 1995)

Particle theorists are getting unusually excited these days as new ideas and different approaches converge in the search for a picture which describes all the underlying mechanisms of Nature. Although the final picture has yet to emerge, the outline is becoming clearer. While the intellectual mountain range to be crossed was once intimidating, these new developments are beginning to point to a way over.

A series of recent topical workshops have highlighted these developments and leap-frogged ahead — including String 95 at the University of Southern California this spring and a conference on Mirror Symmetry and S-duality held in June at Trieste's International Centre for Theoretical Physics. Closing the Trieste meeting, prominent theorist Ed Witten said "This is one of the most exciting conferences in which I have ever participated".

With profound problems to be overcome, the new ideas now on the market at first look very unconventional. Classical electromagnetism exploits the parallels between electricity and magnetism but accepts the everyday wisdom that free magnetic charges (magnetic monopoles) do not exist. Particle theorists are not so sure, and for a long time magnetic monopoles have been tentatively included on the theoretical menu. The role of these monopoles has now become crucial.

Also playing a central role is the idea of supersymmetry. In a quantum theory, basic particles, like quarks and leptons (fermions), interact through force-carrying particles (bosons) like the photon of electromagnetism, the W and Z of the weak nuclear force and the gluon of the strong inter-quark force. In supersymmetry, each fermion has additional boson partners, and vice versa.

So far, no evidence for supersymmetry has been found, but the underlying ideas are so convincing that its existence is almost taken for granted among theorists. Supersymmetry would have governed the mechanics of the Big Bang, but as the temperature fell, supersymmetry 'froze' out and became almost invisible.

In the late 1970s, Klaus Montonen and David Olive pointed out that if magnetic monopoles are included in a supersymmetric

quantum picture, the electric and magnetic sectors are in some respects mutually complementary. Magnetic charges provide additional calculational leverage, sidestepping the traditional problem of having to solve the equations of the theory through sometimes unsatisfactory approximations.

Subsequently, the ideas were enlarged to include 'dyons' — particles having both electric and magnetic charges, providing a much richer scenario.

Theories with sufficient numbers of supersymmetric particles can provide an appealing correspondence ('duality') between different sectors of the theory. These theories are naturally finite, with no troublesome infinities thrown up by the calculations. While this looks superficially attractive, real physics unfortunately does not behave so nicely, and 'renormalization' constraints have to be imposed to remove unwanted infinities.

Last year, Nathan Seiberg and Ed Witten wrote a milestone paper (December 1994, page 3) in which massless monopoles in a field theory with less supersymmetry (and therefore requiring renormalization) ensured that quarks were automatically 'confined' in larger particles. While quarks are the natural constituents of all nuclear particles, they are never encountered as free particles, and one of the big puzzles was always how to ensure that these quarks are automatically locked inside nucleons. Seiberg and Witten's toy model of quark confinement made theorists sit up and take notice. As well as providing physics insight, the new picture also suggested a simpler way of handling the underlying four-dimensional geometry.

Including electromagnetism and the strong and weak nuclear forces is not the end of the story. To get right back to Big Bang conditions, theorists have to bring in gravity too. With their widely different behaviour, from the long-range gravitational pull between galaxies to the intricate inter-quark mechanisms at work inside nuclear particles, putting all these forces together is an intimidating prospect.

In trying to do this, many theorists have come to believe that the basic elements are not pointlike particles at all, but even smaller two-dimensional 'superstrings' in multi-dimensional spaces (usually ten dimensions).

In physics, writing down a set of basic equations is not the bottom line. Solving them is quite another problem. Many physicists are convinced that the compelling features of these superstring theories could provide a natural framework for the equations of a Theory of Everything. The revolution in quantum electrodynamics resulting from Richard Feynman's introduction

of simple diagrams in the late 1940s is a good example of how an intuitive ingredient can make a difficult theory more assimilable.

The ten dimensions of superstrings include the four of conventional space-time, complemented by a six-dimensional internal (Calabi-Yau) space, which at some stage has to 'compactify' — curling up on itself to become invisible. The invisibility of these additional dimensions was originally a handicap, as they could curl up in all sorts of ways and their role in the underlying unified theory was not clear.

The big question was how to apply the Seiberg-Witten ideas to superstrings. Seminal ideas by A. Sen of Bombay's Tata Institute were followed by recent advances by C. Hull and P. Townsend in the UK. At the Trieste meeting, A. Strominger of Santa Barbara explained how certain kinds of multidimensional superstring can 'compactify' to four-dimensional space-time scenarios.

Previous efforts to reconcile invisible internal geometries had come across singularities — places where the mathematics breaks down. Singularities are awkward to handle, but often indicate that deeper down in the theory, something significant is happening.

With gravity an essential part of the superstring picture, quantum black holes can occur. Classically, black holes are concentrations of matter so dense that nothing can escape from them. On the scale of Big Bang dynamics, even these black holes, classically at least several times larger than the Sun, can happily exist as massless objects. These quantum black hole ideas had been seeded early in the 1980s, but the implications of this leap in imagination are only now being appreciated.

The new work has shown that presence of massless black

The new work has shown that presence of massless black holes can sidestep some of the problems of the internal six-dimensional spaces. These holes help iron out troublesome topological twists when the six-dimensional internal spaces curl up. Building on the above ideas, S. Kachru and C. Vafa, from Harvard, were able to show that the Seiberg-Witten results extend to a class of string theories with the same number of supersymmetries as the field theories considered by the latter in their seminal work, thereby demonstrating how these ideas can be applied to obtain exact results in theories containing quantum gravity and possessing complicated dynamics.

With these ideas in place and their implications beginning to be appreciated, theorists can glimpse the first outlines of a Theory of Everything.

DIRAC MEDAL OF THE ICTP 1995

The International Centre for Theoretical Physics takes pleasure in announcing that the 1995 Dirac Medal of the ICTP will be awarded to Michael Berry (Royal Society Research Professor at the University of Bristol, UK) for his discovery of the non-integrable phase that arises in adiabatic processes in quantum theory. This effect was first detected in 1986 in an optics experiment by Tomita and Chiao in which the rotation of the polarization plane of a wave propagating in a twisted optical fibre was interpreted as a Berry phase. In the same year it was found that the frequency splitting in the nuclear quadrupole resonance spectra of a slowly rotating nucleus could be ascribed to a Berry phase phenomenon.

The Berry phase is now known to play a significant role in many different areas of microscopic physics ranging from chemistry and molecular physics to optics, nuclear and solid state physics and relativistic quantum field theory. In all these areas the recognition of the non-integrable phase has led to a deepening of our understanding of the underlying quantum dynamics.

The International Centre for Theoretical Physics instituted the Paul Adrien Maurice Dirac Medal in 1985. The Medal is awarded yearly on P.A.M. Dirac's birthday — 8 August — for contributions to theoretical physics and mathematics. The Medalists also receive a cheque for US\$ 5,000.

A selection committee including Professors N. Cabibbo (Italy), S. Lundqvist (Sweden), Y. Nambu, S. Weinberg, E. Witten (all from USA) and Abdus Salam (ICTP) selects the winners from among nominated candidates. The Committee invites nominations from anyone working in the areas of theoretical physics or mathematics.

The Dirac Medals of the ICTP are not awarded to Nobel Prize or Wolf Foundation Prize winners.



ICTP PRIZE
1995

PROF. SPENTA WADIA

The 1995 ICTP Prize in the field of High Energy Physics, in honour of Professor Steven Weinberg, has been awarded to Professor Spenta Wadia from the Tata Institute for Fundamental Research Bombay, India.

Professor Wadia is an eminent Indian scientist, whose research work in theoretical High Energy Physics has received international acclaim. He graduated in theoretical physics at the City University of New York in 1978. From 1978 to 1982 he was a postdoctoral fellow at the Enrico Fermi Institute in Chicago. During this period, he made important contributions in the study of gauge theories, both on the lattice and continuum. Particularly noteworthy are his results on large- N phase transition and the derivation of loop-equation in lattice gauge theories. He joined TIFR in 1982. Since then he has worked on a number of subjects in theoretical physics, including string theory and 2-dimensional quantum gravity. In particular, he and his collaborators were one of the first groups to propose that the Liouville mode in the non-critical strings provides an extra space-time dimension. His group was also one of the first to construct a black hole solution in 2-dimensional string theory, thereby opening the way to a new line of research, namely the study of black hole backgrounds in string theory. He and his study of black hole backgrounds in string theory. He and his collaborators also produced a series of interesting works in $c=1$ matrix models, revealing the underlying fermionic system and the related W_∞ symmetry. These works also led to bosonization of non-relativistic fermion systems in 1+1 dimension.

From his scientific achievements described above, it is clear that Professor Wadia and his collaborators constitute one of the most important research groups in the area of string theory and 2-dimensional quantum gravity. It should also be pointed out that he played an important role in the development of theoretical physics in India. In particular, he succeeded in building up a strong research group in TIFR, which has produced many brilliant young physicists.

Prof. Wadia was born in Bombay, India, in 1950. He studied

in his hometown and in Kanpur, and obtained his Ph.D. from the City University of New York in 1978. He was Research Fellow at the Enrico Fermi Institute in Chicago from 1978 to 1982, and since then he has made his career at the Tata Institute in Bombay, holding first a position of Fellow, then Reader, Associate Professor and finally Professor within the Theoretical Physics Group since 1 August 1995. He has also been Visiting Scientist in Princeton from 1990 to 1991.

He is a Member of the editorial board of *Modern Physics Letters A* and *International Journal of Modern Physics A*. In 1992, he was elected Fellow of the Indian Academy of Sciences.

The ICTP Prize was handed over to Professor Wadia by the Deputy Director of the ICTP, Professor Luciano Bertocchi, during a ceremony that took place in the Main Lecture Hall of the ICTP on 14 June 1995, within the framework of the Summer School in High Energy Physics and Cosmology. Messages of congratulations were sent to Professor Wadia from Professor Steven Weinberg, Professor Abdus Salam (President of the ICTP), and Professor Miguel Angel Virasoro (Director of the ICTP).

Before delivering his lecture "Quark Confinement and Dual Representation of Yang-Mills Theory in 2+1 Dimensions", Professor Spenta Wadia wished to thank the ICTP and spoke in favour of collaboration among scientific institutions.

SPEECH OF THANKS BY S. WADIA

Friends, Ladies and Gentlemen,

Thank you Professor Bertocchi and Professor Randjbar-Daemi. I am deeply honoured to receive the ICTP Prize in honour of Professor Steven Weinberg.

honour of Professor Steven Weinberg.

On this occasion, I should like to say a few words about several things:

Since I returned to India in 1982 my research has been deliberately a cooperative activity and I wish to take this opportunity to mention those with whom I have worked closely during these past thirteen years: A. Dhar, S.R. Das, S. Jain, G. Mandal, A.M. Sengupta and R. Shankar.

Only three of them are now at the Tata Institute as regular members, while the others have gone to work in other important institutions in India.

There are, in all, seven members in the String Theory, Quantum Field Theory Group at the Tata Institute. I have especially benefited from the support of Ashoke Sen in sustaining

Annual ICTP Prizes were created in 1982 by the ICTP Scientific Council in recognition of outstanding and original contributions within Mathematics and Physics. Every year, a Prize in honour of an eminent scientist is announced in a specific field of interest.

Candidates must be nationals of developing countries, working and living in developing countries. Leaves of absences due to sabbaticals or studies abroad would not disqualify candidates. In order to be considered for the Prize, a candidate must submit a review of his/her work and attach a brief curriculum, a list of publications and any relevant published work. The age of the candidate must not exceed 40 years at the time the submission is made. Submissions for the Prize must reach the ICTP before 31 May of the relevant year and should be addressed to the ICTP Prize Committee.

The winner of the Prize will be selected by an International Committee, from among the most outstanding scientists in the announced fields. The Prize consists of a medal, a diploma, and the sum of US\$ 1,000, payable in US dollars or in local currency.

The 1996 ICTP Prize shall be in honour of Professor Sir Nevill Mott (UK), in the fields of Solid State, Atomic and Molecular Physics.

Prof. S. Wadia (TIFR, Bombay) and Prof. L. Bertocchi, Deputy Director of ICTP.

ICTP.



our activities at the TIFR.

Now let me come to different matters:

The TIFR was established fifty years ago in June 1945. Its existence almost coincided with the emergence of an independent India, and it embodied the vision of Dr. Homi Bhabha, its Founding Director. The Tata Institute has approximately three hundred scientific members. The areas of research pursued are pure mathematics, high energy physics, condensed matter physics, astronomy and astrophysics, nuclear physics, chemical physics, molecular biology and computer science. It is one of the most important scientific establishments in India, and has shaped many aspects of Indian science in these last fifty years.

The ICTP is approximately thirty years old. My association with it is ten years old, and it has definitely helped grow and nourish the High Energy Physics activity at the TIFR. In fact, all the seven members of the string group at TIFR have been or are Associates of the ICTP. The ICTP has also initiated and supported the excellent Kathmandu Summer School in some areas of theoretical physics.

I should like to say that the ICTP is a unique establishment of the modern world. In the sense that, it is the first time that an institution has been created in the western world where scientists working in developing countries interface with those from scientifically advanced nations, for common activities.

We who believe in the creed of science, and believe it to be a basis of development in a democratic society, consider this a most important contribution, and without doubt most of the credit for this goes to the Founding Director, Professor Abdus Salam, whose vision, drive and courage made ICTP possible.

I am aware that the concept of the creation of ICTP in the western world had opposition from certain sections of the Indian science establishment. But I am glad that Professor Abdus Salam with the help of his Italian colleagues, succeeded in establishing it. These last decades have shown that, without doubt, both views are correct — there is a need to develop science at home, but there is also a need for ICTP to lend a helping hand in the process of our scientific development.

The task at both ends is enormous. It is my hope and desire that we can sustain a combined effort to make progress on a few selected problems of scientific development in the developing countries.

I also wish to take this opportunity to express my support and wish Professor Virasoro, the new Director of ICTP, the very best in the herculean task that lies ahead of him.

Thank you.

"PRIMO ROVIS" INTERNATIONAL PRIZE

In recent years the problem of scientific communication has attracted great interest worldwide, and in Europe and Italy in particular. The demand for the diffusion of scientific and historical scientific culture is today widely called for. This demand is no longer restricted to the scientific community alone.

In Italy the Minister for the University and Scientific Research and Technology has set up a National Committee for the promotion, protection and use of scientific culture and its diffusion throughout Italy. The Committee, in collaboration with the ministries of Education and National Heritage and the National Research Council (CNR), has set out a series of proposals and schemes dealing with the dissemination of scientific culture in the country. Trieste without doubt has an important role to play in these activities and with their diffusion to the countries of Eastern Europe.

Within the CNR's strategic program called "Scientific Museums", the "Laboratorio dell'Immaginario Scientifico" has been entrusted with the study of multimedial scientific communication. It is within this context that the importance of scientific communication in the field of scientific museum exhibits, information and education can be fully appreciated.

It is because of these considerations that an international prize has been established at the Trieste International Foundation for Scientific Progress and Freedom, presided over by Nobel Prize winner Prof. Abdus Salam. This prize for the diffusion of scientific culture is to be awarded to those scientists who, either in Italy or abroad, have made significant contributions in this important and currently relevant field.

This initiative has been made possible by the generous offer of a fellow citizen, Primo Rovis, who has allowed the Trieste International Foundation, on the date marking the tenth anniversary of its foundation, to award an annual prize of US\$ 20,000 to those who have made the most important contribution to the diffusion of scientific culture. These contributions should be in the spirit and purpose set by the educational and cultural activities of the "Laboratorio dell'Immaginario Scientifico" within the framework of the national plan for the dissemination of culture and information.

In 1990 the prize was awarded to Prof. Richard Langton Gregory of Bristol University (UK); in 1991 to the scientific

journalist Sergio M.C. Brandão (Brazil) and in the same year it was awarded also to the Nepalese Prakash Khanal; in 1992 the prize went to ECSITE (European Collaborative for Science, Industry and Technology Exhibitions) in the person of its President Roger Lesgards; in 1993 the Prize was awarded to the scientific journalist of the Italian national TV network, RAI, Piero Angela; in 1994 the Prize was awarded to the Association of Scientists of Senegal (ACS).

Regulations and conditions regarding the Prize can be obtained on request from the Trieste International Foundation for Scientific Progress and Freedom, c/o ICTP, Strada Costiera 11, 34014 Trieste, Italy.

Excerpts from the Regulations

Art. 1

The Trieste International Foundation for Scientific Progress and Freedom awards the "Primo Rovis" Prize of the amount of US\$ 20,000 to a candidate who has majorly contributed, by 31 December of each year, to the diffusion of science and information based on scientific research and contemporary technology.

With the "Primo Rovis" Prize the Foundation intends to participate on a world-wide basis, to the promotion and progress of Science at all levels.

Art. 2

An Organizing Committee composed of four Councillors and the Chairman of the Foundation is in charge of the organization of the "Primo Rovis" award. Generally, the duties of the Committee are to organize each year the various departments of the Science museum, to give out information, to prepare multimedial didactic communications, to choose the subject of the award, to evaluate and select candidates.

Art. 3
Subject of the award, to evaluate and select candidates.

Art. 3

The Award Committee members are the following:

- the Chairman of the Foundation
- Mr. Primo Rovis
- S.A.S. Prince Carlo Alessandro della Torre e Tasso
- the Chancellor of the University of Trieste
- the Chancellor of the University of Udine
- the Director of SISSA
- the head of the Laboratorio dell'Immaginario Scientifico
- two scientists.

The President of the Foundation acts as the Chairman of the Award Committee, based in Trieste.

Art. 4

The Prize will be awarded to the selected candidate during a public ceremony organized by the Foundation.

CONVERSATION WITH PROF. VIRASORO

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right, it means that it is an approximation, but it may be a very good approximation, and one should not just disregard it. Now, if you ask this question among intellectuals that have always been discussing philosophy, literature, etc. they will not understand what you are talking about. This is something that is extremely important, because in the language of science quantities are real numbers; they are not just yes-or-no problems. Therefore, in the language of science you have a much larger way to reach agreements than by talking another language in which you see only right or wrong. I remember so many discussions about where we should start from, and somebody always wanted to start from postulates. We know that there is only one science that starts from postulates, while all the other sciences start from real facts, some small correction to these real facts, some modelling of these real facts plus working hypotheses, etc. I think that the development of science as an essential ingredient of culture is extremely important for the Third World countries. The second aspect which is rather specific is that theoretical physics has always set a very high standard of quality. So the point is — and I know this by experience — that if you decide that you are going to do only the part of science that applies to your particular country, then there is a lack of an international standard, because you are doing very useful science but a science that applies to a very specific situation. In such a case there is no possibility of quality control by your peers. Then you cannot realize whether you are really doing high-level or low-level research. And unfortunately, many times, when one insists too much on doing extremely applied things, one finally develops low-level applied science, applied things, one finally develops low-level applied science, which is not good for anyone. Still, I must say that there are certain subjects in theoretical physics that are better suited than others for scientists who would like to work in developing countries. There can be certain subjects in which, for instance, whatever you do is important because of the particular geographical situation in which you are working. Let me give you an example of a subject that I had chosen after some discussions I had when I returned to Argentina — oceanography. Oceanography is a subject in which you can use the full machinery of theoretical physics. You can even use Feynman diagrams, because they are used to study gravity waves in the ocean. You can do very sophisticated statistical mechanics arguments; you can develop all the theory of turbulence, which is extremely important to oceanography, as are the techniques

of renormalization groups. It is a very challenging subject, and one which is obviously extremely suitable for any country lying on an ocean. Let us talk about my particular experience in my own country, Argentina, which is on the Southern Atlantic. The Southern Atlantic was not modelled at all, because not enough information was available. For this reason, anything that could be done on that particular area was extremely important, both in Argentina and elsewhere. This is something that one should take into account. On the other hand, I want to stress that experience has shown that one should not constrain anyone to do research in a particular subject. I mean that each person should decide for himself what he wants to do, because research is not something which you can programme yourself to do.

Hussain: How do you see Trieste and the ICTP, located near the Balkans, in the part of Europe which is locally called 'Mitteleuropa'? We are in a frontier area, near a region which is now at war, and at the end of a century marked by disasters all around. Is there something we can do to help former Yugoslavia?

Virasoro: There was a Lebanese physicist who died very young, Rammal. Looking at the civil war in Lebanon, he said, "The only hope we have is that intelligence finally prevails." And the only thing I can say about these crazy things that are going on is that I share Rammal's hope. If so, I think Trieste has a brilliant future as a cross-roads. We should try to make use of all of the investment that Trieste has made in science, so that science can continue to flourish here. This would not be the responsibility of the ICTP alone, but of all the various institutions located in Trieste. Together with the authorities of Trieste, we should think of ways of benefiting from the good effects of all the concentration of research facilities in this area. The local authorities are very interested in this — I found Illy (the Mayor of Trieste), in particular, very concerned about this fact. He wants to see something coming out of all the expertise available in Trieste.

HONORS

Prof. J. Eells, founder and first director of the Mathematics Section of ICTP, has been appointed Honorary Professor at Nankai University in Tianjin, China. The award was made on the occasion of the 10th anniversary of the founding — by Prof. S.S. Chern — of the Nankai Institute of Mathematics.

continued on following page

ACTIVITIES AT ICTP SPRING & SUMMER 1995



Prof. Jacob Palis, a Member of the ICTP Scientific Council since 1989, received the 1995 Interamerican Prize for Science (named after the Nobel Laureate Bernardo Houssay), amounting to US\$ 30,000, and given by the Organization of the American States, this year in the areas of Mathematics, Physics, Chemistry and Geosciences. Among the more than 100 candidates previously selected, the prize was awarded to Prof. Jacob Palis. According to the Prize Committee, he excelled in every item considered. Namely, he gave outstanding contribution to the development of Mathematics, specially in the field of dynamical systems: fundamental facts and conjectures in the understanding of stable systems and their bifurcations and, more recently, on the theory of chaotic systems are due to him. He also excelled in helping to build up a most remarkable research institute in Brazil, the Instituto de Matematica Pura e Aplicada (IMPA) and in forming a formidable research school in his domain in Latin America, having advised himself more than 33 Ph.D. students from 10 different countries in the last two decades.

ROLE OF BASIC SCIENCES IN VIETNAM

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environment due to the use of chemical fertilizers and insecticides. In order to minimize or prevent the use of these dangerous chemicals, it is necessary to invent new techniques for the protection of the plants, and this work cannot be done without the basic research on the biological subjects which exist in Vietnam but do not exist in other countries. This basic research must be carried out locally, of course with international cooperation.

The needs to have appropriate technologies to fabricate low-cost construction materials, to produce materials for purifying drinking water on the small scale (for a family, for a group of families or for a small village) etc. are other examples of the urgent problems of the Vietnamese science. In these fields we certainly can learn from the experience of other developing countries, but there is still a lot which must be done by ourselves. The scientists in basic chemistry and physics have made significant contributions to the invention of the appropriate technologies for these purposes. We could materialize these because in the country there are many scientists who are able to solve the problems.

During thirty years in Vietnam the basic sciences have received the attention and support of the Government and the valuable help from the foreign and international scientific organizations. We hope that this will continue in the future.

Title: College on Computational Physics, 15 May – 9 June.

Organizers: Professors S. Baroni (International School for Advanced Studies, SISSA, Trieste, Italy), V. Kumar (Indira Gandhi Centre for Atomic Research, Kalpakkam, India), A. Nobile (local organizer, ICTP), and C. Rebbi (Boston University, USA).

Report: This was the fifth of a series of Colleges on Computational Physics held at the International Centre for Theoretical Physics since 1986. The College attracted a very good response which made it possible to select participants with excellent background. In all there were 82 participants from 36 countries. Out of these 7 acted as tutors and 24 came under the Associateship/Affiliation programmes. Most of the participants were new applicants. There were 11 lecturers including the College Directors.

This edition of the College was planned with a focus on Computational Materials Science and Statistical Mechanics. It covered several important topics ranging from general computational techniques to classical and ab initio molecular dynamics, classical and quantum Monte Carlo simulations, electronic structure calculations, wavelets and their applications. There were also lectures on new developments such as Fortran 90, High Performance Fortran, parallel computing and applications, and the World Wide Web. Mornings were completely devoted to lectures. One further lecture and/or specialized seminar was generally presented in the afternoon and the remaining time was used for computer exercises. The participants were divided into four major groups, namely Monte Carlo simulations, molecular dynamics, electronic structure methods and partial differential equations, according to their main points of interest. The good level of participants was reflected also in the number and quality of the seminars which many of them gave within the groups.

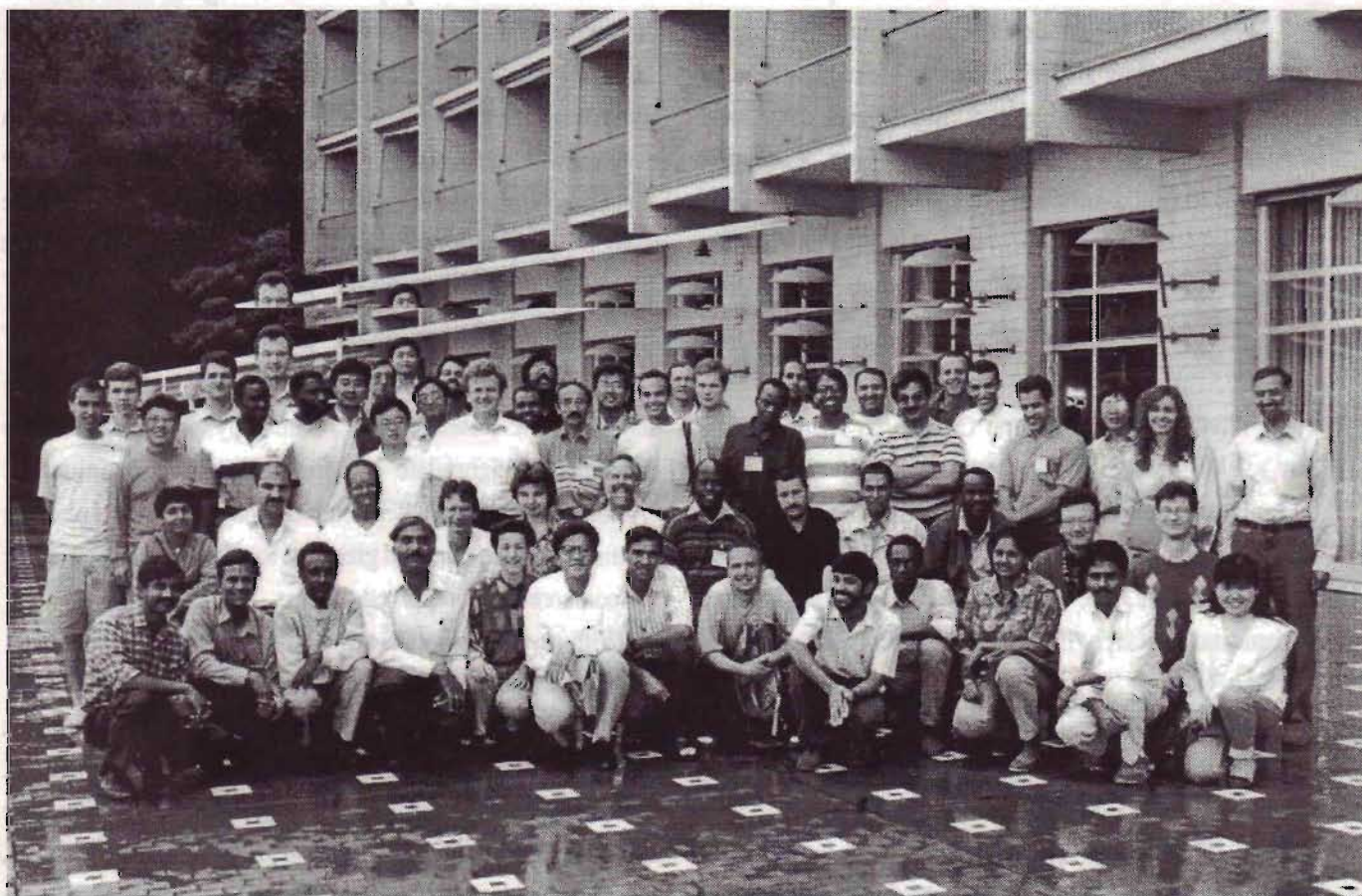
A questionnaire was distributed among the participants. From the answers as well as from informal discussions with the participants and lecturers, it emerged that the College was a success. The lecturers were leading experts in their fields and interacted with the participants. Some of them installed software on the ICTP machines and demonstrations were arranged. The expertise and dedication of the tutors, together with the number

of personal computers available to the participants, larger than ever before, made the tutorial sessions by far the best in all editions of this College. There were 30 personal computers running Unix (in addition to DOS/Windows) specifically dedicated to the participants of the College, which were heavily utilized even late in the evening and on weekends. As the number of participants in each tutorial session was more than 30, the availability of a few more personal computers would have been desirable. A special session was arranged at 22:00 hours for World Wide Web access on the network (during daytime, unfortunately, the high traffic congestion along international routes makes the use of the Web impractical, especially for tutorial demonstrations). The participants could carry home the software demonstrated in the College. Some of the software was written especially for the College in Fortran 90 language. This will help the participants to pick up Fortran 90 which is expected to replace Fortran 77 in the near future.

For a few participants some lectures were too advanced while a few would have liked more lectures on specialized topics. This is inevitable when there are participants with varied interests. But as a whole it was a balanced College, though there is always room for improvements. Our earlier suggestion that the College should be followed by a specialized workshop was taken up this year and a Workshop on Electronic Structure

Methods in Materials Science and Engineering took place immediately after the College. Some of the participants at the College stayed for this Workshop, thus leveraging the benefit they received from both. We recommend that this practice be continued in the future.

In developed countries there is an ever increasing application of computers to the development of the methodologies/models/materials needed to find solutions to the most challenging scientific, technological and economic problems. Since computers are progressively becoming more easily accessible and affordable in many developing countries, we feel that it would not only be useful to continue to organize Colleges on Computational Physics, but to hold them every year, so that in alternate years there can be a College on Computational Materials Science and some College dealing with other topics and techniques (e.g. fluid dynamics applications). It is not difficult to find talented people in developing countries. What is lacking are the facilities and a conducive environment for research. Experimental research is very expensive and only limited progress can be hoped for the near future in developing countries. On the other hand, computers can be very effectively used by researchers working in very diverse areas, because large amounts of software are today available in the public domain and there are possibilities for using computers through the Internet if one



College on Computational Physics, 15 May – 9 June.

own's facilities are not powerful enough. ICTP has been and can play an extremely important role in this development. From informal discussions with participants from Africa and Latin America, one of us (Vijay Kumar) noted that many countries now have access to Internet (even in some African countries) although their respective computational facilities are inadequate for any serious computational effort. Moreover, one expects that Internet access will become available to several other countries in the near future, while it will probably take some amount of time before good computational facilities become available there. We recommend, therefore, that a special effort be made to enhance substantially the computational facilities at the ICTP, thus making the Centre a provider of remote resources for those scientists from developing countries who have access to the Internet but not yet to adequate computers in their own home countries. In fact, compared to the standards of developed countries, the facilities at the ICTP are today just nominal. When there is a large number of visitors at the ICTP, as happens regularly during the summers, it becomes difficult to get time on IBM machine, and the turnout becomes very slow. Visitors to ICTP would derive enormous benefit from an improvement of the computational facilities, which, during the leaner periods, could be made available to researchers in developing countries through the Internet.

We also recommend that a few terminals be placed in the Galileo Guest House so that visitors can have improved access to computers, extending also to odd hours. Indeed late at night the ICTP gate is closed, and even during the day, since most participants do not have a working place, at times it becomes truly difficult to find a terminal.

*Stefano Baroni, Vijay Kumar,
Claudio Rebbi, Alyse Nobile
Claudio Rebbi, Alvise Nobile*

Title: First Antonio Borsellino College on Neurophysics, 15 May - 9 June.

Organizers: Professors G. Geiger (Massachusetts Institute of Technology, Cambridge, Mass., USA), J. Kaas (Vanderbilt University, Nashville, TN, USA), and O. Siddiqi (Tata Institute of Fundamental Research, Bombay, India). Local organizer: J. Chela-Flores (ICTP).

Report: The late Professor Antonio Borsellino, a founding Director of the ICTP Colleges on Neurophysics, was honoured this year by two events in Italy.

From 3 - 12 May the Ettore Majorana Centre in Erice held a "Memorial Course" for Borsellino, who founded the Ettore Majorana International School of Biophysics in 1969. This

year's Erice event was directed by Professors Franco Conti and Vincent Torre.

At the ICTP we held the First Antonio Borsellino College on Neurophysics from 15 May - 9 June. It was directed by Professors Gadi Geiger, Jon Kaas and Obaid Siddiqi. The subject of the College was: "The Processing and Use of Sensory Information in Biological Systems". In the opening ceremony, chaired by Professor Luciano Bertocchi, Deputy Director of the ICTP, the following text was read, which was written by Professor Paolo Budinich:

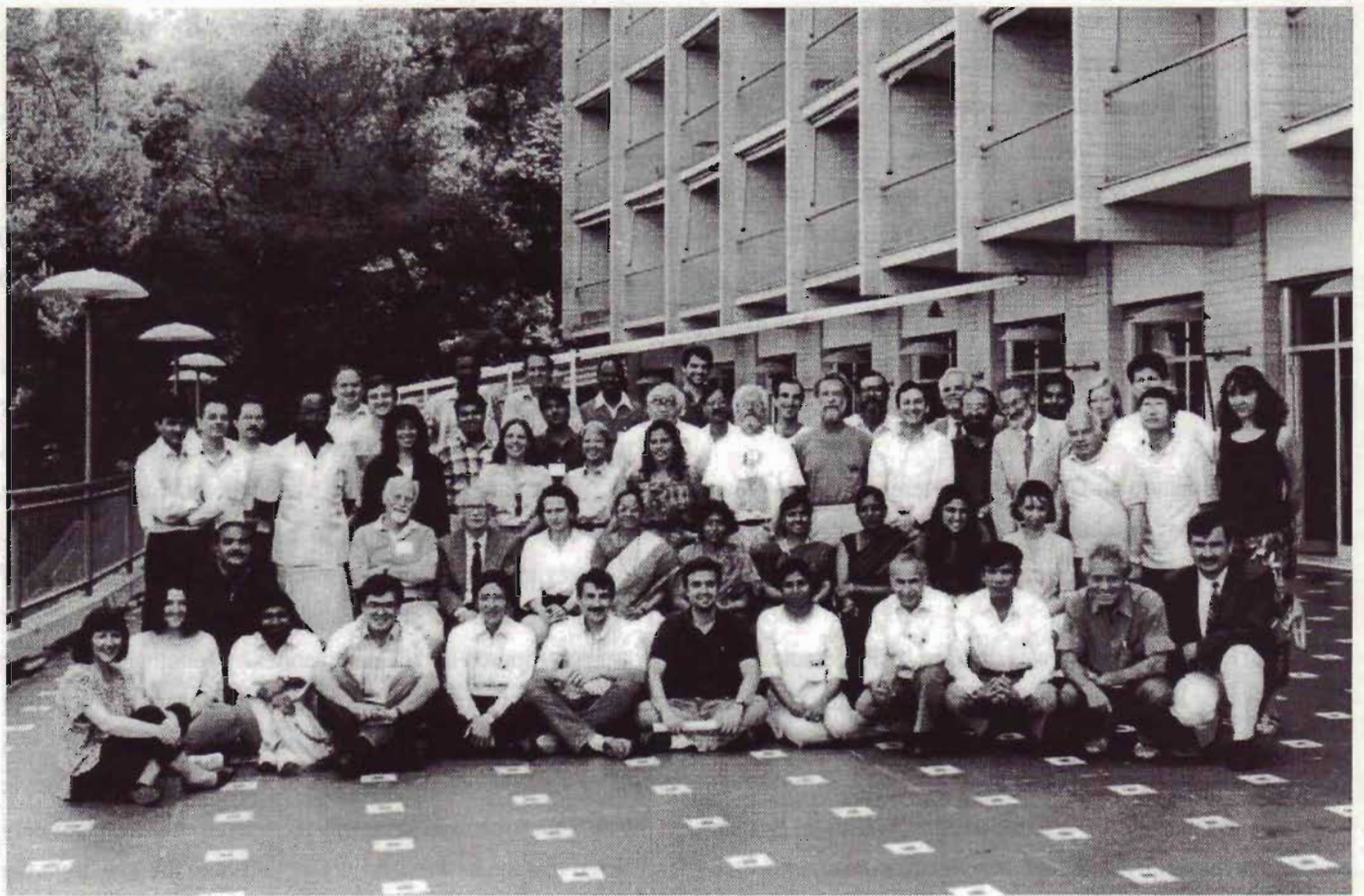
"I met Nino Borsellino at the Scuola Normale in Pisa in 1934. He was coming from Reggio Calabria and I from Trieste. This did not prevent us from becoming friends. For me that was the closest friendship of my life. Since the beginning in Pisa we had tremendous discussions frequently ending in fights at the end of the night when the first light of day was entering through the window! Borsellino accused me of being a mystic; I accused him of being blinded by abstract logic. In Pisa he graduated in Theoretical Physics; he was the favourite student of Giulio Racah. However Racah had to emigrate as a Jew. Later Borsellino devoted himself to biophysics for which he was a pioneer in Italy. When we created SISSA it was quite natural for me to try to have him in the first nucleus of professors, together with Ambrosetti for Mathematics and Dallaporta for Astrophysics. The idea was that biophysics and biological sciences were fundamental for the future of SISSA and he was the best professor we could have in Italy. I personally felt it necessary to have Borsellino — a close friend of mine whom I trusted both as a man and as a scientist without reserve — with me in that new adventure. Now the biological branch, extending also to cognitive sciences, is flourishing in SISSA. It is good to remember that a lot of these successes are due to Antonio Borsellino."

a lot of these successes are due to Antonio Borsellino."

A message was read from the Italian Minister for University and Scientific Research and Technology, Professor Giorgio Salvini: "I congratulate you for your important initiative: "Antonio Borsellino College on Neurophysics". It is a pleasure for me to send my personal greetings to all participants, wishing the conference the deserved success.

With my best personal regards,
Giorgio Salvini"

The College had 23 lecturers coming from Brazil, Germany, India, Israel, Italy, UK, and USA. The topics covered included: visual processing of space and motion; auditory coding; taste and olfaction; coding in somatosensory systems; attention, memory, learning, recognition and reading — all of these topics were considered in human and animal models; motor control



First Antonio Borsellino College on Neurophysics, 15 May - 9 June.

systems; theoretical considerations, neural models and their application to understanding neuronal processing; development and plasticity; clinical studies and brain imaging.

The 52 participants came from the following countries: Argentina, Brazil, Colombia, Cuba, Egypt, Germany, Hungary, India, Iran, Israel, Nigeria, Pakistan, Peru, P.R. China, Romania, Sierra Leone, Turkey, Ukraine, USA and Vietnam. These participants came from departments and institutes of: Audiology participants came from departments and institutes of: Audiology and Speech Therapy School; Biochemistry; Bioelectronics; Biology; Biomedical Engineering; Biophysics; Children's Hospitals; Electrical and Electronic Engineering; Mathematics; Medicine and Psychology; Molecular Biophysics; National Research Centres; Neurological Surgery; Physics and Psychology.

The format of the College was very successful. The subject matter was covered in 72 lectures. Within the framework of the conference, a three-day mini-symposium was inserted on the "Dynamic Properties of Receptive Fields and Plasticity of Processing Systems" in which this topic was covered in depth in 14 lectures. The topics covered included: dynamic features of visual processing; adult plasticity; plasticity in the auditory, visual and somatosensory systems; models of adult plasticity;

"learning" in somatosensory systems; glutamate receptors and synaptic genesis; activity dependent regulation of plasticity; NMDA receptors and nitric oxide in the development of visual connections; visual activity and cortical development; development of cortical connectivity; observed plasticities which are difficult to account. This aspect is considered by us as so important that we feel it should be part of future Colleges. Another important aspect of this activity was a set of discussion sessions at the end of the day in which, besides discussions in detail of the day's lectures, participants delivered 15 specialized seminars on a variety of topics closely related to the main theme of the College.

In addition, a session of posters received 9 contributions from the participants.

Recommendations — The very high level in the First Antonio Borsellino College on Neurophysics, achieved by the dedication and initiatives of its Directors, should be continued in 1997. For logistics reasons we suggest once again the late spring for the next College.

We have also observed that the possibility of having direct oral and poster presentations by well-qualified participants was an important aspect of the College and was well appreciated.

This aspect should also represent a component of future activities.

As mentioned above, the Mini-symposium is considered one of the key factors for the success of the College and this format should be preserved in the future.

Finally, we have noticed that the ICTP mailing lists are still oriented too much towards the physical sciences and not as much towards the life sciences, particularly psychology and neurology departments. The preliminary life science mailing lists should be improved.

Julian Chela-Flores

Title: Workshop on Dynamical Systems, 22 May - 2 June.

Co-sponsors: Instituto de Matematica Pura e Aplicada (IMPA, Rio de Janeiro, Brazil) and European Commission (EUROCONFERENCE).

Report: The Workshop was directed by Professors J. Palis (IMPA, Rio de Janeiro, Brazil), Ya. Sinai (Princeton University, USA) and J.C. Yoccoz (Université de Paris XI, Orsay, France).

It was intended for young mathematicians in developing countries working in the general area of Dynamical Systems.

Structure and Organization — Altogether, forty-one lectures of 45 minutes each, followed by 10-minute discussions, and twenty-eight 30-minute talks were delivered.

Participation — Forty-four countries were represented of which 31 were developing countries. The total number of participants was 158, of whom 50 were from the European Union. Thanks to a generous grant of the European Commission, 18 young participants from the European Union countries were financially supported.

Scientific Content — The topics covered were:

- Bifurcations, chaotic systems, strange attractors, invariant measures;
- Variational methods in Hamiltonian and Lagrangian systems;
- Polynomial differential equations, Stoke's phenomenon and Hilbert's problems;
- One-dimensional dynamics.

Many new results of high scientific quality were reported at the Workshop, especially from young researchers working in developing countries. The interaction was intense and I heard of many plans from participants to have joint research projects.

The overall activity was exceptionally high-standard; nothing less could be expected from this team of Directors, one of them being a Field Medalist.

The Directors propose to have another Workshop at ICTP in 1998.

Giovanni Vidossich

Title: Trieste Conference on S-duality and Mirror Symmetry, 5 - 9 June.

Organizers: E. Gava (Istituto Nazionale di Fisica Nucleare, INFN, Trieste, Italy, and ICTP), K.S. Narain (ICTP) and C. Vafa (Harvard University, Cambridge, MA, USA).

Report: The Conference brought together about 150 scientists, both physicists and mathematicians, including 30 speakers, almost all the leading experts in the area.

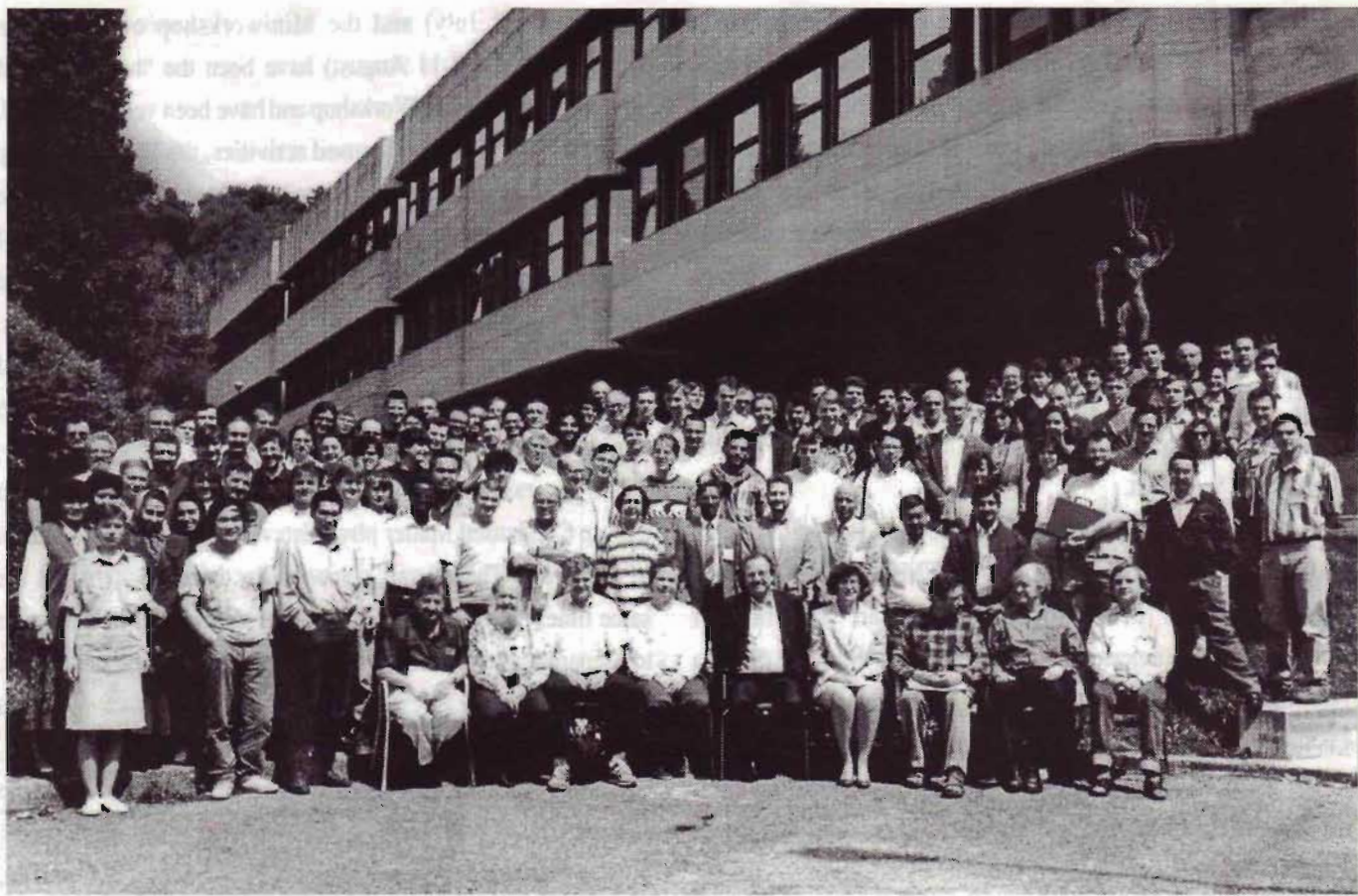
The event occurred at a moment when string theory is providing new exciting developments, related precisely to Mirror Symmetry and S-Duality. This is best witnessed by the words of E. Witten in his closing talk, where he said that "This is one of the most exciting conferences I have ever participated in".

As reviewed by D. Olive in his opening talk, the idea of electric-magnetic and strong-weak coupling duality symmetry was first proposed in the late seventies by Montonen and Olive in the context of certain quantum field theories possessing magnetic monopole solutions. This conjecture was based on a striking similarity between the magnetic interactions and electric interactions observed in those models. It was immediately realized that the best candidates for self-dual theories were the $N=4$ supersymmetric Yang-Mills theories, due to their peculiar non-renormalization properties.

The issue was reconsidered about one year ago by A. Sen, who proved that the prediction of duality symmetry in $N=4$ theories, concerning the spectrum of BPS-saturated states was indeed verified, at least in the sector of magnetic charge 2. The above prediction was then verified in the general case and further evidences for duality in $N=4$ theories were subsequently found by other authors. At the same time the S-duality symmetry was explored in the $N=4$ heterotic string by J. Schwarz and A. Sen.

In Summer '94, Seiberg and Witten made a spectacular progress applying duality ideas to the $N=2$ gauge theories. They postulated the occurrence of massless monopoles at some point in the parameter space of those theories, and this allowed them to compute exactly their low energy effective action, including non-perturbative corrections. This result had also a dramatic impact on the Mathematics side, providing much simpler theory of 4-manifold invariants, as compared to the celebrated Donaldson theory. In his talk, E. Witten gave a beautiful physical interpretation of some recent results in the mathematical literature.

The highlights of the Conference, however, had mainly to do with some new developments concerning String Theory which took place during Spring '95.



Workshop on Dynamical Systems, 22 May - 2 June.

In fact, A. Strominger applied Seiberg-Witten ideas to the $N = 2$, type II string compactified on a Calabi-Yau manifold. He proposed a resolution of the so-called “conifold puzzle” in string theory, which again involved the appearance of massless solitonic states, this time charged black-holes. According to his proposal these states would be responsible for the singularities (called conifold singularities) appearing in the low energy effective action when the C.-Y. manifold itself becomes singular. These singularities are a generic feature of the low energy effective theory as computed using Mirror Symmetry and signal breakdown of the low energy description. Strominger interprets them as due to a loop of massless charged black-holes. The idea that (BPS) black-holes have to be treated as elementary states goes back to S. Hawking, A. Salam and others and was the subject of the talk of A. Sen, who argued that indeed the entropy in BPS black-holes agrees with the multiplicity of elementary string states.

At a conceptual level Strominger’s idea has a satisfying consequence, as pointed out by B. Greene, A. Strominger and D. Morrison: they argued that the condensation of these black-holes would allow a smooth transition between topologically distinct C.-Y. spaces, i.e. between vacua with different low

energy spectra. This idea would then essentially unify all C.-Y. compactifications, in agreement with similar proposals coming from the mathematical side and due to M. Kontsevich. All of these developments were reviewed in the Conference in the talks of Strominger, Greene, Morrison and Kontsevich.

In parallel to these developments, the program of extending Seiberg-Witten approach to the heterotic $N = 2$ case was accomplished, especially due to some work of Kachru and Vafa, which C. Vafa reviewed at the Conference. They in fact proposed a duality between type II and heterotic string with $N = 2$ supersymmetry, giving also some explicit examples of dual pairs. The most interesting upshot of this proposal is that Mirror Symmetry, used to compute world-sheet non-perturbative effects on the type II side, computes also nonperturbative spacetime corrections on the heterotic side. This led some authors to use the words “second quantized Mirror Symmetry”.

S. Ferrara, J. Harvey and K.S. Narain reviewed some further developments in this context and some successful tests of the $N = 2$ type II-heterotic duality in some explicit examples. There were other interesting talks on various aspects of String-String duality and extensions of Seiberg-Witten work within field theory.

In conclusion, the picture emerging from the Conference is that String Theory has received an extraordinary fertilization from duality ideas. From the computational point of view, it seems that non-perturbative issues are becoming accessible and from the conceptual point of view it seems that various different String Theories (as suggested by Witten, even 11-dimensional supergravity!) are actually different realizations of the same Theory.

E. Gava

Title: Research Workshop on Condensed Matter Physics, 12 June - 18 August.

Co-sponsors: European Commission, Italian National Institute for the Physics of Matter (INFM).

Organizers: Professors G. Baskaran (Institute of Mathematical Sciences, Madras, India), F. Bassani (Scuola Normale Superiore, Pisa, Italy), E. Burstein (University of Pennsylvania, Philadelphia, PA, USA), P.N. Butcher (University of Warwick, Coventry, UK), H. Cerdeira (Universidade Estadual de Campinas, UNICAMP, Campinas, Brazil, and ICTP), S. Fantoni (International School for Advanced Studies, SISSA, Trieste, Italy, and ICTP), F. Garcia-Moliner (Instituto de Ciencias de Materiales, Madrid, Spain), F. Gautier (Université Louis Pasteur, Strasbourg, France), S. Lundqvist (Chalmers University of Technology, Gothenburg, Sweden, and ICTP), Chi Wei Lung (International Centre for Materials Physics, Academia Sinica, Shenyang, China), N.H. March (University of Oxford, UK), A. Mookerjee (S.N. Bose National Centre for Basic Sciences, Calcutta, India), F.S. Persico (Università di Palermo, Italy), T.V. Ramakrishnan (Indian Institute of Science, Bangalore, India), S.R. Shenoy (University of Hyderabad, India, and ICTP), E. Tosatti (International School for Advanced Studies, SISSA, Trieste, Italy, and ICTP), M.P. Tosi (Scuola Normale Superiore, Pisa, Italy) and Yu Lu (Institute of Theoretical Physics, Academia Sinica, Beijing, P.R. China, and ICTP).

Report: This has been the 26th of the series of Condensed Matter Summer workshops organized at ICTP and has been the fourth year that the Workshop combines some focused activities with researches along certain lines. A total of 358 scientists including Research Leaders, Participants, associates and Affiliates attended this activity.

Four major activities, namely, the Workshop on "Computational Methods in Materials, Science and Engineering" (12-23 June), the Workshop on quantitative Biophysics at the Molecular and Macromolecular Scales (29 June - 7 July), the Miniworkshop on Quantum Incoherence in Strongly Correlated

Systems (3-21 July) and the Miniworkshop on Josephson Junction Arrays (7-11 August) have been the "highlights" of this Condensed Matter Workshop and have been very successful. Moreover, the other two focused activities, the Working Group on "Surface and Bulk Magnetism" (26 June - 7 July) and the Working Party on the Fabrication, Physics and Applications of Quantum Dots (31 July - 4 August) have also attracted a large number of outstanding lecturers as well as active participants. In addition, the group activities along the research lines "Classical and Quantum Liquids" and "Semiconductor Physics" have been also well-organized and successful.

In general, this re-organization of the Workshop helps to expose Condensed Matter physicists to the latest developments in the field. The overall response has been positive. At the same time, more pedagogical lectures are needed in the future to prepare less experienced researchers for entering new areas.

Yu Lu

Title: Fourth School on Non-accelerator Particle Astrophysics, 17-28 July.

Report: This School was directed by E. Bellotti, R. Carrigan, G. Giacomelli, N. Paver and J. Stone, and L. Forza was the secretary in charge. In addition to ICTP, the School had as a sponsoring scientific institution, the Istituto Nazionale di Fisica Nucleare (INFN - Italy).

It was attended by about 75 participants from several countries, actively working in the field of non-accelerator particle physics and astrophysics, either theoreticians or experimentalists. Some physicists already present at the ICTP and at the University of Trieste also took part. The students were mostly at the Ph.D. or at the postdoctoral level, and came from Algeria, Argentina, Belarus, Bangladesh, Benin, Bolivia, Brazil, Bulgaria, Canada, Denmark, Egypt, France, Georgia, Germany, India, Iran, Italy, Japan, Mali, Morocco, New Zealand, Nigeria, Pakistan, Poland, Romania, Russia, Slovak Republic, Spain, Sri Lanka, Turkey, Ukraine and USA, so that quite a considerable number of nations were represented in this activity.

The School consisted of a series of keynote lectures on subjects relevant to the field of non-accelerator particle astrophysics, presenting the theory, the experimental methods and the future theoretical and experimental perspectives. The topics covered were: the standard model of particle physics and models beyond the standard model, neutrino masses and oscillations, solar and supernovae neutrinos, proton decay, double β decay, cosmological models, properties and models of dark matter, neutrino astronomy, the origin of cosmic rays

and their composition, astroparticle physics with space stations, muon and gamma-ray astronomy, air shower physics, magnetic monopoles and gravitational waves. Moreover, results from accelerator experiments were also reviewed, to give students a complete background. Representatives of large experiments and laboratories gave talks on their present and future programmes. For each subject, ample time was devoted to discussing the theory as well as related experiments in details. Discussion sessions were very lively, with many questions to the speakers and comments from the participants. One afternoon was devoted to training students to the practical use of networks and databases, Internet in particular.

Lectures were given by: M. Baldo Ceolin, G. Barbiellini, G. Battistoni, F. Bobisut, M. Cerdonio, A. Chiavassa, E. Fiorini, M. Ghia, G. Giacomelli, R. Giacomelli, A. Masiero, G. Mandrioli, P. Monacelli, O. Palamara, N. Paver, E. Previtali (Italian institutions and INFN); M. Persic, S. Petcov (SISSA); G.F. Giudice, F. Pietropaolo (CERN); R. Carrigan, E. Kolb (Fermilab); A. Colavita (ICTP); J. Stone (Boston Univ.); M. Nakahata (Tokyo Univ.); K. Kondo (Tsukuba Univ.); D. Vignaud

(Saclay).

Poster sessions were organized, and totalled 16 posters presented by the students. Furthermore, in addition to discussion sessions, some fraction of the time was devoted to library and study time. All that created the atmosphere of a research school.

While xerox copies of the transparencies of all lectures were distributed to participants in real time, it is now planned to publish the proceedings of the School in a book by World Scientific, edited by the organizers with the help of Ms. Forza.

In the concluding session there was a short discussion on the scientific structure of the School and problems connected to the organization. Participants expressed their deep appreciation for the formulation of the physics programme and for the excellent secretarial work. The usefulness and the formative character of the School was recognized, especially by the physicists from developing countries, and it was suggested that the School should be repeated with a two-year frequency. Many students suggested to investigate the possibility of organizing a short visit to some laboratory specialized in this field, immediately following the School.

G. Giacomelli, N. Paver



Fourth School on Non-accelerator Particle Astrophysics, 17-28 July.

Title: African Regional Workshop on Parallel Processing and its Applications, Yaoundé, Cameroon, 31 July - 11 August.

Co-sponsor: United Nations University (UNU, Tokyo, Japan).

Directors: V.P. Bhaktar, M.V. Pitke (Tata Institute of Fundamental Research, Bombay, India), and M. Tchunte (University of Yaoundé II, Cameroon).

Report: The International Centre for Theoretical Physics (ICTP), the United Nations University (UNU) and the University of Yaoundé I (UYI) organized the African Regional Workshop on Parallel Processing and its Applications that took place from 31 July to 11 August 1995 in Yaoundé, Cameroon.

After the solemn ceremony, chaired by the Minister of Higher Education and attended by numerous personalities, such as the Minister of Scientific and Technical Research and the Italian Ambassador, the course started as scheduled. The 11 lecturers from India, Cameroon, France and Gabon presented their lessons during the morning sessions whereas afternoon sessions were dedicated to practical exercises.

Judging from the regular attendance, the numerous questions and the interest for the rich documentation made available, the 46 participants, among which 16 from the subregion and 30 from Cameroon, appreciated very much the teaching which brought up not only the fundamental aspects (e.g. architecture, programming environments, algorithms) but also the applications in mathematics, mechanics, physics, meteorology and chemistry.

During the morning of 5 August, by means of a mini-symposium, participants were given an opportunity to present their own research work. Numerous were the points of convergence which opened possibilities of future collaborations among research workers from the subregion with the scientific support of Indian researchers who have already accumulated a considerable expertise in the field of parallel processing.

On 11 August, during the closing session which was organized in the form of a round table, all participants expressed their gratitude to ICTP, UNU, UNU/IIST, and UYI that made possible such an important scientific event which opened Africa to a high technology domain. They also expressed their interest for the repetition of this kind of workshop in two years time in Cameroon, and proposed that centres, such as the University of Yaoundé I, which are well equipped and have good research teams, could serve as a link for documentation and receive invited scientists for periods of research.

M.V. Pitke, M. Tchunte

Applications to Geometry, 21 August - 1 September.

Co-sponsor: European Commission.

Directors: Professors Chang Kung Ching (Peking University, Beijing, P.R. China) and M. Giaquinta (University of Florence, Italy).

Report: The Conference was organized for an audience of young mathematicians from developing countries. Our aim was to bring them in contact with the recently flourishing use of analytic, and especially PDE methods in geometrical problems.

There were seventeen speakers: three of them gave series of lectures of more than four hours, five of them a series of three lectures, five of them two lectures; finally, four of them gave a one-hour lecture each. Moreover, seven young participants presented their research work in a seminar session.

The speakers gradually introduced and illustrated some of the most recent results and problems, for instance, in the following topics: Variational problems in quantum field theory, Dirac operator in relativistic mechanics, Ginzburg-Landau vortices, Kähler-Einstein metrics, curvature problems, harmonic and p-harmonic maps.

Participation:

Total number of participants: 129 (from 37 countries)

From developing countries: 84 (from 28 countries)

Sponsored with Euroconference funds: 7

From advanced countries: 45 (from 9 countries).

Our impression, deriving from discussions with the speakers and the participants, is that the Conference has been quite successful; not only did the experts enjoy it, but also the participants gained more knowledge and learned new methods.

Chang Kung Ching, M. Giaquinta

Title: Trieste Conference on Chemical Evolution. IV:

Title: Trieste Conference on Chemical Evolution, IV: Physics of the Origin and Evolution of Life, "Cyril Ponnampuruma Memorial", 4-8 September.

Advisory Committee: Mohindra S. Chadha (India), J. Mayo Greenberg (The Netherlands), Mikhail S. Kritsky (Russia), Alexandra J. MacDermott (UK), Alicia Negron-Mendoza (Mexico), Juan Oro (USA), Tairo Oshima (Japan), Manfred Schidlowski (Germany), Peter Schuster (Germany), and Wang Wenqing (China).

Report: This event was directed by Julian Chela-Flores (ICTP, Trieste, IDEA, Caracas, and DIAS Dublin) and François Raulin (University of Paris 12). It was generously sponsored by the International Centre for Theoretical Physics, International Centre for Genetic Engineering and Biotechnology, UNESCO, and Université Paris 12 - Val de Marne.

Title: Conference on Partial Differential Equations and

There were 58 registered participants from a world-wide distribution with significant representations from China, France, Japan, Mexico, Russia and USA. Many other Third World and industrialised nations were represented. Members closely related with the activities of the key agencies that are concerned with the general subject matter that was discussed were also present at the Fourth Trieste Conference, a fitting tribute to Cyril Ponnampereuma to whom this event was dedicated: NASA, the European Space Agency (ESA), the nucleus of the RMT group from Japan (cf., below), as well as scientists from the Babakin Engineering Centre and Lebedev Institute, Moscow.

Altogether there were 48 talks dealing with the subject matter of the Conference, a session of six contributions on the life and work of Cyril Ponnampereuma, and a poster session in which five posters were presented. A photographic exhibition on the work of Ponnampereuma was organised by Alicia Negron-Mendoza and Wang Wenqing. The ICTP Library collaborated with a book display, which included copies of all the proceedings of the three previous Trieste Conferences on Chemical Evolution and the Origin of Life. The first two volumes were published by Deepak Publishers, Virginia, USA, while the Third

Conference was published by Kluwer Publishers (The Netherlands); the proceedings of the Fourth Conference will also be published by Kluwer.

There were two evening sessions in which the international group which was organised by the suggestion of Ponnampereuma during the Third Trieste Conference met in the present meeting for the first time. The group, known by the name "Return-to-Mars-Together" (RMT) is being led by a group of Japanese scientists, of whom four were now present at Trieste. Their aim is to establish a collaborative effort with the next Planetary Mission aimed to land on Mars. It is expected to be launched in late 1997. In this group biologists are represented. During the Conference two of the key figures of the Russian Mission were present in the company of a scientist from NASA, the agency that was responsible for the first landing in the 1970s.

The main message that comes from the Cyril Ponnampereuma Memorial is that the mature discipline of the origin-of-life studies has gone from the exclusive environment of laboratories of organic chemistry (where some of the pioneers of the subject worked, such as Juan Oro and Sidney Fox who were present at the Trieste meeting) to the hands of space scientists,



Trieste Conference on Chemical Evolution, IV: Physics of the Origin and Evolution of Life, "Cyril Ponnampereuma Memorial", 4-8 September.

palaeontologists, geochronologists and biologists. This last group of specialists discussed at length the key topic of the origin of the nucleated cell, since this topic finds itself exactly half way in the range of topics discussed in the modern approach to the subject adopted at the Conference. These subjects go from chemical evolution of the biomolecules of life, to the search for extraterrestrial intelligence (SETI), a subject pioneered by Frank Drake, present throughout the Trieste meeting. The importance of eukaryogenesis may be underlined by the fact that the only intelligence that is known to date consists of (multicellular) eukaryotic organisms, whose presence was triggered by the Earth atmospheric evolution. About two billion years ago our planet acquired significant levels of oxygen, which permitted the onset of eukaryogenesis. The recent discovery of the presence of oxygen in the Solar System (in the atmosphere of Europa, the Jupiter satellite) adds considerable interest to the biological approach to the origin of life.

Conclusions — The success of the Conference was also due in part to the appreciation of the international scientific community for the Trieste events; this is demonstrated by the fact that a major part of the expenses (not covered by the sponsors) was covered partially or totally by many high level visitors from many institutions who were eager to present their results in this regular event in the international scientific calendar.

A set of valuable recommendations regarding the series of four conferences on Chemical Evolution was provided by the members of the Advisory Committee who were present at the meeting.

Julian Chela-Flores

Title: Workshop on General Theory of Partial Differential Equations and Microlocal Analysis, 4 - 15 September.

Co-sponsor: European Commission.

Directors: Professors Qi Min-you (Wuhan University, P.R. China) and L. Rodino (University of Turin, Italy).

Report:

Objectives — The Workshop was devoted to the recent progress obtained in the field of partial differential equations (PDE) by means of microlocal methods. Addressing an audience of experts and young mathematicians from developing countries, the directors selected the following topics, which are representative of the new exciting contributions in this area.

– Foundations of microlocal analysis: classical pseudodifferential operators, applications to the Cauchy problem.

– Nonlinear microlocal analysis: Littlewood Paley theory, paradifferential operators, applications to problems of physical nature.

– Analytic-Gevrey theory of PDE: microlocal Gevrey analysis, analytic hyperbolicity.

Structure and organization — (1) 9 expository mini-courses of 3 or 4 hours. (2) 9 one-hour talks by invited speakers. (3) 2 parallel seminars, taking place in the afternoons, where young mathematicians presented their own work.

Participation — The response from the mathematical community for the Workshop was very enthusiastic. There were invited speakers from all over the world, and a large number of well-known experts and young mathematicians contributed significantly to the Workshop. The meeting was also attended by several young European mathematicians, sponsored by the European Commission's Euroconference Programme.

Total number of participants: 96
 from developing countries: 66
 EC-sponsored: 6
 from developed countries: 30

Scientific content — The mini-courses and the one-hour talks presented the most recent results in the following main topics:

- General theory of PDE on distributions and ultradistributions. Linear equations with multiple characteristics in Gevrey classes.
- Pseudodifferential operators and wave front sets. Cauchy problem for linear hyperbolic equations.
- Analytic hyperbolic equations and systems.
- Littlewood-Paley theory, paradifferential operators. Propagation of singularities and hypoelliptic non-linear equations.
- Microlocal methods for non-linear wave equations, oscillation and concentration effects.
- Second wave front set; applications to non-linear hyperbolic equations.

One of the two seminars was on Microlocal Analysis, addressed to specialists in the topics of the Workshop, the other on PDE and Applications, addressed to non-specialists, working in related areas.

Qi Min-you, L. Rodino

Title: College on Soil Physics, 11 - 29 September.

Report: The College took place at the Adriatico Guest House. It has to be stressed that this was the sixth of a series of

Colleges in this field, an activity which started in 1983 and has been repeated every two years, with the only exception of 1991, a year in which the financial difficulties of ICTP made it necessary to cancel the already scheduled and almost completely organized College.

The Directors of the College were Profs. D. Gabriels (Belgium), D. Nielsen (USA), I. Pla Sentis (Venezuela) and E. Skidmore (USA). Out of these, D. Gabriels and E. Skidmore have been the proponents of the Soil Physics activity and have been among the Directors of all Colleges held up until now.

Besides the Directors, who themselves delivered a remarkable number of lectures, we had 6 lecturers from Belgium, Bolivia, Brazil, Czech Republic, Italy and the Netherlands. Some of them had been lecturers in previous Colleges. As in the last College, we tried to keep the number of lecturers quite small (correspondingly allocating heavy teaching loads to the lecturers and Directors) to stay within the quite limited budget without reducing the number of participants to an unacceptable level. I would like to stress that the spirit of co-operation of the Directors and lecturers, as well as the intelligent and careful programming and the strict selection procedure for the College, had consented us to remain strictly within the allocated budget, and also to keep the level and attendance of the College to a good standard. It is the common opinion of all the Directors that, from the point of view of the preparation and the direct involvement of the participants, the present one has surely been the best College up until now.

The College was attended by 63 participants of which 27 came from Africa, 14 from Asia, 10 from South America, 6 from Eastern Europe and 3 from Turkey, 2 from Spain and 1 from Egypt.

There were 53 lectures delivered during the College. We

There were 53 lectures delivered during the College. We had chosen to improve remarkably, with respect to the previous Colleges, the direct involvement of participants. This was achieved by devoting an appreciable part of the activities to presentations by participants. During these presentations, 17 participants delivered short lectures presenting their own original research work and/or by members of the groups to which they belong in their home institutions. The Directors and lecturers unanimously expressed their satisfaction of the high scientific level of these presentations.

The topics covered ranged from a synthetic but general overview of the subject to specific problems such as classification of soils, analysis of their physical and chemical properties, soil conservation, water erosion, soil degradation, wind erosion and

theoretical models. The accent was on more technical aspects of the field than in previous Colleges. The physical and chemical properties of soils and the corresponding relevant physical processes such as water diffusion, soil degradation, erosion etc., were dealt with in all details with a systematic study of the relevant model equations describing such processes. Specific and sophisticated techniques ranging from the use of gamma radiation, neutron probes, computerized tomography and computer simulation and computer data handling were the subject of a series of lectures. The statistical approach to evaluate the reliability of techniques to collect data, as well as to take appropriately into account and compensating for the extreme spatial and temporal variability of soil properties were also discussed. The aim was to introduce more efficient and appropriate methods for specific management practice.

As the previous Colleges, also the present one was, in my opinion, a remarkable success. This was mainly due to the exceptional devotion and human qualities of the Directors and lecturers. All of them were at the complete disposal of the participants for discussions, suggestions etc. for the whole period of the College. It was an extremely interesting experience to see a community of people (the participants) who had never met before, becoming in a very short time, a highly interactive group with very good human relationships but, more importantly, with a great desire of exchanging views and of establishing fruitful scientific interactions.

The attendance during the College was extremely high. Also, as is usual for this activity, we requested all participants to fill in a very detailed questionnaire, expressing their remarks, criticisms and suggestions. The questionnaires are presently under consideration by Prof. Skidmore who will present a detailed report. At any rate, I feel quite safe in anticipating, on the basis of the many contacts I had with them, that the College has been extremely useful for the large majority of the participants. This is not surprising: the dedication of the Directors and the lecturers, the good preparation of the participants and the fact that the College deals with problems which are of extreme relevance for many developing countries, makes this activity particularly important and successful.

I feel the duty to stress that, in my opinion, this activity is of extreme relevance and has a great impact, particularly for the least developed countries, where a more scientifically qualified way to tackle the problem of soil conservation may have an important effect.

GC. Ghirardi

CALENDAR OF ACTIVITIES AT ICTP IN 1995



- SMR
- 838 Seventh international workshop on computational condensed matter physics:
total energy and force methods 11 - 15 January
 - 841 Fourth ICTP-URSI-ITU (BDT) college on radiopropagation: propagation, informatics and
radiocommunication system planning 30 January - 3 March
followed by
 - 846 Second workshop on rural communications in developing countries 6 - 10 March
 - 842 Conference on ultrafast transmission systems in optical fibres 13 - 17 February
 - 843 Theoretical and experimental workshop on the physics of semiconductor
microstructures, held in Campinas, Brazil 13 - 24 February
including
 - 844 Adriatico research conference on lower dimensionality semiconductor systems,
held in Campinas, Brazil 20 - 24 February
 - 845 Second winter college on optics 20 February - 10 March
 - 847 Conference on topological and geometrical problems related to quantum field theory 13 - 24 March
 - 848 Spring school and Workshop on string theory, gauge theory and quantum gravity 27 March - 7 April
 - 849 Conference on recent developments in statistical mechanics and quantum field theory 10 - 12 April
 - 894 Third ESF Workshop: Network on quantum fluids and solids "Excitations and
spin-polarised systems" 20 - 26 April
 - 852 Conference on perspectives in nuclear physics at intermediate energy 8 - 12 May
 - 853 Antonio Borsellino College on neurophysics 15 May - 9 June
including
 - 902 Symposium on "Dynamic properties of receptive fields and plasticity of processing systems" 17 - 19 May
 - 854 College on computational physics 15 May - 9 June
 - 855 Workshop on dynamical systems 22 May - 2 June
 - 856 Trieste Conference on S-duality and mirror symmetry 5 - 9 June
 - 865 Workshop on computational methods in material science and engineering 12 - 23 June
 - 858 Summer school in high energy physics and cosmology 12 June - 28 July
including Workshop on strings, gravity and related topics 29 - 30 June
 - 859 Research workshop on condensed matter physics 12 June - 18 August
including Working group on "Surface and bulk magnetism" 26 June - 7 July
and Working party on the fabrication, physics and applications of quantum dots 31 July - 4 August
 - 860 Adriatico research conference on physics of sliding friction 20 - 23 June

862	Workshop on quantitative biophysics at the molecular and macromolecular scales including	29 June - 7 July
866	Adriatico research conference on biophysics at the molecular and mesoscopic scale	4 - 7 July
857	Miniworkshop on "Quantum incoherence and quantum coherence in strongly correlated systems"	3 - 21 July
863	Fourth School on non-accelerator particle astrophysics	17 - 28 July
861	Adriatico research conference on chaos in atoms and molecules	18 - 21 July
851	International symposium on African drought	31 July - 4 August
892	African regional workshop on parallel processing and its applications, held in Yaoundé, Cameroon	31 July - 11 August
889	Miniworkshop on Josephson junction arrays	7 - 11 August
867	Workshop on nonlinearity: noise in nonlinear systems	14 - 25 August
...	Adriatico Research Conference on contemporary concepts in condensed matter physics, held in Gothenburg, Sweden	18 - 22 August
869	Conference on partial differential equations and applications to geometry	21 August - 1 September
868	Adriatico research conference on randomness, stochasticity and noise	22 - 25 August
870	Adriatico research conference on information theory in classical and quantum physics	29 August - 1 September
895	Trieste conference on chemical evolution IV: Physics of the origin and evolution of life "Cyril Ponnampuruma Memorial"	4 - 8 September
871	Workshop on general theory of partial differential equations and microlocal analysis	4 - 15 September
873	College on soil physics	11 - 29 September
872	Workshop on materials science and physics of non-conventional energy sources	18 September - 6 October
874	Autumn college on plasma physics	18 September - 13 October
964	Regional college on microprocessor-based real-time control: Principles and applications in physics, to be held in Cape Coast, Ghana	25 September - 13 October
875	Workshop on telematics	2 - 20 October
876	Topical workshop on plasma physics: Collective processes in nonlinear media	16 - 20 October
876	Topical workshop on plasma physics: Collective processes in nonlinear media	16 - 20 October
888	Workshop on Mediterranean Sea — Circulation, strait exchange and dense water formation processes (dedicated to Antonio Michelato)	23 - 27 October
896	Second school in radiophysics (diagnostic radiology)	23 - 27 October
880	IX International symposium on ultrafast processes in spectroscopy	30 October - 3 November
877	Third school on the use of synchrotron radiation in science and technology: "John Fuggle memorial"	30 October - 1 December
879	Third workshop on non-linear dynamics and earthquake prediction	6 - 17 November
878	Workshop on "Physics and chemistry and of transitional metal oxide (including high T_c superconductors), to be held in Bangalore, India	19 November - 5 December
897	ICTP/UN Conference on optical physics in space science and technology	20 - 25 November
970	Workshop on dynamics and statistics of secular climate variations	4 - 8 December
898	Adriatico Research Conference on trends in collider spin physics	5 - 8 December

CALENDAR OF ACTIVITIES AT ICTP IN 1996



- SMR
- 911 Workshop on atmospheric interactions: Downward and upward coupling to the middle and upper atmosphere 5 - 16 February
- 912 First regional course on advanced VLSI design techniques (to be held in Havana, Cuba) 5 February - 1 March
- 913 Winter college on new laser sources 12 February - 1 March
- 914 ICTP-ICS-ITU (BDT) Workshop on economic quantification of the impact of telecommunication in development 26 February - 1 March
- 916 Seventh college on biophysics — Structure and functions of biopolymers: Experimental and theoretical techniques 4 - 29 March including
Mini-symposium on asymmetry in biomolecules: Pharmacological, physical, chemical and biological consequences 13 - 15 March
- 915 Quantum interferometry II (Adriatico Research Conference) 5 - 8 March
- 917 Second workshop on science and technology of thin films 11 - 29 March
- 918 Second conference on recent developments in statistical field theory 13 - 15 March
- 919 Spring school and Workshop on string theory, gauge theory and quantum gravity 18 - 29 March
- 920 School on nonlinear functional analysis and applications to differential equations 15 April - 3 May
- 921 Workshop on nuclear reaction data and nuclear reactors — Physics, design and safety 15 April - 17 May
- 922 College on oceanography 22 April - 10 May
- 923 Spring college in condensed matter physics on "Disorder and chaos in quantum systems" 6 May - 7 June
- 924 Workshop on dosimetry and dose reduction techniques in diagnostic radiology 13 - 17 May
- 925 Workshop on biomass 20 - 31 May
- 927 Summer school on high energy physics and cosmology 10 June - 26 July

926	Mesoscopic phenomena in complex quantum systems (Adriatico Research Conference)	11 - 14 June
960	Workshop on nonlinear control and control of chaos	17 - 28 June
928	Research workshop in condensed matter physics	17 June - 23 August
959	Workshop on strongly correlated electron systems	1 - 19 July
973	The electron quantum liquid in systems of reduced dimensions (Adriatico Research Conference)	2 - 5 July
966	Electron and ion transfer in condensed matter (Adriatico Research Conference)	15 - 19 July
930	Course on ENSO monsoon	15 - 26 July
961	Workshop on proteins, membranes and their interactions	22 July - 2 August
962	Workshop on quantum dissipation and applications	29 July - 9 August
931	Tunnelling and its implications (Adriatico Research Conference)	30 July - 2 August
967	Fluctuation phenomena in high temperature superconductors (Adriatico Research Conference)	5 - 8 August
932	School on algebraic groups and arithmetic groups	12 - 30 August
963	Workshop on dynamics of non-equilibrium systems	19 - 30 August
933	Fifth International conference on 'Applications of physics in medicine and biology' - Giorgio Alberi Memorial	2 - 6 September
934	School on numerical simulation of partial differential equations: methods, algorithms and applications	9 - 27 September
935	Second international workshop on parallel processing and its applications in physics, chemistry and materials science	9 - 27 September
	in physics, chemistry and materials science	9 - 27 September
936	College on medical physics	9 - 27 September
937	International conference on microelectronics for high energy physics	30 September - 4 October
938	Trieste conference on quarks and leptons: Masses and mixings	7 - 11 October
939	College on microprocessor-based real-time systems in physics	7 October - 1 November
940	College on mathematical ecology	14 October - 8 November
941	Research workshop on LAM	21 October - 1 November
942	Third workshop on three-dimensional modelling of seismic waves	4 - 15 November
943	Fourth course on basic VLSI design techniques	18 November - 13 December

GETTING INFORMATION ON ICTP ACTIVITIES VIA COMPUTER



Information on the many ICTP activities throughout the year can be retrieved via electronic mail, the Internet Gopher and WWW Mosaic. The procedure is as follows.

Using Electronic Mail

(1) ICTP Calendar of Scientific Activities

The complete Calendar of Scientific Activities can be obtained by sending an e-mail to smr@ictp.trieste.it using as Subject: **get calendar**

To get this year's calendar only use Subject: **get calendar 1995**

To get next year's calendar only use Subject: **get calendar 1996**

Note: The Calendar is constantly updated. Please check the issue dates.

Each activity listed in the Calendar has an **SMR-number** through which more information may be obtained, when available.

(2) Information on a specific ICTP activity

In order to receive a list with the names of documents available for a particular activity, you should first identify the **smr###** code as indicated above. Then send an e-mail to smr###@ictp.trieste.it using as Subject: **get index**

If you send another mail to smr###@ictp.trieste.it using as Subject: **get document_name** (e.g., *announcement*, etc.), you will receive detailed information on the topic *document_name*.

Note: If you wish more than one document of an activity then use Subject: **get doc1 doc2 ... etc.**

Using Internet Gopher

The ICTP Gopher server allows you to explore, search and retrieve general information regarding the many scientific activities carried out at ICTP. It is possible to access the Gopher space by issuing the **gopher** command and exploring the branch "*Other Gopher servers in the world*" pointing to the geographical region: Europe→Italy→ICTP.

To access directly to the ICTP Gopher server, you can issue the command **gopher gopher.ictp.trieste.it**

Using World-Wide Web (WWW)

The ICTP WWW server allows you to obtain basically the same information available on the ICTP Gopher server, but through the World-Wide Web protocol. You can obtain exactly the same information available on the ICTP Gopher server, but through the World-Wide Web protocol.

The URL (Uniform Resource Locator) is <http://www.ictp.trieste.it/>

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News from ICTP is also available on WWW server



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EDITORIAL NOTE - News from ICTP is not an official document of the International Centre for Theoretical Physics. Its purpose is to keep scientists informed on past and future activities at the Centre and initiatives in their home countries. Suggestions and criticisms should be addressed to the Scientific Information Office.

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