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International Centre for Theoretical Physics

News from ICTP

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The Conference on Cooperation in Science, High Technology and Environment between North and South Mediterranean Countries (12 - 13 November 1990)

Nine months after the Conference on Scientific Cooperation with Eastern Europe, Abdus Salam — Director of the International Centre for Theoretical Physics and President of the Third World Academy of Sciences — invited seventy-five personalities from North and South Mediterranean countries and from international organizations to discuss the state-of-the-art of the cooperation in science, high technology and environment in this region of the world. Speakers and participants had been briefed to evaluate the status and the targets of S&T (science and technology) in their region, their experience with imported technology, opportunities for extending existing modalities in Trieste (ICTP, TWAS, ICS, ICGEB*) to other institutions and other branches of S&T, proposals for cooperation in S&T among developing countries in the proposals for cooperation in S&T among developing countries in the region and within the group of the seventy-seven least developing countries, the cooperation with the European Economic Community (EEC) and individual countries like France, Italy and Spain as well as with international organizations.

More specifically, Abdus Salam, in his opening address, suggested to concentrate the discussion on five points. First, he encouraged the participants to submit ideas and programmes for a fast improvement of S&T in the South Mediterranean countries and, second, he suggested a substantial progress in the cooperation between the Northern industrialized nations (France, Italy and Spain) and the EEC for the support to the Mediterranean developing countries. He further proposed that Northern Mediterranean countries and EEC accept to sponsor some of the centres on high technology and environment to be located in the Southern Mediterranean basin (TWAS promotes the idea of the establishment of twenty such centres in the South). A fourth suggestion was to seek the participation of EEC and Northern Mediterranean countries in the International Centre for Science and High Technology (ICS) which was created, in Trieste, in 1988. ICS is presently strongly supported by the Prime Minister of Italy, the Minister for Foreign Affairs, the Minister for

* ICTP — International Centre on Theoretical Physics;
TWAS — Third World Academy of Sciences;
ICS — International Centre for Science and High Technology;
ICGEB — International Centre for Genetic Engineering and Biotechnology;
EEC — European Economic Community;
IAEA — International Atomic Energy Agency;
UNESCO — United Nations Educational, Scientific and Cultural Organization;
UNIDO — United Nations Industrial Development Organization;
UNU — United Nations University;
UNDP — United Nations Development Programme.

Contents

(From left to right): Prof. A. Forti, ICS Project Leader, Dr. D. Ripandelli from the General Directorate for Cooperation to Development of the Italian Ministry of Foreign Affairs, Professor Abdus Salam, Director of ICTP, Prof. L. Bertocchi, Deputy Director of ICTP, Dr. L. Yaker from UNESCO, Prof. M.H.A. Hassan, Executive Secretary of TWAS, and Dr. A. Cernuta, representing the Mayor of Trieste.

Scientific Research and the Minister for EEC Affairs. His last proposal was to explore avenues for providing scientific literature excerpted from copyright commitments and for creating technological information centres.

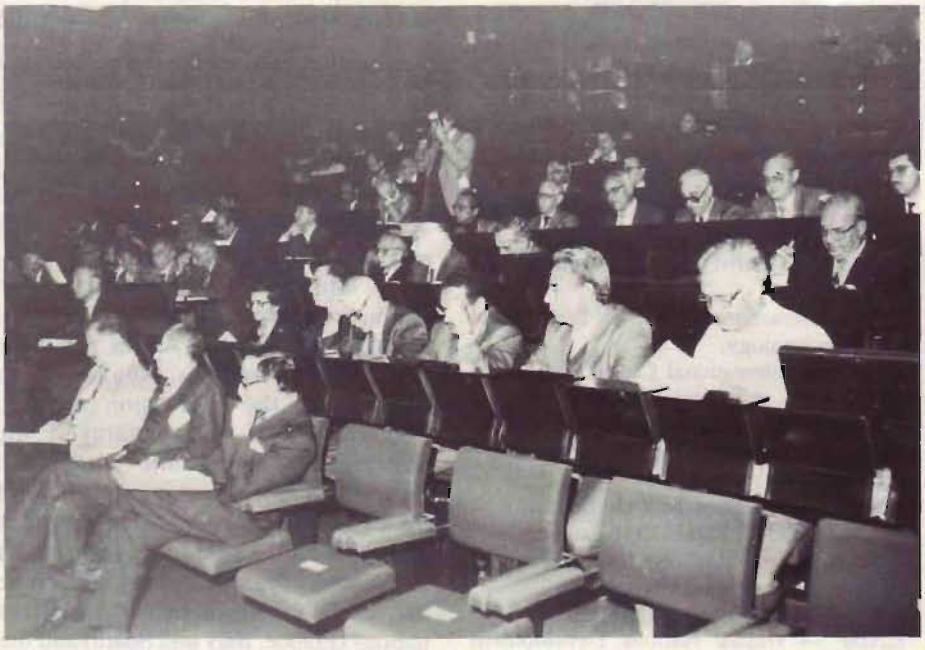
Dr. D. Ripandelli, who represented the Government of Italy, stressed on the global aspect of environmental problems and the need for a closer collaboration between South and North in tackling these. He also illustrated the role of Italy as a donor in cooperation with the South in general and with the Trieste complex (ICTP, ICS, ICGEB, TWAS) in particular.

After the opening ceremony, one session was dedicated to the presentation of the Trieste international activities by L. Bertocchi (Deputy Director, ICTP), A. Forti (Project Leader, ICS), A. Falaschi (Director, ICGEB), M.H.A. Hassan (Executive Secretary, TWAS) and L. Fonda (Scientific Director, Trieste Synchrotron Light Radiation Laboratory). In the afternoon, the state and future of science, technology and environment in the South Mediterranean countries were illustrated in a series of papers by F.H. Hamman (Chairman, Atomic Energy Authority, Egypt), M. Elmandjra (Morocco), M.L. Boguerra (Director, National Institute for Scientific and Technical Research, Tunisia), H. Mara (Vice-Chairman, Academy of Sciences, Albania), K.G. Akdeniz (President, Turkish Physical Society) and R. Blinc (University E. Kardelja, Yugoslavia).

On Wednesday, one session dealt with the role of industrialized countries in the cooperation in science, high technology and environment in a series of presentations by A. Guinier (Academy of Science, France), A. Albert (Vice-President, Consejo Superior de Investigaciones Científicas, Spain), L. Saldanha (High Council for Science & Technology, Portugal) and M. Macioti (Division of Science, Research and Development, EEC) while the same theme was discussed in another session with the role of international organizations — papers by M. Zifferero (IAEA), A. Badran (UNESCO), K. Venkataraman (UNIDO), I. Wesley-Tanaskovic (UNU) and F. Maranzana (UNDP).

After each presentation session, there was ample time for open discussion. Ideas and proposals which were submitted during these discussions and others were debated in the last session which had been scheduled for drawing the conclusions of the Conference and setting a framework for the follow-up.

It was noted that the S&T gap between South and North might widen because of the possible diversion of resources to Eastern Europe. Some participants consider that more assistance should flow from North to South. Others believe that indigenous efforts are more important for the advancement of the countries of the South (the North invests 2.5% of its GNP in R&D, while the South only invests 0.5%). Regional collaboration should include large projects in areas of frontier S&T and environment of major relevance to the development of the Mediterranean basin, joint ventures with universities, scientific associations, research centres and industries promoting the transfer of knowledge to the productive sector, the exchange of information and experience, enhanced mobility of scientists and twinning arrangements between research centres and regional scientific meetings. There was a great interest for the creation of "centres of excellence" in S&T in the Southern Mediterranean countries and it was proposed to study this possibility in the light of the proposals already put forward and of the possible modalities of funding and in particular the example of Italy in this relation should be formulated by EEC and by Northern countries in their capacity. The



A glimpse on the audience attending the "Mediterranean Conference".

modalities of the Trieste complex were highly commended and there was a general consensus that these should be extended to accommodate more scientists in the programs and to avail of scientific facilities in countries other than Italy. A last recommendation that the cooperation between South and North should be funded on a cost-sharing basis.

In his concluding remarks, Abdus Salam insisted that the countries of the South should more rely on themselves. They should expand their human potential. The number of scientists involved in research should be multiplied by a factor of three, very rapidly. The South should increase its R&D funding to 1% of its GNP and decide its S&T priorities in an efficient way. The smaller countries of the South should pool their resources and, in general, the existing cooperation between the South and the North (this includes EEC) should be enhanced. He said once more that one of the three centres of excellence in the Mediterranean area should be an institute for Mediterranean studies.

The Conference was very informative and the lectures and discussions contributed to pinpoint the complex problems in the Mediterranean region. A detailed report on the Conference is available at the ICTP. *News from ICTP* will report on follow-up action in later issues.

A.M. Hamende

Scientific Council Meets

The ICTP Scientific Council held its annual meeting on 14 November 1990. The Council, whose Members are distinguished scientists appointed in their personal capacity and chosen from several countries, usually meets in November to review and assess the ICTP activities of the current year and to formulate proposals and recommendations for the short and medium term. The Council, chaired by S. Lundqvist, was unanimous in congratulating Abdus Salam, ICTP Director, for the achievements attained so far through a judicious use of all the instruments set up by the Centre for the benefit of the developing countries. In particular, the introduction of the Diploma Course (already publicized in *News from ICTP*) was welcomed as an important instrument for scientists from the developing countries to reach or improve their level of preparation for arriving at the level required for undertaking independent research work. The existing collaboration of the ICTP and the International Centre for Science and High Technology (ICS) was highly commanded and regarded as an important condition to set the "Trieste System" as a comprehensive institution for training and for research in the theoretical as well as in the experimental sciences. The Council also expressed its appreciation to Abdus Salam for his initiative to convene a conference on the scientific cooperation with Eastern Europe and another on cooperation between Southern and Northern Mediterranean countries.

The Scientific Council in session.

One important recommendation of the Council was that the ICTP should continue its efforts in consolidating and expanding its computer facilities (mainframe and personal computers) which are more and more required, especially by the younger generation of physicists and mathematicians.

The participants in the meeting included

• *the Members of the ICTP Scientific Council:*

Prof. S. Lundqvist, Chairman (Sweden); Prof. P. Budinich, Secretary (Italy); Prof. Abdus Salam, Director of ICTP; Prof. F. El Baz (USA); Prof. J.J. Giambiagi (Brazil); Prof. Malu wa Kalenga (Zaire); Prof. N.H. March (UK); Prof. J. Palis (Brazil); Prof. Y. Sobouti (Iran); Prof. Zhou Guangzhao (P.R. China); and Prof. A. Zichichi (CERN).

Prof. L.M. Lederman (USA), Prof. Y. Pal (India) and Prof. R.Z. Sagdeev (USSR) were unable to attend.

• *The representatives of the Italian Government:*

Minister Jolanda Brunetti, Representative of the Italian Government to the ICTP; and Counsellor G. Carante.

• *The representatives of the International Organizations:*

Dr. H. Blix, Director General, IAEA; Prof. M. Zifferero, Deputy Director General, IAEA; Dr. A. Badran, Assistant Director General for Science, UNESCO; and Prof. V. Zharov, Director of Division of Scientific Research and Higher Education, UNESCO.

• *The representative of the Third World Academy of Sciences:*

Prof. Mohamed H.A. Hassan, Executive Secretary.

Secretary.

• *The representative of the International Centre for Science and High Technology (ICS):*

Prof. A. Forti, Project Leader.

• *The representatives of the International Centre for Theoretical Physics:*

Prof. L. Bertocchi, Deputy Director; Prof. H.R. Dalafi, Scientific Liaison Officer; Prof. G. Denardo, Office of External Activities; Prof. G. Furlan, Office of Training and Research in Italian Laboratories; Dr. G. Guerriero, Senior Administrative Officer; and Dr. A.M. Hamende, Scientific Information Officer.

A.M. Hamende

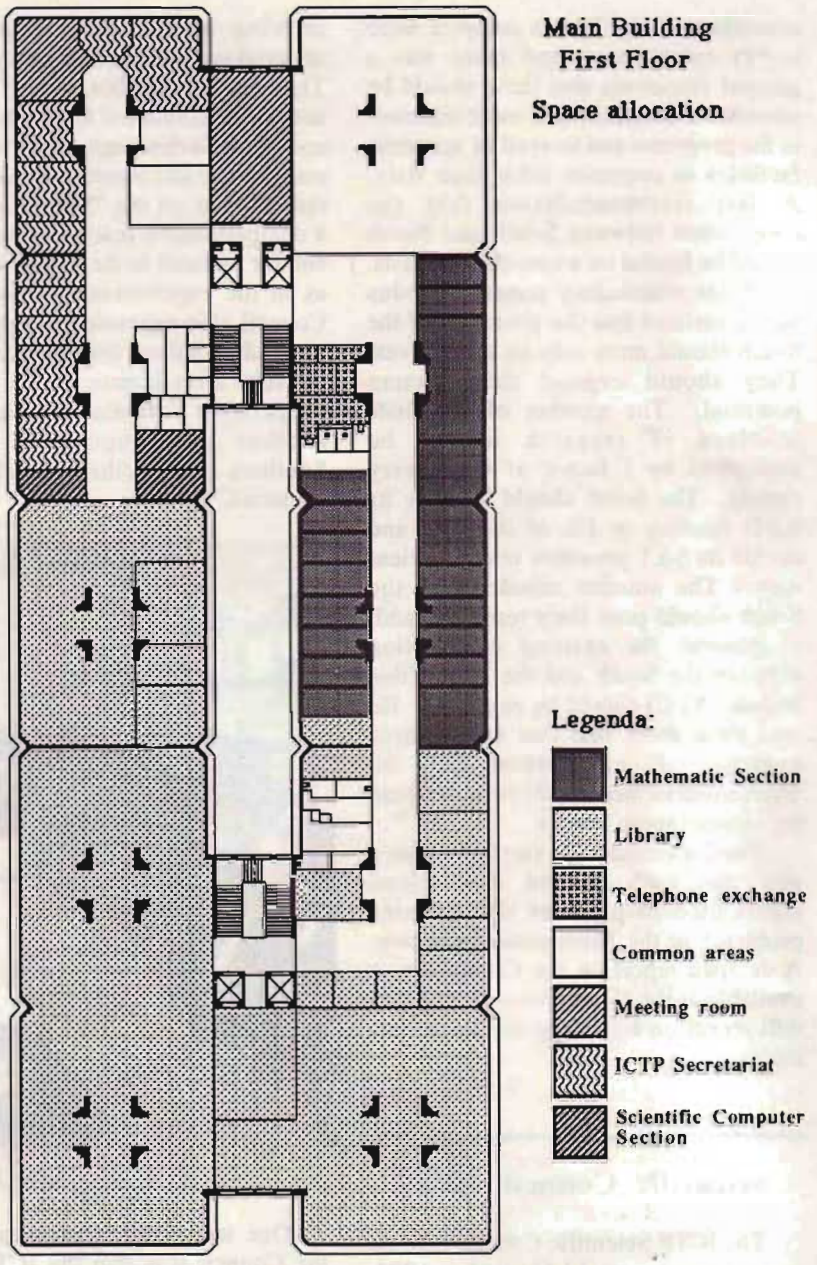
The New Building of the ICTP

On 31 October 1989, during the twenty-fifth anniversary ceremony, Professor Claudio Villi, Chairman of the Consortium for the Advancement of Studies and Research of the Physics Institutes of Trieste University, handed over the symbolic keys of the new ICTP wing to Abdus Salam. The actual occupation, though, started in Spring 1990. This additional space made available has reduced the pressure of the need for office space and has provided for a re-deployment of the research groups and of the administrative staff. For many years, the Condensed Matter Physics activities as well as the Scientific Programme Offices had been concentrated in the Adriatico Guest House. The offices for External Activities, Training in Italian Laboratories, Book and Scientific Equipment Donation, Associate Members and for Federated Institutes as well as those of the Third World Academy of Sciences had been located in the Galileo Guest House. The collections of the Library, books and periodicals, had been divided between three different buildings.

With the present arrangement, the Library occupies, in addition to the space in the "old" building, three modules of the first floor (each floor counts five 250-sqm modules). The other modules of the same floor are occupied by the Office of the Deputy Director, and those of the Senior Administrator, the Scientific Information Officer, Computing Services, and part of the Scientific Programme Offices. The "old" first floor is now the realm of the Programme Offices. The "old" first floor is now the realm of the Mathematicians with the exception of a few offices for the Library Staff. A larger Cafeteria is now at the Terrace Level Floor while bar services are still available in the "old" Cafeteria at the First Floor.

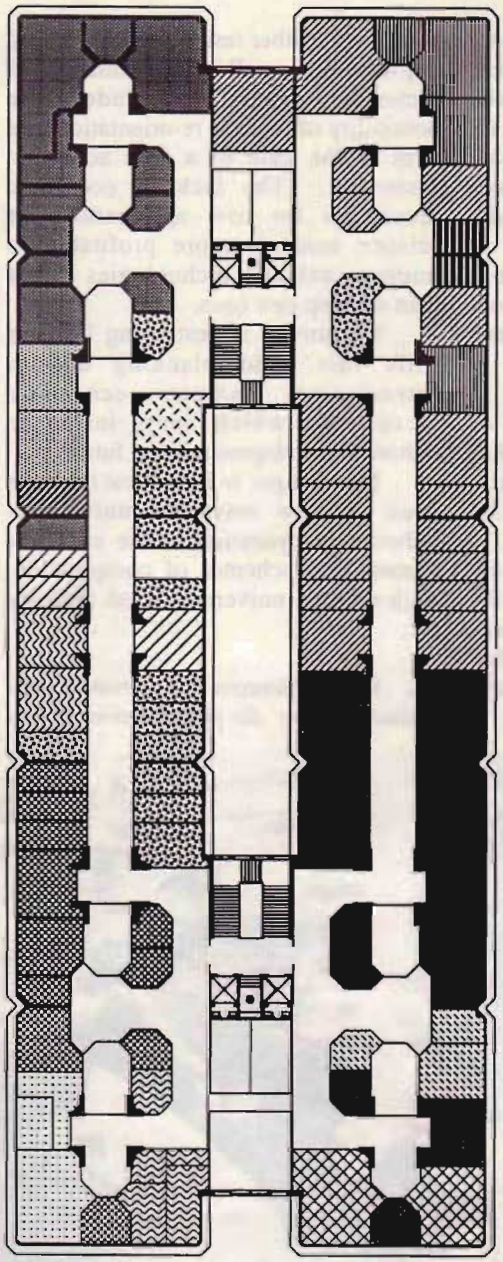
High Energy Physics, Plasma Physics, the Third World Academy of Sciences, the Offices of External Activities ad of Book and Scientific Equipment Donations share the new Second Floor. Professor Abdus Salam has also moved to an office at the same floor, which is the replica of the one he had occupied for twenty years in the old wing.

Condensed Matter physicists and the Department of Theoretical Physics of



Office distribution on the First Floor of the Main Building.

Aerial view of the new buildings: the ICTP Building in front and the new SISSA building at the back. On the upper right, the Galileo Guest House.



Office distribution on the Second Floor of the Main Building.

the University of Trieste and the Office Automation Staff occupy the whole of the former Second Floor.

Novelties at the Ground Floor include the space for the Laser and Fibre Optics Laboratory and the kitchen of the Cafeteria with its storing rooms.

At the Terrace Level and of the left-hand side of the building, two lecture rooms are awaiting their furniture which should become available in the near future.

Administrative services (Finance, Travel, Housing, Bank) have remained in the Adriatico Guest House.

In comparison with the older part of the building, the new wing has a different look. Its design style is definitely more contemporary. The Library is less congested than in the past, there is more space for the readers. It is a place when one really likes to work. The Cafeteria is larger but not quite intimate as it used to be. Old-timers might miss the very special and undefinable atmosphere of the old one.

The valley behind the building has been restructured. A nice road now connects the Main Building to the Galileo Guest House. A parking area has also been created. Altogether, this part of the complex looks tidy, with less green though and more cement. Hundreds of trees have been planted so that, in five years or so, the valley will recover part of its former beauty. A good sign is that deers have come back and graze and play in the neighbourhood of the building.

News from ICTP takes this opportunity to express the gratitude of the Director, the Scientists and the Staff to the Italian Authorities who have made the realization of this big project possible.

A.M. Hamende

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The new wing of the ICTP building — the "New Building".

The new premises of the Library.

Interview with Y. Novozhilov

Q. *Prof. Novozhilov, as a high official of Unesco, you were associated with the life of the ICTP. You are now the Vice-President of the Soviet Society of Physics. Could you tell us in which circumstances this Society was reinstated and what distinguishes it from other Soviet scientific bodies like the Academy of Sciences, for example?*

A. The Physical Society of USSR was reinstated a year ago after a suspension of nearly 60 years. This event happened due to the democratic changes in the USSR where the intelligentsia with its critical attitude is, if not welcomed or listened to, certainly tolerated. In the thirties, most professional societies were banned. The Physical Society aimes at bringing together all physicists who are engaged in fundamental and applied research, and teaching at universities and schools. The large body of school teachers has set up an Association of Physics Teachers.

My Society will try to do what has not been done earlier. For example, over the past 60 years, we did not have general conferences of Soviet physicists. The Academy of Sciences in the USSR is not a kind of learned Society as in many other countries, but rather like a Ministry for Science with characteristic ministerial preoccupations.

We do hope that the Physical Society would find also new possibilities in solving important problems which influence the life of our Physics Community, namely: the insufficient funding of fundamental research and the dangerous tendency of different bodies of Peoples Deputies to reduce this funding even more; the conversion of military-oriented research; and the treatment and position of young talented scientists.

Q. *According to the press, the re-organization of the scientific institutions in the former socialist countries will cause unemployment. Is a similar situation to be expected in the Soviet Union?*

A. Yes, a similar situation is possible in the USSR too. There are two main sources which may cause unemployment. First, a reduction of funds available for fundamental research. For example, the Department of Theoretical Physics at the University of Leningrad has just got budgetary figures for 1991 that cover only 70% of research associates salaries. This means that if we do not get an additional funding from some external source, we shall have either to reduce salaries, or to send off some people.

The second origin of unemployment is the conversion of military-oriented research that in some cases means no more research at all.

Q. *The Soviet Union has trained a large number of scientists from the developing countries. Will this continue despite the present difficulties?*

A. I believe that the training of scientists from developing countries will continue. With the present rationing measures for meat, sugar, butter etc., the problem of feeding these scientists may be stabilized.

Q. *Soviet scientists are extremely well trained. How do you contemplate a collaboration of the Soviet Physical Society with the ICTP, with UNESCO and with developing countries?*

Prof. Yuri Novozhilov exchanging ideas with Professor Abdus Salam.

Q. *The Soviet Union is reputed for the quality of its results in fundamental sciences but not so much for its technology, with the exception of a limited number of branches like space technology. In view of the free market economy which is being gradually introduced in your country, would you expect more emphasis on technological research than in the past?*

A. Officially, a need for technological research has been always proclaimed of high priority. However, the organization of technological research and its links with industry has stimulated neither research nor industrial applications. Rigid planning of technical progress excluded the possibility of a quick re-orientation of a firm in the case of a new scientific discovery. The lack of economic incentives for new applications of science made it more profitable to improve existing technologies rather than develop new ones.

Perestroika is destroying little by little this rigid planning and is introducing various economic incentives, which may influence industrial development in the future.

The changes in East-West relations open up new ways for university-industry co-operation. One can now discuss new schemes of co-operation, such as East university-West industry etc.

A. The Physical Society of the Soviet Union (PSSU) proposes to UNESCO and physical societies in other countries to establish an annual two-week International School of Physics so as to provide advanced training for exceptionally talented young scientist from East and West and, through it, promote East-West collaboration in Physics. Each year, the School will bring together 30 invited participants with leading research experts for a series

of lectures, tutorials ad technical seminars. Activities are designed to broaden the participants' understanding of the physics which underlies their own specializations. The new School will neither duplicate other existing schools nor compete with them. Its venue will rotate among countries of Europe, North America and Japan, with initial emphasis on Northern Europe. The first School will be held in the autumn of 1991 in Leningrad. The topic of each School will reflect the research interests of the host institution.

This proposal was supported by UNESCO. Professor Abdus Salam kindly agreed to be a member of the Advisory Committee of this School.

Professor Abdus Salam has positively considered the proposal of the Physical Society to sign a Federation Agreement with the *Superphysica* Centre of the Society aiming at bringing to international physics those who were previously engaged in military-oriented research and who have never visited other countries.

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Prof. Yuri V. Novozhilov was born in 1924 in Leningrad and graduated there at the Polytechnical Institute in 1947. In 1949 he started working with V.A. Fock at the Department of Theoretical Physics of the same University. From assistant he became associate professor and then professor in 1960. During these years, he taught electrodynamics and quantum mechanics through lectures and seminars. Since 1960 he has been professor of particle and nuclear theory and has taught quantum field theory and particle physics.

In 1966-67 he was UNESCO consultant to centres for advanced studies in Indian universities. From 1973 to 1981 he was Director of the Department in Indian universities. From 1973 to 1981 he was Director of the Department of Scientific and Technological Development at UNESCO, Paris, and subsequently Deputy-Assistant Director General in the framework of the programme which included contributions to ICTP, the International Council of Scientific Unions and projects in 52 developing countries.

After his return in 1981 to the University of Leningrad, he was appointed Head of the Department of Theoretical Physics and Professor in high energy and particle theory, and then also Chairman of the Committee for University Education. Since 1989 he has been Vice-President and Chairman of the Executive Board of the USSR Physical Society.

His works in English include the following titles: Method of Functionals in Quantum Field Theory (1961), written with A.V. Tulub; Elementary Particles (1961); Introduction into Elementary Particles Theory (1975); and Electrodynamics (University lecture course, 1981, in collaboration with Yu.A. Yappa).

His research interests include composite electroweak bosons and induced gravity.

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Magnetic Fusion Research in Developing Countries

by Mohamed H.A. Hassan
Executive Secretary,
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Courtesy of
IAEA Yearbook 1990,
International Atomic Energy Agency.

Nuclear Fusion is the process by which the Sun and the stars generate their energy. The process involves the fusion of light nuclei to form heavier ones, with a very small loss of mass which is converted into large amounts of energy in accordance with Einstein well-known equation: $E = mc^2$.

The fusion reaction is difficult to known equation: $E = mc^2$.

The fusion reaction is difficult to achieve on Earth since it only takes place when two nuclei are brought sufficiently close to each other for the short-range nuclear forces to dominate. For this to happen, the nuclei must be given sufficient energy to overcome the repulsive electromagnetic forces between them. Energies corresponding to temperatures of the order of 100 million degrees Celsius will be required for the fusion reaction to occur in abundance. At these temperatures matter takes the form of a mixture of ionized gases, the so-called plasma or fourth state of matter. Over 99% of the visible Universe exists in this state.

Because plasmas produce and react to electromagnetic forces, they exhibit a variety of collective effects which are utilized in a wide range of space and laboratory studies. Among these, fusion science is by far the most intriguing and scientifically challenging. Its aim is to develop a new source of energy which will provide an unlimited supply of electricity for future generations.

The most likely nuclear reaction for producing fusion energy is that which occurs between the two heavy isotopes of hydrogen, deuterium and tritium. Deuterium can be obtained in large quantities from sea water while tritium can easily be manufactured from the light metal lithium. For fusion to yield large amounts of energy, the deuterium-tritium gas must be heated to temperatures in excess of 100 million degrees. A density of about one thousandth of a gram per cubic metre is required (about one ten millionth of the density of air). The high temperature plasma must be confined in a region away from the walls of the container because otherwise it will cool instantly as soon as it touched them. In magnetic fusion experiments, powerful magnetic fields are used to do this. For energy to be developed from the fusion reaction, a confinement time of at least 1-2 seconds is necessary.

Early studies on producing thermonuclear reactions were based on a device called "Linear Z-pinch", in which confinement is achieved by an azimuthal magnetic field resulting from a current flowing through the axis of a plasma column. Another pinch device that has received some attention is the "theta pinch", in which an azimuthal current flows around the plasma cylinder and the compression magnetic field is longitudinal.

The 'dense plasma focus' is a Z-pinch device in which a fast radially inward

The 'dense plasma focus' is a Z-pinch device in which a fast radially inward flow of particles is used to obtain a high energy density at the focus. The device consists basically of two coaxial cylindrical electrodes and a capacitor bank. Currently there are two types of design: the Mather type in which the diameter of the inner electrode is smaller than its length and the Filippov type in which the electrode diameter is larger than its length.

Various magnetic field patterns have been studied to find the system which would allow the highest temperature and give the necessary density and confinement time. Among the possible patterns, the toroidal system, in which the magnetic field lines form closed rings around the plasma, is the most

Table I — Tokamaks in Developing Countries

Country	*Device*	*a (cm)*	*r (cm)*	B_T *(T)*	I_p *(kA)*	τ_E *(ms)*	n_e *(10^{19} m^{-3})*	T_e *(kV)*	T_i *(kV)*	β_T *%*
Brazil	TBR-1	11	30	0.5	12	1	1.0	0.20	0.05	0.1
China	CT-6B	10	45	1.3	30	1-2	1-4	0.3	0.1	0.5
	HT-6B	12.5	45	1.2	40	1-3	3	0.25	0.08	1
	HT-6M	20	65	1.5	120	10	7	0.6	0.2	1
	MPT-X	8	40	1						
	HT-U	35	125	3						
	HL-I	20	102	3-4	225	16-18	7.2	1.8	0.87	
	KT-5B	6	30	0.5	15	2		0.1	0.03	
India	ADITYA	25	75	1.5	250	6	1	0.5	0.3	
	SINP	7.5	30	2	75	20	3	0.4	0.3	
Iran, Islam. Rep.	ALVAND	12.6	45.5	0.8	6		2	0.1	0.05	0.2
Korea, Rep.	SNUT-79	15	65	3	120	50	10	0.5		0.4
	KAERIT	5	27	4.2						
Libyan Arab J.	LIBTER	53	11.5	4	120	1	5	0.75	0.25	
Malaysia	Tokamak	5	25	0.5	40	0.1	1	0.1	0.1	0.2
Mexico	NOVILLO	8	23	0.47	12	0.15	2	0.15	0.05	1

*Note: **a** is the minor radius of the toroid; **r** is the major radius of the toroid; B_T is the toroidal field strength; I_p is the plasma current; τ_E is the confinement time; n_e is the electron density; T_e is the electron temperature; T_i is the ion temperature; and β_T is the ratio of the plasma pressure to the confining toroidal magnetic field pressure.*

promising. The best known toroidal system is the tokamak in which a strong toroidal magnetic field and a weaker poloidal field resulting from an induced current are used to confine the plasma. This differs from the tokamak in that it has a weaker toroidal field comparable in strength to the poloidal field.

Research programmes based on tokamaks and other magnetic fusion devices are currently being undertaken in different parts of the world to establish the scientific and technological feasibility of producing electric power from fusion reactions. While the largest of these programmes are based in the industrialized countries (the European Community (EC), Japan, the Union of Soviet Socialist Republics and the United States of America), there are several countries in the Third World in which magnetic fusion programmes based on small and medium scale experiments are being conducted.

Overview of Research in Developing Countries

Plasma Physics is one of the few areas of Modern Science which attracted the attention of research groups in developing countries nearly as early as it did in the industrialized world. In fact one developing country, Argentina, has a strong claim to be among the very first (in 1949) to start a scientific project in high temperature plasmas. Although this project was closed down in 1952, one year after it was prematurely announced that the problem of controlled fusion had been solved, it succeeded in drawing the attention of many countries to the subject, especially the USA.

In recent years several developing countries have expanded their research programmes in fusion science and its related technology and many others have started research activities. At present there are 62 institutions in 29 developing countries with magnetic fusion programmes; 37 have experimental facilities — mainly small and medium sized tokamaks, plasma focus machines and pinches. A list of all tokamaks in developing countries is given in Table I. The dominant research and training programmes in fusion science in the Third World are carried out in Argentina, Brazil, China, India, the Republic of Korea and Malaysia, while there are also research groups in Chile, Columbia, Egypt, Indonesia, the Islamic Republic of Iran, the Libyan Arab Jamahiriya, Mexico, Pakistan, Turkey and Venezuela. Fusion work in the rest of the developing countries is mainly theoretical and the research groups are confined to a few individuals.

Asia

China. There are 15 countries in Asia with magnetic fusion programmes, involving 37 institutions. Among these, the Chinese programmes are by far the largest and most elaborate. Although interest in fusion research started in China in the 1960s it is only very recently that the work became known to the international fusion community in general. The most important theoretical and experimental fusion research is conducted in nine scientific institutions. The two major programmes are in the Institute of Plasma Physics in Hefei and the Southwestern Institute of Physics in Leshan (see Fig. 1). Most of the research efforts in magnetic fusion in China is based on the tokamak approach. There are seven small and medium sized trokamaks (nearly half of the tokamaks in the Third World). The fusion programmes maintain close connections with similar programmes in Germany, Italy and the USA.

India. The second largest Asian scientific programme in controlled

fusion is in India, where high temperature plasma research started in the early 1970s. Currently, the leading fusion programmes are located in seven institutions and are mainly theoretical, with emphasis on turbulence, RF heating, parametric instabilities and solitons. Recently, however, a national fusion programme has been established, with a major component at the Institute of Plasma Research in Gandhinagar, where a medium sized tokamak device named ADITYA (Fig. 2) has just been built. The main objective of ADITYA is to study basic tokamak physics and to investigate a number of diagnostic techniques.

Malaysia. Fusion research in Malaysia is largely carried out at the University of Malaya's Plasma Research Laboratory, which was founded in the 1960s by S.P. Thong. Experimental work in the laboratory is at present based on a small tokamak, plasma focus devices (Fig. 3) and a pinch device. The research programme has a strong training component and several research workers have obtained higher university degrees in plasma and fusion physics.

Republic of Korea. In the Republic of Korea, an enormous effort has recently been made to enhance experimental fusion research, with the emphasis on the design and development of high vacuum techniques, power supplies, and discharge cleaning and basic diagnostic systems. There are six institutes involved. The two main ones are Seoul National University, where a medium sized tokamak has been built (Fig. 4), and the Korea Advanced Energy Research Institute, where experimental research is carried out using a small tokamak.

Other developing countries in Asia with experimental facilities in fusion include Indonesia (plasma focus device), the Islamic Republic of Iran (small tokamak device), Pakistan (plasma focus and theta pinch devices) and Turkey (compact torus and plasma focus devices). The remaining countries with active fusion interests — Bangladesh, Nepal, the Philippines, Singapore, the Syrian Arab Republic, Thailand and the United Arab Emirates — have small theoretical research groups.

Latin America

Argentina. In Argentina the 1952 termination of its first project was a severe set-back to plasma physics research and several subsequent attempts to establish new teams ended in failure. It was not until 1967, fifteen years after the first project ended, that a successful research group was established at the University of Buenos Aires. Ten years later a nuclear fusion division was created in the Argentine National Atomic Energy Commission (CNEA). A research group was established at the National University of Rosario (in 1977) and a smaller one at the University of Tandil (in 1981). In the absence of a national fusion programme these groups are currently working independently and are pursuing theoretical and experimental fusion research based on plasma focus machines at the University of Buenos Aires and Tandil and a field reversed theta pinch at the CNEA (Fig. 5).

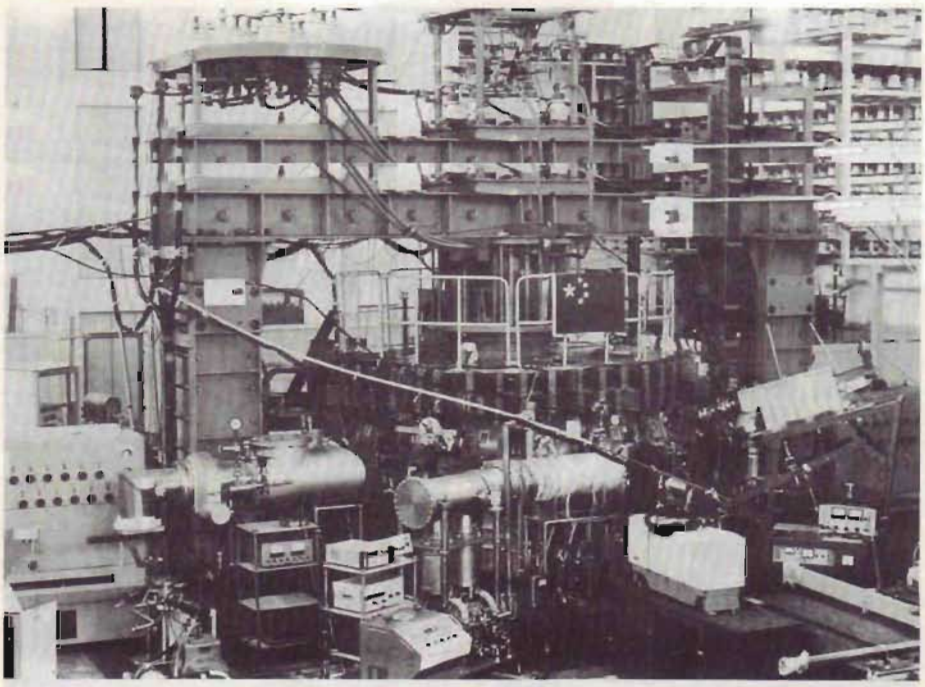

Fig. 1. The largest tokamak in China: the HL-1 device in the Southwestern Institute of Physics, Leshan.

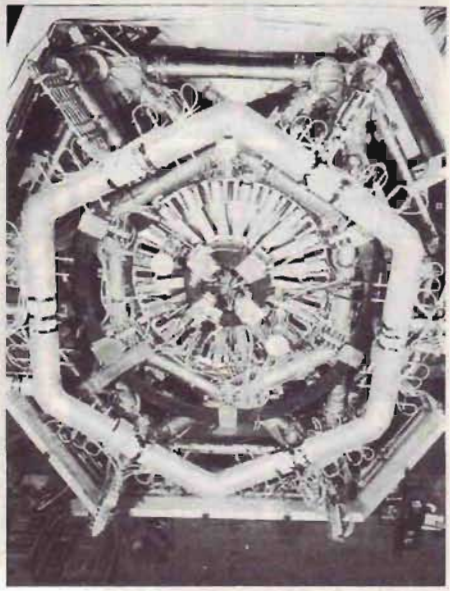

Fig. 2. The ADITYA tokamak, the major fusion device in India (Institute of Plasma Research, Gandhinagar).

Brazil. The largest magnetic fusion research programme in Latin America is at present in Brazil, indicating rapid progress since the setting up of the relevant research groups in 1974. There are currently six research groups in fusion physics in Brazil, with over sixty permanent staff and an equal number of graduate students. The major fusion experiments in the country involve a medium sized tokamak at the University of São Paulo and a field reversed configuration at Campinas. The Brazilian Government has recently approved the establishment of a National Plasma Laboratory and the construction within this of a low aspect ratio compact tokamak experiment (Fig. 6).

within this of a low aspect ratio compact tokamak experiment (Fig. 6).

Other countries in Latin America also have active programmes. In Mexico, a research group to work on thermonuclear fusion has recently been established at the National Institute for Nuclear Research, where a small tokamak, named NOVILLO, was built in 1986. Other fusion groups have been formed in Chile, Colombia and Venezuela, where studies are being performed using small plasma devices.

Africa

The fusion programmes in Africa are much smaller than those in Asia and Latin America, in terms of both experimental facilities and the numbers of trained personnel. Among the

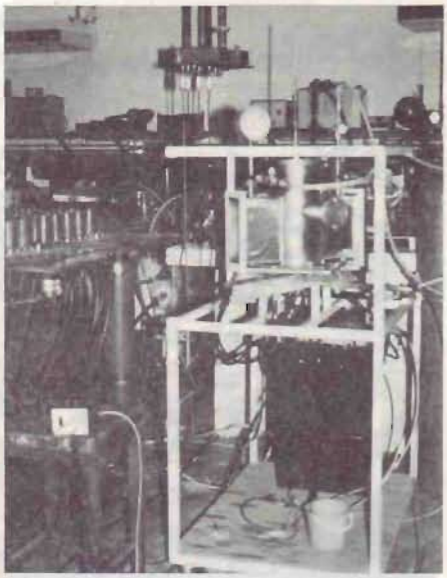

Fig. 3. Plasma focus device at the University of Malaya.

countries in the region with fusion programmes (Egypt, Kenya, the Libyan Arab Jamahiriya, Nigeria, Senegal and Sierra Leone). Egypt has the largest, mainly conducted by the Atomic Energy Authority and Al-Azhar University. The experimental facilities include plasma focus machines, pinch devices and shock tubes. The only tokamak in Africa is the Soviet built device at the Tajura Nuclear Research Centre in the Libyan Arab Jamahiriya. Small plasma focus devices have also been built in Nigeria and Sierra Leone in collaboration with the plasma research group in the University of Malaya.

Plasma Physics and Magnetic Fusion Work at the ICTP

The International Centre for Theoretical Physics (ICTP) was established by the IAEA in 1964 at the suggestion of Professor Abdus Salam of established by the IAEA in 1964 at the suggestion of Professor Abdus Salam of Pakistan, the Nobel Laureate who has been serving as its Director since its inception. In 1970, the United Nations Educational, Scientific and Cultural Organization (UNESCO) joined the IAEA in the running of the Centre. For over 25 years the Centre has been providing advanced training and research opportunities to physicists and mathematicians from all countries and in particular from the developing world. It now welcomes over 4000 scientists every year; more than two thirds of these come from developing countries.

The first major activity to be held at the Centre was a highly successful one-month seminar on plasma physics organized in 1964 by M.N. Rosenbluth (USA), B.B. Kadomtsev (USSR), W.B. Thompson (UK) and C. Oberman (USA). The seminar provided a rare opportunity for magnetic fusion experts from the leading fusion projects in the USA, USSR, and UK to interact shortly after these projects were declassified. Although the seminar was largely dominated by participants from these three countries, it succeeded nevertheless in establishing a strong tradition of international co-operation which benefited a large number of scientists from developing countries in subsequent years. As a result of the seminar, an active research group was established in 1965 and produced in a span of two years more than thirty important research papers. Between 1966 and 1975 the ICTP organized small workshops and meetings of advisory groups in plasma physics. In 1977, the Centre took a significant step in fostering plasma physics research in developing countries by instituting a series of biennial 'colleges' under the leadership of B. McNamara of the UK, who directed the first four colleges.

Typically, a plasma physics college runs for approximately four weeks and involves about seventy participants from developing countries whose participation costs are borne by the Centre and an equal number from the North whose participation costs are borne by their home institutions. The lecturers at the colleges are drawn from the major plasma physics fusion laboratories, including a few from developing countries, thereby making the activity truly international. The topics covered by the colleges include magnetic fusion, plasma-laser interactions and space plasmas. The colleges have been very successful in providing high level training to young plasma physicists from developing countries as well as in giving them the opportunity to interact among themselves and with internationally recognized experts.

In addition to these colleges, the ICTP, through the programmes of the Office of External Activities, supports the organization of workshops and conferences in plasma physics and fusion research in developing countries.

Through its other regular programmes the ICTP also assists distinguished plasma physicists from developing countries in their research efforts. This is done partly by appointing some twenty individuals as ICTP Regular Associates. As Associates they are entitled to visit the Centre three times in a six years period to pursue their own research work using the comprehensive computing and library facilities and, if they so wish, participate in activities of interest to them. On average, the plasma Associates and other visitors produce some ten to twelve research papers annually. A special programme run by the Centre since 1983 has supported visits of a number of plasma physicists to laboratories in Italy active in plasma research. In 1989, the Centre took the first steps in establishing a permanent research group in plasma physics and fusion research. The leader of this group

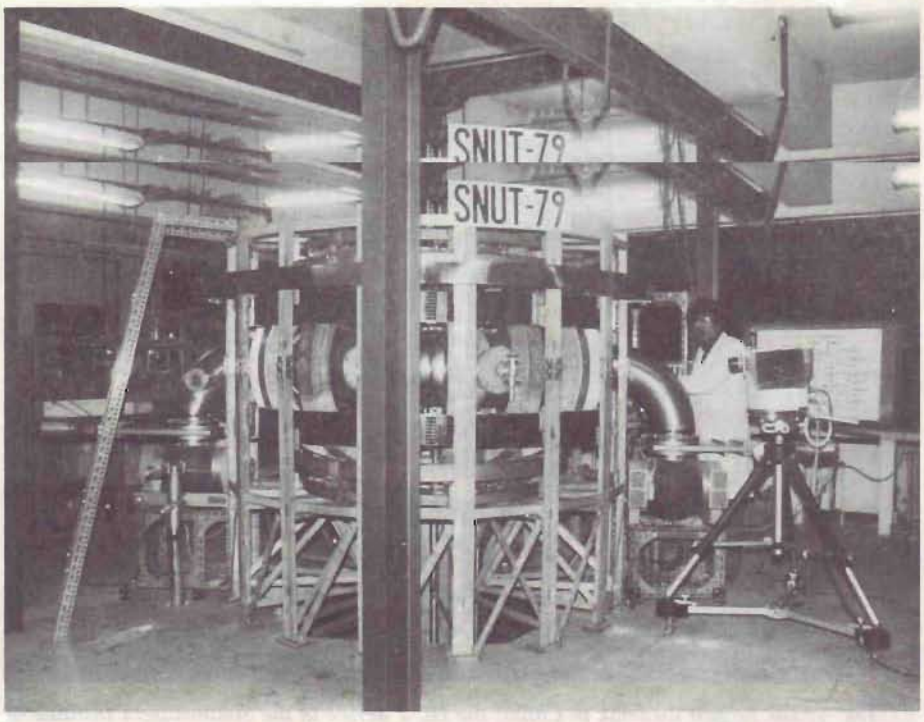

Fig. 4. Main part of the SNUT-79 tokamak at Seoul National University.

is S. Mahajan of the Institute for Fusion Studies at the University of Texas at Austin, USA.

Third World Cooperation in Fusion Science

There is a large degree of similarity between the fusion programmes of the developing countries, particularly among the leading fusion laboratories. Evidently this similarity in approach is largely dictated by the limitation of funds in these countries. It is for this reason that magnetic fusion research in developing countries is mainly centred on small scale fusion devices. The most important common device is the medium sized tokamak currently available in eight developing countries (Table I). Other smaller devices such as the plasma focus and pinch are available in more than twenty developing countries.

It is clear that regional and interregional co-operation among the fusion countries of the Third World in the pooling and sharing of expertise and scarce resources is of vital importance. Perhaps the most significant interregional fusion project is that pioneered by the plasma research group at the University of Malaya under the guidance of S. Lee. The project is based on the concept of sharing with other developing countries inexpensive plasma focus research facilities developed indigenously by the group. The project, which has been supported by the United Nations University and the ICTP, has succeeded in developing plasma focus fusion facilities in Egypt, India, Indonesia, Nigeria, Pakistan, Sierra Leone and Thailand.

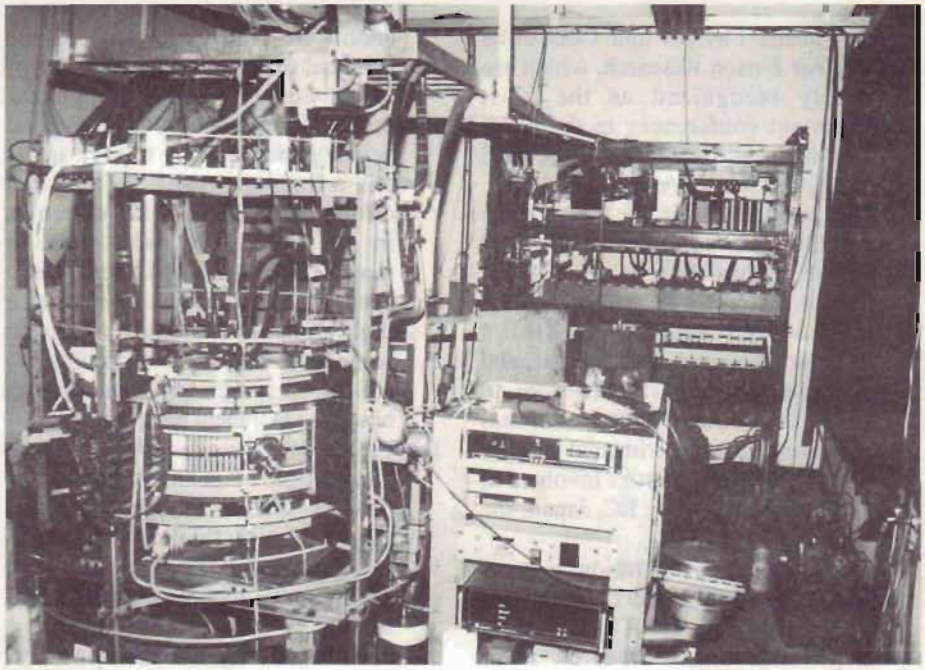

Fig. 6. The TBR-1 tokamak at the National Plasma Laboratory in São Paulo, Brazil.

In an effort to promote closer collaboration and communication among the plasma physics and fusion research groups in developing countries, the participants of the 1989 ICTP Spring College on Plasma Physics established the Third World Plasma Research Network. The objectives are:

- To provide opportunities for intensive cooperation and collaboration between members of the Network;
- To undertake common projects;
- To arrange workshops, seminars, symposia and training courses on various topics of common interest;
- To publish a newsletter giving information about national and international plasma physics and fusion activities;
- To set up a bulletin board facility to provide information regarding the availability of experimental equipment and other resources;
- To facilitate exchange of equipment and help arrange scientific visits amongst member organisations.

The Network offers one of the best hopes of Third World collaboration in

The Network offers one of the best hopes of Third World collaboration in fusion science. It is also planned to encourage the active participation of developed countries with small scale research programmes.

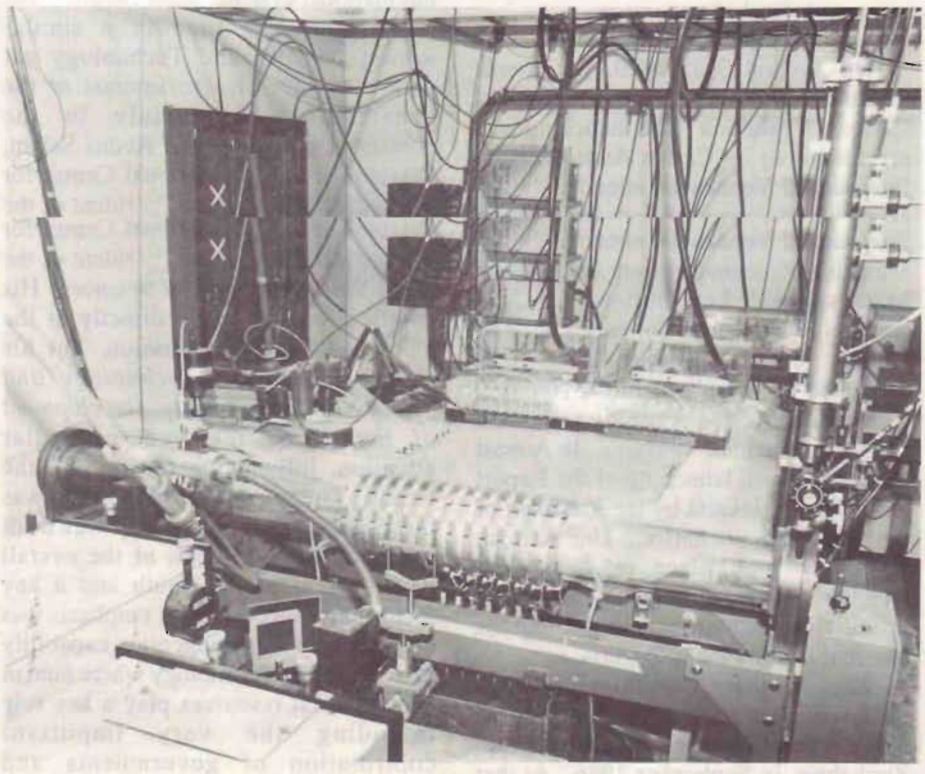

Fig. 5. Field reversed theta pinch device at the CNEA, Buenos Aires.

International Collaboration in Fusion

The IAEA has been playing a leading role in promoting international collaboration and the exchange of information on fusion research since the declassification of such research in the late 1950s. Among its important international activities in the field of plasma physics and controlled fusion are:

- The organization of a series of biennial international Conferences

on Plasma Physics and Controlled Nuclear Fusion Research, which are widely recognized as the most important conferences in the field. The thirteenth meeting will be held in 1990 in the USA.

— The publication of the prestigious monthly journal *Nuclear Fusion*, now in its thirtieth year.

— The initiation and promotion of international projects in fusion technology, namely the International Tokamak Reactor (INTOR) up to 1987 and now the International Thermonuclear Experimental Reactor (ITER). The four parties involved in these projects are the EC, Japan, the USSR and the USA.

International co-operation is very crucial to the future development of fusion actvities in the Third World, since the mainstream of research in this field is located in the developed world within the laboratories of the countries involved in the IAEA international projects.

For the fusion programmes of the Third World to flourish and to benefit the international fusion community, they must be dovetailed into the programmes in the developed countries. This can be achieved by:

— Developing bilateral programmes and exchanging expertise between fusion laboratories;

— Facilitating the transfer of surplus research equipment and supplies available in fusion laboratories in the developing countries to certain laboratories in the Third World;

— Increasing the participation of scientists from the Third World in international and regional meetings abroad and in large fusion projects in the industrialized countries through long term visits;

the industrialized countries through long term visits;

— Initiating and sponsoring research projects involving scientists from the developed and developing countries focused on unresolved and insufficiently explored issues in fusion physics which do not require the use of large machines.

Conclusion

It is relevant to ask why developing countries should be involved in fusion research and technology. Among the possible answers are the following:

(a) The developing world comprises three quarters of humanity. Although the per capita energy consumption is presently very low, the future energy needs will be enormous. Nuclear fusion holds the promise of an unlimited supply of 'clean energy', and although the practical realization of commercial power generation by this means is still a long-term goal, the research efforts of the developing countries in this field will enable them to monitor the progress in fusion and ensure the availability of a core of highly qualified indigenous fusion scientists and technologists to follow through national fusion based development programmes.

(b) Fusion physics requires in-depth knowledge of many branches of physics, such as electromagnetism, atomic physics, fluid mechanics and statistical physics, together with experimental techniques. Qualified fusion physicists thus obtain a broad training in the physical sciences which will enable them to develop their talents even outside the main domain of fusion research.

(c) Fusion science yields many technological spin-offs which may benefit local industry where such technologies as vacuum techniques, isotope separation, power generation, plasma coating, plasma etching and microwaves electronics are used.

South Commission Report

by A. Papič,
South Commission.

On August 3rd, 1990, the South Commission Report was launched in Caracas, Venezuela. The launching was presided over by Carlos Andres Perez, President of Venezuela, attended by Dr. Mahathir Mohamad, Prime Minister of Malaysia and key initiator for the creation of the South Commission. The Report of the Commission was presented by Mwalimu Julius Nyerere, Chairman of the Commission and former President of Tanzania. In August 1990, the Asian launching of the Report took place in Jakarta by the President of the Republic Soeharto. The African launching took place in Arusha in October. There were many launchings in individual countries and the regions like that one in Abuja, Nigeria, etc.

The South Commission was initiated during the 8th Summit of Nonaligned Countries held in Harare, Zimbabwe, in September 1986. At that Conference, President M.J. Nyerere got a mandate to establish a non-governmental and independent South commission. It was expected that the Commission would make a thorough evaluation of the position of the South and make proposals for policy and measures to improve its position and to solve the crucial problems.

Within a year, President Nyerere made extensive consultations with governments of the South with regard to the work of the Commission and consulted on the selection of its members. Finally, twenty-seven members of the Commission (besides Chairman Nyerere) were selected from all major areas of the South, including China. The Commission is composed of high-level people/politicians — two presidents of country, vice-presidents of country, a prime minister, a cardinal, top scientists, Nobel Laureates, Professor Abdus Salam, many economists, ministers of finance and bankers, and women activists.

The Commission had nine plenary meetings discussing the main issues to be covered in its Report. It concentrates on internal problems of the South, South-South co-operation, North-South relations and the position of the South in the world economy. Main emphasis is put on mutual co-operation, self-reliance both in individual countries and in South-South relations. As to world position and relations with the North (both West and East), it is insisted on a rational and development-oriented international system.

For the first time in a similar Report, Science and Technology got great attention, due to interest of the Commission but mainly to the contribution of Professor Abdus Salam, Director of the International Centre for Theoretical Physics and President of the Third World Academy of Sciences. His contribution was made directly at the meeting of the Commission, but his *Notes on Science, Technology and Science Education in the Development of the South* received particular attention, influencing the text of the Report. Great value of this activity was that Science and Technology was dealt with as an integral part of the overall development of the South and a key factor in its success. The emphasis was on strengthening indigenous capability in Science and Technology where human and financial resources play a key role including the very important contribution of governments and business. The role of scientists,

including the adequate treatment of them and of scientific institutions, and the reciprocal contribution to the development of the countries were emphasized. Adequate education was elaborated as a key factor for strengthening human resources.

Besides efforts of individual countries, new possibilities for South-South co-operation in Science and Technology for self-reliance were elaborated in a rather concrete manner. International co-operation, including that of North-South and international organizations, were elaborated. The Commission Report, elaborating the results and achievements of the ICTP and future three Centres, the contribution of the Third World Academy of Sciences (TWAS) and Third World Network of Scientific Organizations (TWNSO), in fact made an appreciation of their work.

At the 9th Meeting the Commission had in Arusha, Tanzania, in October 1990, the program for implementation of recommendations of the Commission was adopted. That Meeting meant the end of the three-year work of the Commission. However, Chairman Nyerere, with the support of the South Secretariat in Tanzania and Geneva, has continued to act initiating many activities throughout the world for the implementation of the Commission Report. He visited many countries' heads of state. The 2nd Committee of the General Assembly of the United Nations adopted a special resolution on the implementation of the Commission Report which will be dealt in the Summer Session of the United Nations Economic and Social Council (ECOSOC) in 1991. Former members of the South Commission expressed their readiness to be at the disposal of Chairman Nyerere making their effort and contributions for the implementation of the recommendations elaborated in the South Commission Report.

Publishing its Report, the Commission implemented its task. Now it is the responsibility of the governments of the South to carry out those proposals and suggestions suitable to individual countries and in particular those which relate to the South as a whole and to their relations with the North. As indicated before, Chairman Nyerere is available for any assistance in this regard, as well as former Commissioners.

EEC and Scientific Research

During the last five years, the European Economic Community has successfully launched several programmes for the promotion of research collaboration within its Member States and also with other countries. Trieste has not yet appeared on the lists of the EEC collaboration programmes and this is the reason why the ICTP, the Trieste Foundation for the Advancement of Science and the Technological Village invited Professor P. Fasella, Director General of the EEC Directorate for Science, Research and Development, to illustrate the EEC programmes on 24 November 1991.

Abdus Salam opened the meeting and gave the floor to P. Fasella who described the broad lines of EEC scientific and technological cooperation. A. Forti, Project Leader of the International Centre for Science and High Technology (ICS), then expounded his views on the projects of scientific and technological development in European cooperation with a reference to ICS. The next speaker was P. Budinich, former Deputy Director of the ICTP, who spoke about the scientific collaboration between Trieste and the East European countries. Later, two high officials of the EEC, G. Poggio and R. Gerald, elaborated on the EEC programmes with non-European countries and on the operational methods and procedures of the European Community. With these two contributions together with that of P. Fasella, the possibilities of the Trieste institutions to cooperate with the EEC became clearer and clearer. These possibilities do exist but proper channels have to be found for them to become a reality. The morning session was concluded with a contribution from Mr. G. Rossetti, Member of the European Parliament on "Scientific and technological cooperation in human and

Prof. P. Fasella speaking at the Seminar, and Professor Abdus Salam (left).

On. G. Rossetti, Member of the European Parliament from Trieste, was invited to attend the Seminar. Prof. P. Budinich, former Deputy Director of ICTP and former Director of SISSA, is sitting next to him. In the second row, from left to right: Prof. D. Romeo, President of Area di Ricerca, Prof. Borsellino (SISSA) and Prof. L. Bertocchi, Deputy Director of ICTP.

financial resources with Central and Eastern European countries".

In the afternoon, P. Fasella chaired a round table on "Opportunities of scientific collaboration for Trieste within the European Community", during which several possibilities of cooperation were discussed. The complexity of the matter, however, requires a more detailed study which will be done by a task force in the near future.

A.M. Hamende

New Scientific Information Officer at ICTP

The next issue of *News from ICTP* will be edited by Mr. Mohammad Farooque from Bangladesh who has been appointed as Scientific Information Officer of the Centre as of 12 December 1990. Mr. Farooque has been a Principal Scientific Officer and Head of the Scientific Information Division of Bangladesh Atomic Energy Commission. He was also the Liaison Officer of IAEA from 1977 to 1989 from Bangladesh. He had a long experience of twenty-four years in research and scientific information.

Dr. Mohammad Farooque.

He is 47 years old and has a Master Degree in physics from the University of Dhaka. During his career he has participated in many relevant training courses in his country and abroad. He has in his credit a number of research publications in national and international journals.

His office and telephone number are 132 and 356 respectively, at the Main Building.

As for myself, I shall retire on 31 December after having served at the Centre for 26 years. I wish Mohammad Farooque a successful career in Trieste and I take this opportunity to thank all those who have contributed to the publication of the Newsletter, and in particular Anna Triolo who has patiently typed, proof-read and corrected the manuscript for the last six years.

A.M. Hamende

For Today's Scientist, Skill in Public Speaking is Essential

by Liane Reif-Lehrer

A scientist's ability to get up in front of an audience and give a good talk is no longer just an incidentally useful skill. Indeed, for today's investigator, the art of engaging a group of listeners is apt to be integral to success in the research world. Many scientists find, for example, that if they don't give talks at professional meetings, their peers are less likely to find out what they're doing, since, these days, publishing one's work is not enough. With the abundance of science journals now in circulation few researchers have the time to read as much as they would like and miss out on many important articles. Besides, the face-to-face interaction that occurs in an oral presentation leaves a stronger impression than words on a printed page.

stronger impression than words on a printed page.

Unfortunately, while most scientists have to give talks at one time or another — or are required to give oral presentations if they are site-visited by a grant-review board — their training rarely prepares them for this challenge. Since public speaking is a learned art, it's a good idea for scientists to get used to giving talks by offering to give them rather than avoiding them. The best ways for scientists to combat nervousness are to talk about things that really excite them, know their subject matter, and be well prepared.

I arrived at graduate school having never given a talk, and was shocked to hear that each first-year chemistry student had to give two oral presentations. I spent weeks preparing and then practicing. Despite my rehearsals, I was so nervous and talked so fast that I finished my memorized speech 15 minutes early and had to ad lib to fill up the time. In retrospect, I sometimes wonder whether that last bit might not have been the best part of the talk.

As someone who now talks easily for four to six hours with nary a butterfly in my stomach, I've come a long way. There are definite techniques to help you ease the pain.

Make An Outline

Whether you plan to speak for 10 minutes or an hour, it pays to make an outline for your talk. Plan what to say about each point in the outline and focus on what the audience needs to know about the subject rather than on what you want to tell them. You may be all excited about some innovative method you used to obtain a given set of data, but the audience may respond more positively if you just show them a summary of the data and convince them through your discussion that you reached a logical conclusion from your findings.

It helps a lot if your delivery has a logical progression that the audience can follow easily — even if they are not familiar with the subject. Try to present supporting material for each major subtopic in easily digestible units of information. Illustrate your points with a small number of uncluttered slides or overheads. Slides are generally better for a short talk, while overheads, which often require more of your involvement in showing them, tend to create a more informal atmosphere and are best left for longer presentations.

Don't Overrehearse

The preparation time for your talk

Don't Overrehearse

The preparation time for your talk should be commensurate with the occasion. A very formal hour-long talk to a group of esteemed colleagues at an important international meeting may warrant an appreciable amount of your attention over a period of several weeks. But spending all your work hours for three weeks preparing for an informal in-house journal club is a waste of precious research time.

Memorize Your Talk

For brief presentations, in which the timing is fairly critical, it is advisable to memorize the talk or to use only a single index card listing the key words as a mnemonic aid. Not having to shuffle through notes will allow you to

speak unhaltingly. Making frequent eye contact with the audience conveys an air of confidence and knowledgeability about the subject matter. Keep a copy of the text at hand, on the off-chance that stage fright causes you to have amnesia.

Adapt to Time Constraints

For a short talk, it is best to stick to a single major message. First, tell the audience what you are going to tell them. For example, "We have gathered an overwhelming amount of evidence that drug X is the underlying cause of syndrome Y. I'd like to outline for you what made us suspect this connection and how we arrived at this conclusion." That gives people something to "hang their hats on"; most people learn by making connections with things they already know. Then tell them what they need to know about the topic. Finally, tell them what you told them.

Even in a long talk, good speakers do not try to cover too much ground, sticking instead to the elegant development of a single theme. But you have more options when you have more time. For an hour-long presentation, you might want to write the topics you plan to cover on a flipchart or overhead, or present them on a slide. Then, start with the "bottom line," that is, the conclusion, and present it as a strong, enticing opening statement.

Encourage Participation

If the audience is small and the topic and atmosphere appropriate, it often breaks the ice to get the audience involved in discussing the subject or asking questions early in the presentation. That is, try to establish rapport early. Audience members will decide in the first few minutes whether they will listen to you. It's important to make them want to hear what you have to say.

There are many ways to develop your subject. It is best to choose a way that is in keeping with your personality. Some people do well by presenting a scientific study like a mystery story. Others prefer a more straightforward approach but may successfully incorporate humor in a way that helps keep the audience alert. The judicious use of a few relevant cartoons can do a lot to keep people from getting drowsy.

Once you have introduced your subject, it is advisable to provide some background, and perhaps say a bit about how you became interested in the topic. Then discuss your approach to the subject or problem. Don't give too many experimental details unless the method is the main point of the talk. For each set of data, explain the significance of the findings. Don't assume that the audience will know what you mean. Looking around at the faces will help you assess whether people are nodding in agreement or looking puzzled.

Clue the audience in when you are about to make a transition from one topic to another: "Now I'd like to tell you how..." If you are not pressed for time, stop once or twice during the talk to summarize and ask if anyone has any questions or comments. That helps reinforce what they have learned in the minds of the listeners and is especially useful for those who got derailed.

Don't Ramble

It makes the information easier to digest if you say what you have to say directly and concisely, and don't ramble or get off the track. Try to get some sense of the size of the audience and their heterogeneity with respect to their knowledge of the subject. If they are all in your specific field, have a ball with jargon. If it's a mixed audience, ask for the indulgence of the more experienced people when you explain things to those who are less well-informed.

Whenever possible, provide the audience with a handout outlining what you plan to say — that lets them concentrate on listening to you, rather than being distracted by madly taking notes. Providing a bibliography in case people want more detail is another thoughtful touch.

Think about good tone and timing so you don't drone or race. Speak loudly and clearly or use a microphone. If the audience has to strain to hear, it's easier for them to lapse into their own thoughts.

Be prepared, if necessary, to alter what you had planned to say to accommodate the needs of the audience. Let's say you planned to talk primarily about subject A and to mention subject B in passing. Ten minutes into the talk you surmise that your audience is much more interested in subject B. If you are well prepared, you'll probably be able to change the emphasis of the presentation (without changing the contents too much) to maintain the audience's attention.

Don't get into a power struggle with someone in the audience. Always graciously agree that factors that neither of you had considered may account for a difference in results or conclusions.

Check Your Equipment

Because it detracts from a presentation when things go wrong, it's a good precaution to call or write ahead to ensure that the host institution will have all the equipment you need for your talk: projector with remote control, back-up projector (or, at least, a spare bulb), flipchart with markers that work, pointer (with extra batteries if it is battery-operated), and microphone. I make do with whatever equipment the host institution provides; however, juggling wires from a projector remote control, an electric pointer, and a microphone can be awkward, so I always ask whether wireless equipment is available.

On the day of your talk, get to the room early and check that everything is as you want it and that the equipment works properly. If at all possible, load your slides into the projector and preview them before you speak. Preview rooms are now available at many large meetings.

With good preparation, a positive attitude toward the audience, and a little experience, you're likely to find that the jitters will quickly fade from your oral presentations.

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Steps To A Successful Presentation

1. Prepare way ahead of time and review what you will say about a week before the talk, and then again the evening before.
2. Unless you have been introduced by someone else, always start your talk by introducing yourself. The audience wants to know what gives you the authority to talk to them.
3. Keep slides simple and easy to read. Don't mix fonts on a slide. More than one word in all capital letters is hard to read. Use simple diagrams. For long talks, vary the color and style of your visuals to avoid mesmerizing an already saturated audience.
4. Interject humor and human-interest stories when appropriate, but don't make jokes (for example, ethnic jokes) that may hurt people's feelings.
5. Don't insult your audience or put them in a position of having to admit their ignorance. Don't ask, "How many of you don't know...?" Rather, say, "Some of you may not know..."
6. Avoid doing things that distract the

audience; nervous habits like playing with the microphone cords or noticeable repetitive hand motions tend to have a hypnotic effect on the audience.
7. Dress appropriately. The audience may get distracted by unusual clothes or egg on your tie.
8. Stay on schedule. (This includes leaving time for questions.)

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Liane Reif-Lehrer, author of Writing a Successful Grant Application *(2nd ed., Jones and Bartlett Publishers, Boston, 1989) is president of Erimon Associates, a consulting firm based in the Boston area.*

Telescope High and Dry in the Desert

by Steven Dickman

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One of the clearest, driest places in the world was chosen last week by the European Southern Observatory (ESO) as the site for its Very Large Telescope (VLT). Cerro Paranal, a 2,664-metre-high mountain in the Atacama Desert in Chile, was selected for the excellent image quality and good weather as well as the absence of light pollution.

A six-year meteorological survey showed that Paranal is one of the best sites in the world for optical astronomy, approaching the standards of Mauna Kea, Hawaii, generally considered the best year-round site for optical and infrared astronomy. Several US and international telescopes are based there.

Although Mauna Kea has the international telescopes are based there.

Although Mauna Kea has the advantage of being at a higher altitude, so that less atmospheric water vapour interferes with spectroscopic measurements in the infrared, Paranal has more clear nights and a more stable atmosphere. In terms of 'seeing', meaning the sharpness of stellar objects in both optical and infrared astronomy, Paranal will be better (at a median of 0.66 arcseconds) than the main ESO facility in Chile at La Silla (median of 0.76 arcseconds), which is well known for its excellent observing conditions. Similar measurements are not yet available for seeing at Mauna Kea.

The only surprise about the decision was the placement of the telescope so far from La Silla, 600 km to the south. ESO astronomer Massimo Tarenghi was confident that no logistical difficulties would arise from the separation.

VLT consists of four 8.2-metre telescopes which can work separately or together, in which case they make VLT with its effective 16-metre diameter the largest optical telescope in the world. The four telescopes will begin to be installed in 1995 and the entire array should be in place by late 1998.

There will be a satellite link between Paranal and ESO headquarters in Garching, Germany, allowing astronomers to control VLT remotely. The high-speed link of up to 8 megabaud will allow even better remote control than is currently possible between Garching and La Silla.

Sir Michael Atiyah Elected President of RS

Courtesy of Royal Society News, 1990.

Sir Michael Atiyah, former Member of the ICTP Scientific Council, has been elected President of the Royal Society, London. Sir Michael was born in 1929. His father was a distinguished Lebanese and his mother came from a Scottish background. He was educated at Victoria College, Cairo, and Manchester Grammar School. After National Service, he went to Trinity College, Cambridge, where he obtained his B.A. and Ph.D. degrees and continued with further research, finally as a university lecturer and Fellow of Pembroke College. In 1961 he moved to Oxford, initially appointed to a Readership, and later to the Savilian Professorship of Geometry.

From 1969 he was Professor of Geometry.

From 1969 he was Professor of Mathematics at the Institute for Advanced Study in Princeton, USA, (where he had held a Commonwealth Fund Fellowship in 1955) until 1972 when he returned to Oxford as a Royal Society Research Professor and Fellow of St. Catherine's College. He held this post until this year when he was made Master of Trinity College, Cambridge, and Director of the new Isaac Newton Institute for Mathematical Sciences.

Sir Michael has worked in many fields of mathematics, especially those involving geometry. He has contributed to algebraic topology, in collaboration with F. Hirzebruch, through the development and application of K-theory, which became a powerful new tool leading to the solution of difficult problems. In a long collaboration with I.M. Singer he developed the index theory of elliptic differential operators, and in work with R. Bott combined this with fixed point theorems. More recently he has contributed to mathematical aspects of the gauge theories of elementary particle physics.

Sir Michael was elected to the Fellowship of the Royal Society in 1962. He was awarded a Royal Medal in 1968, the Copley Medal in 1988 and was Bakerian Lecturer in 1975 and Humphry Davy Lecturer in 1986. He served on Council in 1972-74 and again from 1984-85, and is Chairman of the international exchanges panel C (Eastern Europe and the USSR) until the end of this year.

He has received numerous other honours, notable among which is the Fields Medal awarded to him in Moscow in 1966. He was knighted in 1983.

Robinson Prize to Martin Rees

The Robinson Prize in Cosmology has been awarded to Professor Martin Rees, FRS, Plumian Professor of Astronomy and Experimental Philosophy at the University of Cambridge. Professor Rees is also director of the Institute of Astronomy at Cambridge.

This is the first occasion on which the Robinson Prize has been awarded. The Prize, which was established in 1990 for outstanding work in the field of cosmology, has a current value of £10,000 and is the first award instituted by the University for worldwide competition.

. Professor Rees will receive his award competition.

Professor Rees will receive his award at a ceremony in Newcastle University on 6 March 1991. He will deliver a public lecture following the presentation.

Professor Rees is internationally renowned for his work on the interpretation of the solar system, the evolution of the galaxies and the laws of nature governing the universe.

The founder of the Prize, Mr Philip Robinson, was awarded an honorary MA by Newcastle University in May 1988 and has been a major benefactor to the University Library, which is named after him. He has maintained a lifelong interest in the study of cosmology.

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Professor Martin Rees has been

course director and lecturer at ICTP several times. All ICTP Scientific and General Staff who have known him join in expressing most heartfelt congratulations.

Salam Prize to S.K. Hasanain

Dr. S.K. Hasanain, of the Department of Physics, Quaid-i-Azam University, Islamabad, Pakistan, has been awarded the Dr. A. Salam Prize for Physics, for the year 1989.

This Prize is awarded each year to a young scientist of Pakistan who is considered to have made significant contributions to his field. The Prize rotates between the fields of Physics, Mathematics and Chemistry.

Dr. Hasanain has been cited in this award for his 'Experimental Studies on the Magnetic Properties of High T_c Superconductors'. His work has mainly focussed on the glassy properties of high T_c materials, including magnetic relaxation effects.

In 1988 Dr. Hasanain, was awarded a TWAS research grant for work on experimental superconductivity.

Global Research Centres Open

by Peter Aldhous

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Imperial College, London, and the University of Oxford are both launching

Imperial College, London, and the University of Oxford are both launching new environmental research centres in the hope that the recent high profile given to environmental issues will win funding from industry.

Imperial's Global Environment Research Centre opened on 14 December, with six staff and about £1 million of start-up funds from the college. But director Iain Thornton wants to recruit ten postdoctoral researchers and set up Britain's largest environmental library, which will require £12 million over the next five years. Thornton is seeking donations from companies in Britain, North America and Japan.

The Imperial centre will carry out research into climate change, pollution and clean technology, and will also develop environmental policy. Director of policy John Gordon, a former diplomat, hopes to use seminars to bring together policy-makers, industrialists and pressure groups. An independent voice is needed to ease the often confrontational relationship between government and environmentalist groups, he says.

Oxford's Environmental Change Unit will open in February, concentrating on the impact of environmental change on forestry and natural ecosystems. The university has again provided initial funding of more than £1 million, and the US computer company IBM has agreed to pay the director's salary and provide computing facilities. But another £5 million is still needed from industry.

Proposal for an International High Technology Centre

The University of Strathclyde in Glasgow, Scotland, UK, is planning to set up an International Centre for High Technology which will offer scientists and engineers training and research in emerging and strategic technologies, such as: information technology, new manufacturing techniques, advanced materials technology.

Activities of the Centre would include:

- Technology transfer opportunities in partnership with industry,
- Training programmes through course work on emerging technology areas,
- Research and Development through short term secondment, and collaborative projects,

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- Access to high technology systems and equipment.

The Centre will pay particular emphasis on participation from developing countries in order to promote scientific and technological growth, and enhanced technology transfer.

The proposal is being developed in conjunction with the commonwealth Institute, Third World Academy of Sciences and its sister organisation, Science, Technology and Development Forum; local government and industry.

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ICPAM

The International Centre for Pure and Applied Mathematics (ICPAM-CIMPA, Nice, France), has published its Programme 1991 which is as follows:

Spring School CIMPA-UNESCO, Wuhan University — Invariant Differential Operators on Lie Groups and Homogenous Spaces, Wuhan, China, April 22 - May 10, 1991;

Summer School I CIMPA UNESCO, Integrable Systems, Nice Sophia-Antipolis, June 10-28, 1991;

Summer School II CIMPA-INRIA-UNESCO, Artificial Vision and 3D Perception, Nice Sophia-Antipolis, June 17 - July 5, 1991;

Winter School CIMPA-UNESCO-Chile, Dynamical Systems and Frustrated Systems, Temuco (Chile), December 30, 1991 - January 24, 1992;

CIMPA-UNESCO Programme, "Mathematics & Microcomputers", Sessions "Computer Tools for Mathematicians".

Preview of 1992 Programme:
Symplectic Geometry and Applications (Nice);
Structural Optimization (Rio de Janeiro);
Robotics (Nice).

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Women's Association of the Trieste Scientific Community

by R. von Rentzel Richter

Founded in 1986 by the American Mrs. Nan Eells, wife of Prof. J. Eells, at that time Director of Mathematics Department of the ICTP, Mrs. Eells was president of the "Ladies' Club", former name of this association, until 1987, when she and her husband returned to England. The association is being supported by the Director of the ICTP,

Prof. Abdus Salam.

From 1987 until Summer 1990, Mrs. Janet Verjovsky, wife of Prof. Alberto Verjovsky, presently vice-director of the Mathematical Department of the ICTP, was a successful president of the association. When Mrs. Verjovsky started her full time teaching at the United World College in Duino, Mrs. Renate von Rentzell-Richter, wife of Dr. Rudolf Richter, from the Sincrotrone Trieste, was asked to take over the "Ladies' Club ICTP" which then became the current "Women's Association of the Trieste Scientific Community", taking into consideration the growing of the science world in Trieste. It no longer concerned only the women at ICTP, SISSA and TWAS, but also all ladies of Area di Ricerca with its many laboratories such as Carso, CIB, CIVAB, CRES, INFM-TSC, INSIEL, Poly-Bios LBT, UNIDO-ICC, UNIDO-ICGEB, as well as Sincrotrone and the Astronomical Observatory.

Mrs. Renate von Rentzell-Richter, German-born, came from Berlin to Trieste in October 1987.

She has worked many years as a translator and interpreter in ministries in Bonn, German embassies abroad and in foreign consulates in Germany, where she took care of the public relations work and the organization of social and cultural activities.

The aim of the "WATSC" association is to assist the wifes of foreign scientists as well as foreign women scientists coming and living in Trieste, to help them adapt to the city, to the new language and to the new customs and way of life. They are helped with the problems they are facing.

At coffee parties taking place every

At coffee parties taking place every

first Wednesday of the month from 10 a.m. until 12 p.m. at the Rotunda of the Galileo Guest House, they have the possibility to meet other foreign women who are in the same circumstances. It is important they know they are not alone. The WATSC is considered a centre for wifes of foreign scientists, it keeps them together like a big family. It is the first point of reference for them when they arrive in Trieste. We encourage all new coming wifes of foreign scientists to come to meetings of the WATSC.

The current president, Mrs. Renate von Rentzell-Richter, can be reached at the Galileo Guest House every Wednesday from 10 a.m. until 11:30 a.m. under the phone number 2240411. During the other days, Mrs. Bruna Marcuzzi, phone No. 2240312, at the Galileo Guest House, will gladly help.

For newcomers, Italian and also English language courses are being offered free of charge. The teachers, some of them wives of scientists, are leading these courses on a voluntary basis.

The association has a fund of second-hand items available free of charge, including baby equipment, warm clothes for adults and children, household items.

Visits to historical areas, companies, industries in the area of Trieste, as well as visits to museums, expositions, such as the Longobards, are periodically organized — also visits to the Castle of Duino and family picnics in the park of Villa Revoltella. Sometimes activities are being organized together with the Science Link Committee, whose president, Dr. Fulvia Costantinides, is always ready to collaborate and help. Very much liked were the visits to the operas at Teatro Verdi. For the future monthly talks are planned. The first one in November was about chromotherapy, held by Mrs. Judith Horvath-Fontana. The next important event will be the International Christmas Fair "Arts and Crafts" on Sunday 16 December 1990, from 11 a.m. to 8 p.m. at the Circolo di Cultura Italo-Austriaco, Piazza S. Antonio, 2, whose president, Dr. Sigfrido de Seemann kindly put his rooms at disposal for this International Christmas Fair. Members of the "Women's Association of the Trieste Scientific Community" will present beautiful works they do in their spare time, such as painting on glass, porcelain and material, knitting, embroidery on material and leather, sewing, designing, drawing, Christmas decorations, centre pieces, ornaments, jewellery and many more.

As a support of Prof. Abdus Salam's "Fund for Hunger in the world" all proceeds from the international cake lottery and sale are destined for this project. I am sure it will be interesting for the people in Trieste to visit this Fair since it is the first time ever the wifes of foreign scientists altogether present their beautiful hobbies.

Visits to ICTP

Prof. F.H. Hammad

The Chairman of the Atomic Energy Authority of Egypt, Prof. F.H. Hammad delivered a lecture at ICTP on 15 November 1990, on "Nuclear Research in Egypt: An Experiment in Scientific Development".

Giunta Provinciale

On 16 November, three members of the Council of Trieste Province, headed by Chairman Crozzoli, met the Deputy Director, the Administrative Officer and consultant Dr. L. Stasi to discuss the problem of more space for ICTP and its activities.

Senator Capuzzo

Senator U. Capuzzo was at ICTP on 19 November 1990. He met Scientific Officers to have an overview of the various programmes held at the Centre.

Giorgio La Malfa

On the occasion of the visit of Mr. Giorgio La Malfa, Secretary of the Italian Republican Party, at ICTP, a meeting was convened on 14 December 1990 to briefly discuss on the international institutions in Trieste.

Dr. Bonaventure Loo

Dr. Bonaventure Loo (Malaysia), while spending a period of research at ICTP as a Visiting Mathematician, was invited to visit the Institut des hautes études scientifiques at Bures-sur-Yvette, France, and the Max-Planck-Institut für Mathematik in Bonn, Germany, in order to work with some of the mathematicians there.

Activities at ICTP November-December 1990

Title: THIRD AUTUMN

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COURSE ON MATHEMATICAL ECOLOGY, 29 October - 16 November 1990.

Organizers: Professors L.J. Gross and T.G. Hallam (University of Tennessee, Knoxville, USA) and S.A. Levin (Cornell University, Ithaca, USA), with the co-sponsorship of the Direzione Generale per la Cooperazione allo Sviluppo (Ministry of Foreign Affairs, Rome, Italy).

Lectures: Overview of theoretical ecology. Classical population models—discrete. Matrix population models. Theory in behavioural ecology. Classical population models—continuous. Modelling continuously structured populations: general

introduction. Stochastic population models. Age/stage structured prey/predator and host/parasitoid models. Models of individuals. Introduction to evolutionary theory. Case study of daphnia population dynamics. Response models and ordination techniques. Models in plant biology. Theoretical community ecology. Multi-dimensional ecological space and Niche theory. Introduction to water quality modelling. Introduction to epidemiological modelling. The epidemiology of AIDS. Introduction to conservation biology. Population biology and conservation of endangered primates. Models of structured metapopulations. Viability theory and population dynamics. WASP—a water quality model. WASP—computer demonstration. Conservation of large-scale natural systems. Modelling invasion of competing species into open areas. Mathematical ecotoxicology. Relation between uptake and effects of xenobiotics. Dynamics of very rare species. Population dynamics of scale insects. Soviet contributions to mathematical ecology. An optimum life history model for aphids. Stochastic attraction. Dynamics of moderately rare species. Modelling agricultural systems. A mathematical model descriptive of the behaviour of trace substances in undisturbed soils. Computer methods in ecosystem modelling. Automatic computation of static basin yield for horizontally stratified unconfined aquifer. Simulation of processes in soil and their applications to water quality modelling. Mathematical models in epidemiology. Role of mathematics in environmental management. Social structure in epidemiological models — basic models. Introduction to bioeconomics. Parasitic helminths in wild animal [illegible] Parasitic helminths in wild animal population. Evolutionary aspects of epidemiology. Adaptive management of natural resources. Computer demonstrations — Niche breadth, diversity, multivariate analysis. Social structure in epidemiological models — parameter estimation. Environmental regulation. Models for fisheries. A consideration on species abundance relations. Periodic reproduction and structure of populations. Resource management: economic issues. Infectious disease models with infectivity depending on age of infection. ESS searching and foraging strategies in communities of bees and flowers. Analysis of indirect effects in ecological networks. Fitting models to data. Vector transmitted diseases. Economics of biological conservation. Population regulation through disease. Resource utilization and coexistence in tropical grasshoppers: comparison with null models. Modelling of bisexual populations allowing for gestation period and density dependence. Effect of ecosystem variation on human physiology.

Workshop Sessions: Environmental problems in developing countries. Conservation biology problems in developing countries. Ecotoxicology — Effects. Conservation biology — Political problems. Epidemiology. Resource management: usable models.

The Course was attended by 148 lecturers and participants (98 from developing countries).

Title: WORKSHOP ON EARTHQUAKE SOURCES AND REGIONAL LITHOSPHERIC STRUCTURES FROM SEISMIC WAVE DATA, 19 - 30 November 1990.

Organizers: Professors A.L. Levshin (Institute of Physics of the Earth, Academy of Sciences, Moscow, USSR) and G.F. Panza (Istituto di Geodesia e Geofisica, University of Trieste, Italy), in collaboration with the Institute of Geodesy and Geophysics of the University of Trieste and the International Centre for Earth and Environmental Sciences (ICE, Trieste, Italy), with the co-sponsorship of the Direzione Generale per la Cooperazione allo Sviluppo (Ministry of Foreign Affairs, Rome, Italy).

Lectures: Surface waves fundamentals. Formal description of a seismic source. Frequency-time analysis [illegible] seismic source. Frequency-time analysis of surface waves. Estimation of source parameters from long period surface waves. Episodic deformation of the lithosphere: fast ruptures, slow earthquakes, and subseismic events. Attenuation studies: introduction. Waveform tomography. Surface wave crustal studies. Polarization analysis of surface waves. A ten-year catalog of normal-mode excitations: evidence for a new type of earthquake. Measuring surface wave attenuation. Regionalization of surface waves. Slow precursors to fast seismic ruptures and their implications for earthquake prediction. Inversion of surface wave attenuation data for Q structure. Surface wave data tomography by cubic splines. The nonlinear inversion of surface wave data. Synthetic seismograms computation by Gaussian beams method. Scattering of surface waves. Body wave modelling for earthquake source inversion. Wave propagation in inhomogenous media. Simulation of broad-band motion. Analysis of strong ground motion. Laboratory approaches to the earthquake source study. Description of ICTP/ICEM activities in solid earth geophysics.

The Workshop was attended by 70 lecturers and participants (39 from developing countries).

Title: EXPERIMENTAL WORKSHOP ON HIGH-TEMPERATURE SUPERCONDUCTORS AND RELATED MATERIALS (advanced activities), 26 November - 14 December 1990.

Organizers: Dr. F. De la Cruz (Centro Atómico Bariloche, Argentina), Dr. P. Ganguly (Indian Institute of Science, Bangalore, India), Dr. G. Leising (Institute for Solid State Physics, T.U., Graz, Austria) and Dr. F.C. Matacotta (Istituto per la tecnologia dei materiali metallici non tradizionali, Milan, and ICTP), with the co-sponsorship of the Direzione Generale per la Cooperazione allo Sviluppo (Ministry of Foreign Affairs, Rome, Italy), Consorzio Interuniversitario Nazionale per la Fisica della Materia (INFM, Italy), and the Kuwait Foundation for the Advancement of Sciences.

Lectures: Structural aspects of HTS cuprates. Transport properties in the normal and superconducting states. Flux response of the superconducting state. Thermal transport in ceramic superconductors. Topological pinning in [illegible] superconductors. Anisotropic superconductors. Topological pinning in ceramic superconductors. Anisotropic melting and softening of the vortex structure in $Bi_{2.1}Sr_{1.9}Ca_{0.9}Cu_2O_{8+\delta}$. A survey of HTSC research activity at ICMAB (CSIC). Properties of the Zn doped high-T_c oxides. Relationship between structure and charge transfer in $Ln_{1+x}Ba_{2-x}Cu_3O_y$ solid solutions: X-ray Rietveld and IR spectroscopy analysis against conductivity measurements. Chlorine incorporation in $La_{2-x}Sr_xCu_{4-\delta}$. Experimental activities with high T_c superconductors in the low Temperature Laboratory of the Institute of Solid State Physics in Sofia. Recent developments in Raman spectroscopy of 123 compounds: electronic scattering, cation substitution,

hydrogenation. Work on high temperature superconductors at the University of Hyderabad. Dynamic magnetic measurements related to flux-pinning. Magnetic flux structure in HTS. Granular behaviour of high temperature superconductors. IR optical properties of high temperature superconductors. Characterization of HTS materials by NMR and EPR techniques. Transport properties of Y-Ba-Cu-O type superconductors — polycrystalline samples and large single crystals. Variation of T_c and transport properties with carrier concentration in Y- and Pb-doped Bi-superconductors. Critical current and their physical problems in high T_c oxide superconductors. The thermal conductivity investigations of high T_c superconductors. Normal-state specific heat of cuprate superconductors. Thin films and tunnelling in HTS. Photomodulation and photoluminescence spectroscopies of HTS. High T_c superconductor thin films: deposition by pulsed excimer laser ablation and processing for realization of device features. Sample preparation of C-axis oriented film of high T_c phase Bi-Sr-Ca-Cu-O compound and study the magnetoresistive transition of these samples. High temperature superconductors — the point of view of electron-lattice coupling mechanisms. Some characteristics of Bi-containing superconductors. A dynamic-mechanical investigation for the flux-pinning during magnetion process.

The Workshop was attended by 66 lecturers and participants (51 from developing countries).

Title: FIRST INTERNATIONAL SCHOOL ON COMPUTER NETWORK ANALYSIS AND MANAGEMENT, 3 - 14 December 1990.

Organizers: Dr. A. Nobile (International School for Advanced Studies, SISSA, and ICTP, Trieste, Italy) and Dr. F. Liello (Istituto Nazionale di Fisica Nucleare, INFN, Italy), in co-operation with Regione Autonoma Friuli-Venezia Giulia (Italy).

Lectures: Communication links telephone lines, packet switching networks. COSINE/RARE. Introduction to computer networks. Network planning and management: a case study. HEPNET. Super Janet. NJE-RSCS and their managements. Decnet structure and management. SNA basics. EARN. Electronic mail: structure of the network. The TCP-IP protocol suite. EUNET. Communication links telephone lines: satellite lines. UUCP. Services available on the network. Structure and management of mail routing programmes.

The School was attended by 64 lecturers and participants (41 from developing countries).

Workshop on Earthquake Sources and Regional Lithospheric Structures from Seismic Wave Data, 19 - 30 November 1990.

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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 Dr. A.M. Hamende, Scientific Information Officer.