No. 2
November 1985

INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

NEWS FROM ICTP

P.O. Box 586
I-34136 TRIESTE
Italy

1985 Miramare Trieste

Tel.: 22401
Cable: CENTRATOM
Telex: 460392 ICTP I

N E W S F R O M T H E I C T P

Allocation of offices to all scientists working at the ICTP has been a difficult task, especially during the summers, until 1984. Fortunately, since April 1985, the ICTP rents the Adriatico Palace, a hotel within walking distance from the main building, providing not only for lodging but also for some offices for scientists, lecture facilities and a cafeteria. The finance, travel and housing Staff, previously based at the Galileo Building, has moved to the Adriatico. A small scientific library with the most frequently-used periodicals is set up there as well. The total bed capacity available to the ICTP for its visitors is now of the order of 300, including 100 beds from the Galileo Building. As yet, the Tests of Electroweak Physics, Polarized Processes and Other Phenomena, the Summer Workshop in Condensed Matter Physics, the Sixth Trieste International Symposium "Fractals in Physics", the Working Party on Mechanical Properties, the 7th Trieste International Symposium "Hopping Transport", the Topical Meeting on Phase Space Approach to Nuclear Dynamics, the 3rd Trieste College on Microprocessors: Technology and Applications in Physics and the College on Representation Theory of Lie Groups have been held at the Adriatico Hotel.

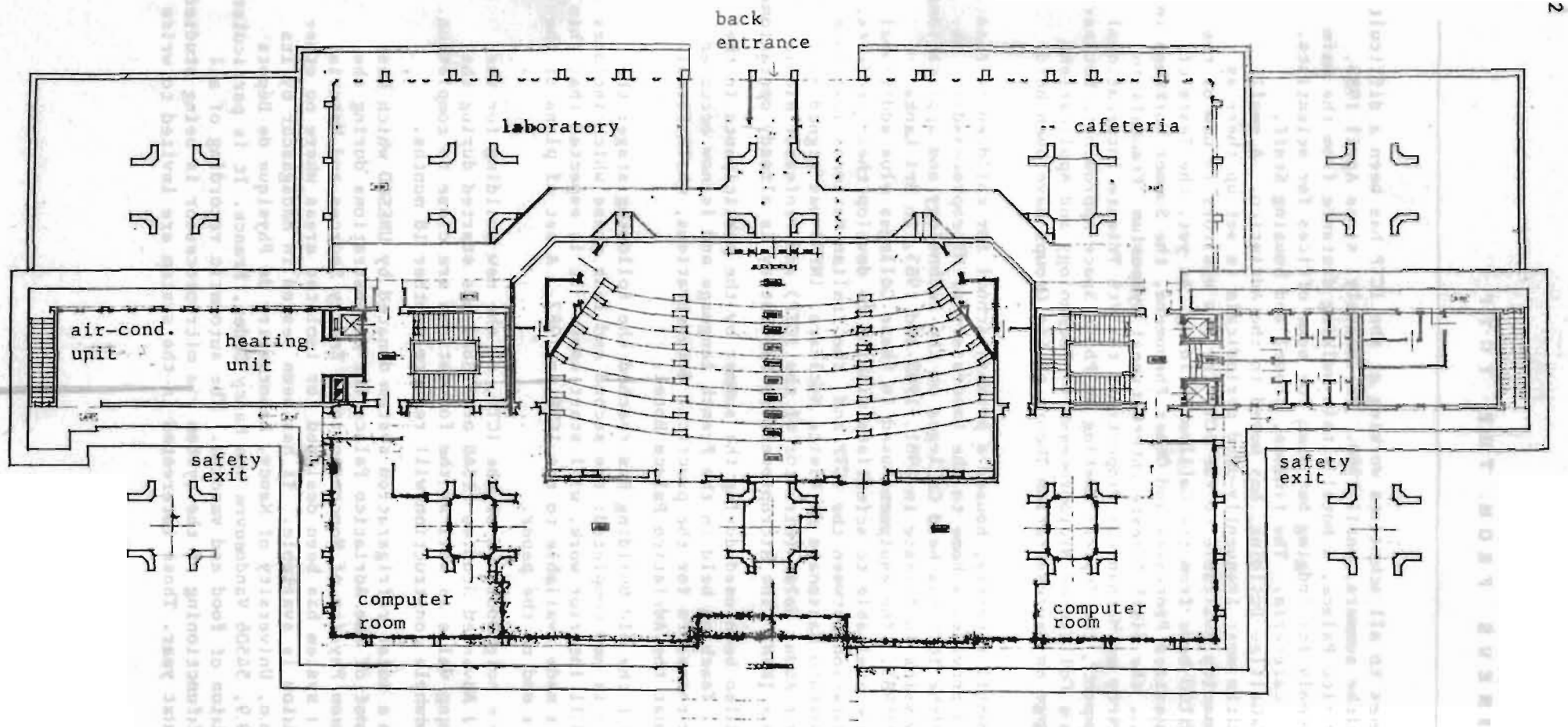
A building which, until recently, housed a primary school for children is also rented by the Centre and provides a home to the Laboratory of Microprocessors. As some readers will know, the ICTP has held Colleges on the technology and applications of microprocessors in physics in Trieste in 1981, 1983 and 1985, in Sri Lanka in 1984 and in Colombia in 1985. The equipment used in these Colleges plus additional acquisitions will be made available to scientists wishing to develop their projects. An agreement for collaboration between the ICTP and the Italian National Institute for Nuclear Physics (Istituto Nazionale di Fisica Nucleare, INFN) was signed on 7 October 1985 by Professor Abdus Salam (Director of the ICTP) and Professor Nicola Cabibbo, President of the INFN. The Microprocessors Laboratory is already operational.

This building has also been used during the summer by the participants in the Summer School in Physics Teaching held in the French language and is now occupied by the College on Microprocessors for the practical demonstrations, while formal lectures are being held at the Adriatico Palace Hotel.

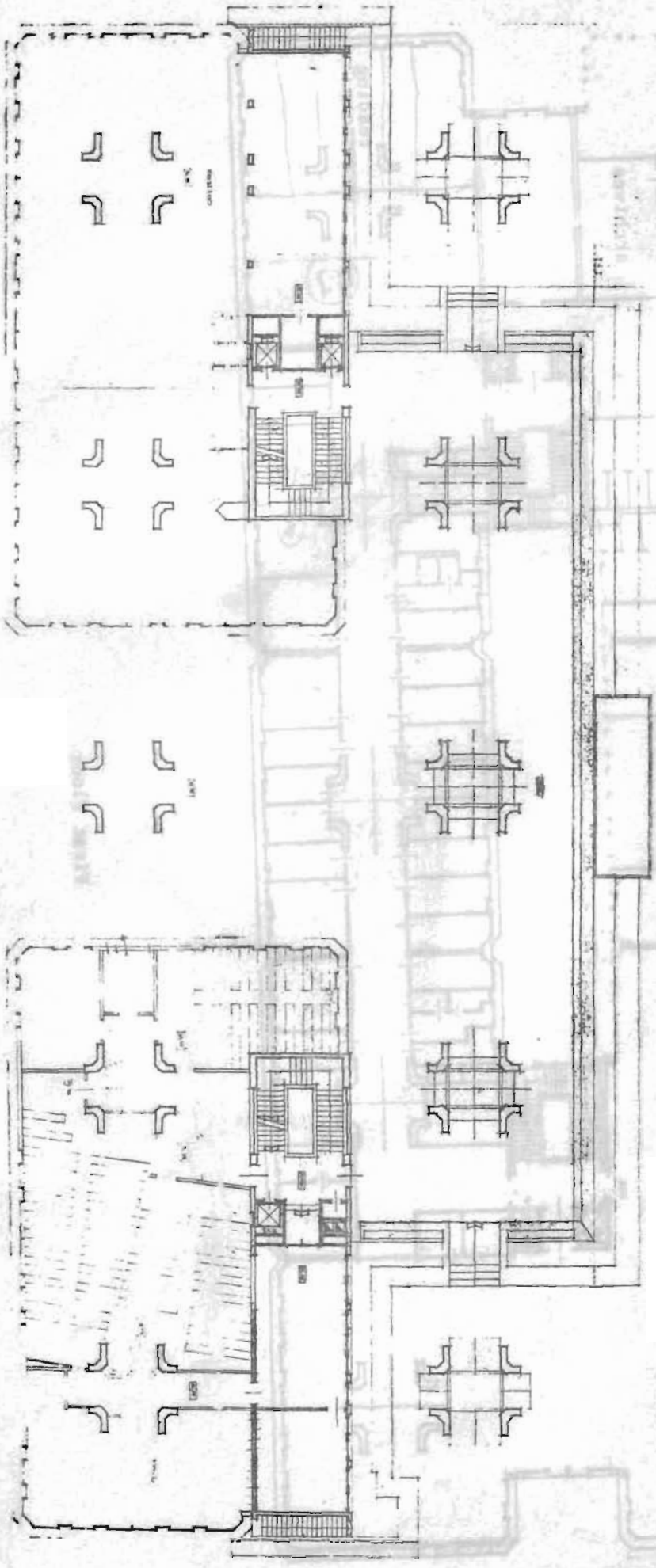
The 'duplication' of the old building has reached the following stage: the structure up to the roof is now completed; the second and last phase which includes the internal walls and all interior work, will start soon. It is expected that this additional space will be made available to the ICTP in 1987. A set of plans of the building is shown at the end of the paper.
additional space will be made available to the ICTP in 1987. A set of plans of the building is shown at the end of the paper.

The erection, in the neighbourhood of the ICTP, of the new building for the International School for Advanced Studies (ISAS or SISSA) has started during the spring. As yet, retaining walls as well as the foundations are close to completion. It is expected that the whole construction will require another 18 months.

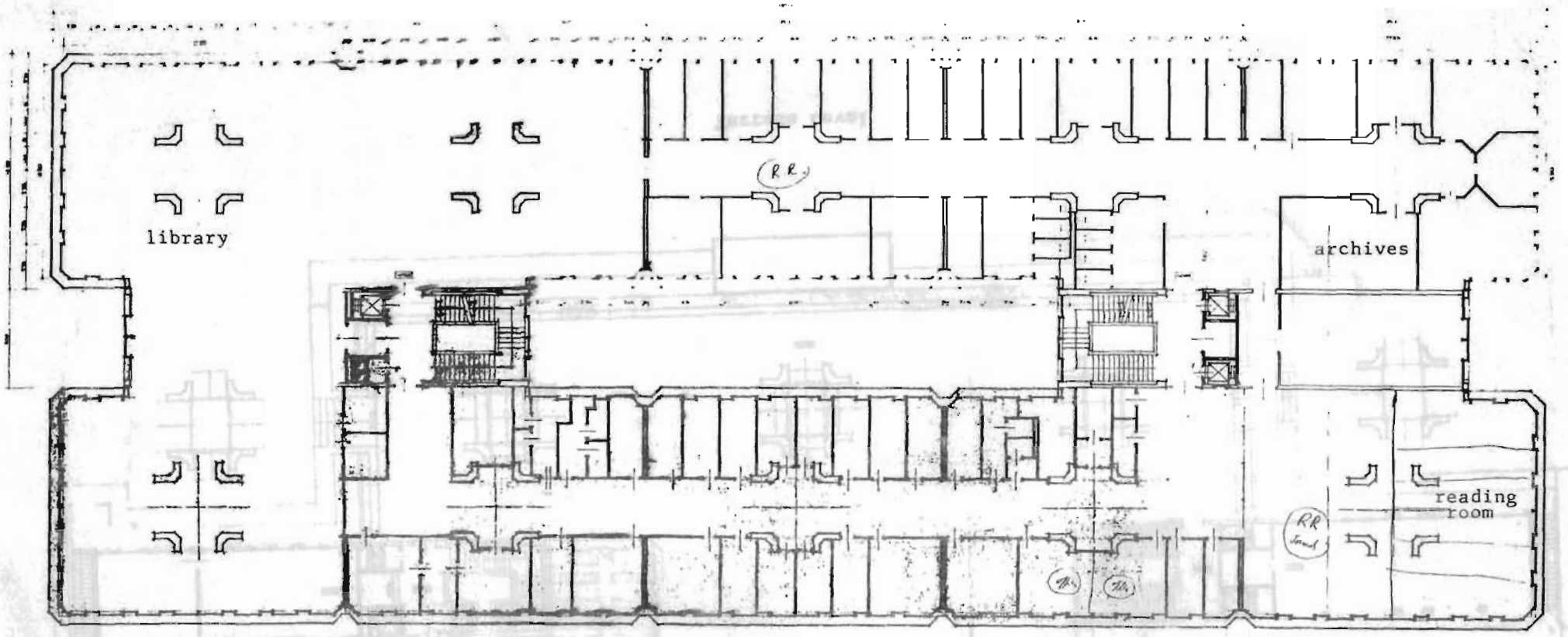
Another novelty is a solar refrigeration system donated by UNESCO which has been installed on the roof of the Adriatico Palace for demonstrations during the Conference and Workshop on Physics of Nonconventional Energy Sources and Material Science for Energy. The system has been designed for isolated areas where no other source than solar radiation is available. It has been tested in Madagascar by its designer Prof. J. Flechon, University of Nancy, Laboratoire de Physique de Dépots Métalliques, B.P. No. 239, 54506 Vandoeuvre Les Nancy Cedex, France. It is particularly useful for the conservation of food and vaccins. The automatic recording of all data characterizing the functioning of the system via microprocessor is being studied and will be installed next year. Those interested in the system are invited to write to Professor Flechon.



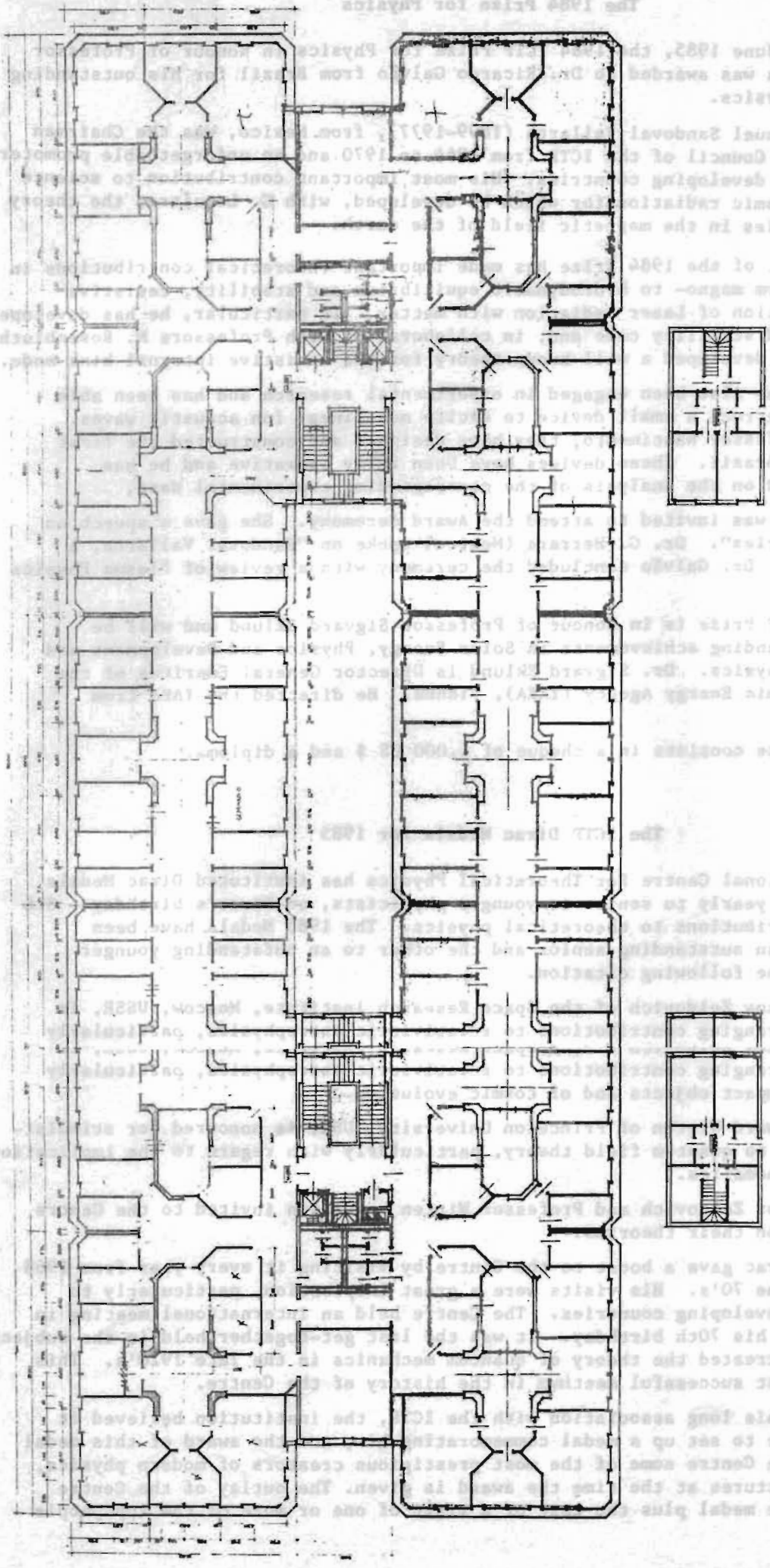
Ground Floor



Terrace Level



First Floor



Second Floor

The 1984 Prize for Physics

On Friday 7 June 1985, the 1984 ICTP Prize for Physics in honour of Professor Sandoval Vallarta was awarded to Dr. Ricardo Galvão from Brazil for his outstanding work in Plasma Physics.

Professor Manuel Sandoval Vallarta (1899-1977), from Mexico, was the Chairman of the Scientific Council of the ICTP from 1964 to 1970 and an unforgettable promoter of science in the developing countries. His most important contribution to science is his work on cosmic radiation for which he developed, with G. Lemaître, the theory of charged particles in the magnetic field of the earth.

The recipient of the 1984 Prize has made important theoretical contributions in fields ranging from magno- to hydrodynamic equilibrium and stability, resistive modes and interaction of Laser radiation with matter. In particular, he has developed an equilibrium and stability code and, in collaboration with Professors M. Rosenbluth and B. Coppi, has developed a well-known theory for the resistive internal kink mode.

Dr. Galvão has also been engaged in experimental research and has been able to design and construct a small device to excite non-linear ion acoustic waves. Together with Professor Nascimento, they have designed and constructed the first Tokamak built in Brazil. These devices have been fully operative and he has intensively worked on the analysis of the corresponding experimental data.

Ms. Vallarta was invited to attend the Award ceremony. She gave a speech on "Trieste, my memories". Dr. G. Herrera (Mexico) spoke on "Sandoval Vallarta, a man of his time". Dr. Galvão concluded the ceremony with a review of Plasma Physics in Brazil.

The 1985 ICTP Prize is in honour of Professor Sigvard Eklund and will be awarded for outstanding achievements in Solar Energy, Physics and Development and other fields of Physics. Dr. Sigvard Eklund is Director General Emeritus of the International Atomic Energy Agency (IAEA), Vienna. He directed the IAEA from 1961 to 1981.

The ICTP Prize consists in a cheque of 1,000 US $ and a diploma.

The ICTP Dirac Medals for 1985

The International Centre for Theoretical Physics has instituted Dirac Medals which are awarded yearly to senior or younger physicists, on Dirac's birthday - 8th August - for contributions to theoretical physics. The 1985 Medals have been awarded - one to an outstanding senior and the other to an outstanding younger physicist, with the following citation.

Professor Yakov Zeldovich of the Space Research Institute, Moscow, USSR, is honoured for far-ranging contributions to relativistic astrophysics, particularly in theories of compact objects and of cosmic evolution.

Professor Edward Witten of Princeton University, USA, is honoured for stimulating contributions to quantum field theory, particularly with regard to the implication of new kinds of anomalies.

Both Professor Zeldovich and Professor Witten have been invited to the Centre to give lectures on their theories.

Professor Dirac gave a boost to the Centre by visiting it every year from 1968 till the end of the 70's. His visits were a great inspiration, particularly to physicists from developing countries. The Centre held an international meeting in 1972 to celebrate his 70th birthday. It was the last get-together held in the subject of those who had created the theory of quantum mechanics in the late 1920's. This was one of the most successful meetings in the history of the Centre.

In view of this long association with the ICTP, the institution believed it would be desirable to set up a medal commemorating him, and the award of this medal would bring to the Centre some of the most prestigious creators of modern physics, who would give lectures at the time the award is given. The outlay of the Centre is the cost of the medal plus the cost of a visit of one or more of the top people in the subject.

The Award is announced on Dirac's birthday - 8 August - and a selection committee is constituted each year. The selection committee for 1985 consisted of: Stig Lundqvist, Göteborg University; Robert Marshak, Virginia Polytechnic; Abdus Salam, ICTP, Trieste; Julian Schwinger, University of California, Los Angeles; Leon Van Hove, CERN, Geneva and Steven Weinberg, University of Texas, Austin.

Meeting of the Society for International Development (SID)

From 18 to 20 January 1985, the ICTP hosted the third meeting of the SID Chapter Leaders. SID was created in Washington in 1957 with the objective of contributing to the industrial and economic take-off of the developing countries and to the North-South collaboration following the guidelines of the United Nations. SID has recently become a consultative body to the European Economic Community. The ICTP was chosen as the venue for the meetings because it offers a concrete example of collaboration between the North and the South. In the meeting, thirty SID Chapter Leaders reviewed the activities of the Society and, in particular, discussed the new approach of Europe to the solution of the problems affecting the Third World in five sessions. Some of the speakers were Professor Abdus Salam Director of the ICTP, Dr. Y. Berthelot (France), President of SID, Prof. P. Budinich, Director of SISSA and Chairman of the SID Trieste Chapter and Prof. Emmerij (The Netherlands), Rector of the Institute for Social Studies, The Hague. The Address by Professor Abdus Salam is given below.

The address of SID is: SID, Palazzo della Civiltà del Lavoro, EUR, 00144 Rome, Italy. The report on the meeting is available from: Assessorato del Friuli Venezia Giulia per lo Sviluppo Internazionale, Chapter of the Society for Industrial Development, Strada Costiera 11, 34136 Trieste, Italy.

Address of Professor Abdus Salam to the Participants in the Meeting of the SID Chapter Leaders

On behalf of the Society's chapter of the Friuli-Venezia-Giulia region, it is a very great pleasure for me to welcome the European meeting of the Society for International Development to the International Centre. Trieste is a town which has taken upon itself the tasks of helping with international development through Science, particularly in the developing countries. Since bringing about an awakening to the role of Science in development is also one of the major aims of the Society, I am appreciative that the Society chose to meet here at the Centre in Trieste. This meeting will acquaint our guests with the initiatives Trieste is taking in this regard, with the Government of Italy's active help, and with UN participation through this Centre. We are privileged to welcome 1000 scientists every year from developing countries in all disciplines of Physics - pure and applied, as well as the proposed UNIDO Centre. On our side, it will no doubt give our assembled scientists newer perspectives in the tasks of development in our countries.

There is no question but that the developing world is in a terrible situation at present. The disaster of the Ethiopian famine is merely a symbol of this. There are other indicators equally dire at which one may point. Take peace and security; since the end of World War II, there have been 110 conflicts in the world, almost all of them fought on the soils of the developing countries. At the present time, 12 such conflicts are raging, almost all in the Third World, with at least half of them with direct or indirect involvement of the Super Powers. The loss of security and the misery these conflicts entail can be gauged even at a Centre such as this, which devotes itself to pursuit of physics. Frequently we are called upon to welcome scientific refugees from these countries in which these wars are being fought. And then there is the economic bankruptcy of the Third World, brought about not because of our countries' profligacy, but principally because of any lack of progress on ideas to which this Society has made fundamental

contributions - like the New International Economic Order with its insistence on fair prices for developing countries' commodities . Altogether, the developing world is a very unhappy place to live in.

You have assembled to discuss today what role Europe can play in alleviating some of these problems. In this respect, I personally have a number of roles; first, as a citizen of a developing country; second as directing a United Nations institute of Science designed for developing country scientists which is situated in an oasis of peace and tranquillity in Europe, through the generosity of a hospitable country and a hospitable town; and thirdly as a member of a European chapter of SID. Thus, whereas on one hand, I must highlight the achievements of Europe and Italy in particular in respect of assisting development, I will also be frank and critical from the point of view of the developing countries and their perceptions of Europe's role.

There is no question but that some of the individual European nations have impressive records of help to, and have distinguished themselves by displaying a real feeling for, developing countries. To take one index of this in terms of aid, Norway, Holland, Sweden, France and Denmark already exceed the .7% target, recommended by the United Nations, with Belgium reaching .6% and West Germany reaching .5% . There are countries which have not attained this target (or they once did and are now falling behind), like Britain with .35, Switzerland .31, Italy .24, Austria .24, But even the last two countries (Austria and Italy) - which started only recently - reach the figures registered by USA with its present .24%. (Recall that at the time of the beginning of the Marshall Plan the US was giving an aid amount of 2.79% of GNP.)

But notwithstanding this commendable generosity, forgive me for saying this: When one hears of the scandal of the grain surplus either accumulating at mountaineous cost to European tax-payers and then being made available to some Eastern European countries for feeding their cattle, when one hears of Europe not putting its political weight behind correcting the imbalance of commodity versus industrial prices, one gets the perhaps wholly unjustified perception from developing countries of the passivity of European help - at the least, of not thinking about these issues in a coherent manner. I mentioned farm surpluses which bankrupt EEC. The other side of the coin is that 500 million people on this earth (1 in 9) are severely malnourished; 1/4 million children will die this week from diseases related to malnutrition, while a third of the world's food grains - 450 million tons - are fed to livestock to provide high protein food for the lucky few. In this respect, I may be permitted to quote the EEC Court of auditors itself as quoted in the "Economist" of London this week. This Court has severely criticised the administration of humanitarian aid from EEC. According to the Economist, in their 1983 financial report, they bluntly state that aid frequently arrives late or at the wrong time. "By the end of December 1983, some of the countries in greatest need of aid (Tanzania, Zambia, Ghana, Somalia, Sri Lanka and Madagascar) had not received any of the aid promised to them under the 1983 programme. Altogether, only 42% of the cereals, 36% of the milk powder and 26% of the butter oil the commission had intended to send was actually delivered".

I have started with these critical remarks on matters which are economic or political - both areas where I have no particular expertise. Forgive me for bringing them up; but I shall now turn to my proper sphere, as a scientist, and concentrate on science-related problems. The plea I wish to make is in respect of Europe taking a concrete lead in building up of scientific infrastructure of developing countries.

I do not have to tell this audience of the value of harnessing science and technology to the problems of development. There is no question but that the modern interdependent world and most of its problems have basically been brought about by the physicist who created the communications systems and by the chemist and the biologist who created the penicillin and fertiliser

revolutions. There is no question but that the developing world's problems can only be resolved by harnessing and investing in science and technology.

Now Science and Technology do need investment for their deployment. But first and foremost they need scientists and technologists - trained scientists and technologists. There is, however, scant movement to build up trained scientific communities in our countries. Even worse, while the need for technologists is recognised, the need for scientists and for science transfer is not even appreciated in the developing world. Thus, barring a few of its countries - Argentina, Brazil, China and India - the third world, despite its recent realization that science and technology are the sustenance, and its major hope for economic betterment, has taken to science - as contrasted even to technology - as only a marginal activity. I would not bring this point up today, but it happens to be true of the aid-giving agencies of the richer countries, of the agencies of the United Nations and also, unfortunately, of the scientific communities of the developed countries which might naturally have been expected to be the third world scientists' foremost allies in this crusade for more science.

Why am I insistent that science in developing countries has been treated as a marginal activity? Two reasons:

Policy makers, prestigious commissions (like the Brandt Commission), as well as aid-givers, speak uniformly of problems of technology transfer to the developing countries as if that is all that is involved. It is hard to believe but true that the word "science" does not figure in the Brandt Commission report. Very few within the developing world appear to stress that for long term effectiveness, technology transfers must always be accompanied by science transfers; that the science of today is the technology of tomorrow and that when we speak of science it must be broad-based in order to be effective for applications. I would even go so far as to say: if one was being machiavellian, one might discern sinister motives among those who try to sell to us the idea of technology transfer without science transfer. There is nothing which has hurt us in the third world more than the slogan in the richer countries of Relevant Science. Regretfully this slogan was parrotted in our countries unthinkingly to justify stifling the growth of all science.

It is not clearly understood that science transfer is effected by and to communities of scientists. Such communities (in developing countries) need building up to a critical size in their human resources and infrastructure. This building up calls for wise science policies, with long-term commitment, generous patronage, self-governance and free international contacts. Further, in our countries, the high-level scientist must be allowed to play a role in nation-building as an equal partner to the professional planner, the economist and the technologist. Few developing countries have promulgated such policies; few aid agencies have taken it as their mandate to encourage and help with the building up of the scientific infrastructure.

In my remarks, I wish to concentrate on just this one problem. I wish to suggest that one sphere of action for Europe is to place emphasis on the building up of scientific infrastructure in their aid policies and also to create institutions for developing countries on the lines of what the Government of Italy has done in supporting this Centre for Physics or the UNIDO Centre for Biotechnology.

To illustrate my remarks, I will mainly be concerned with the new areas, not adequately covered so far, concerning the sciences of energy and scientific ecology. The need and value of creating institutions for scientific training and research in these disciplines is well recognised. For example, Dr. Henry Kissinger, as US Secretary of State in 1974, committed the US Government to setting up a multiciplicy of institutions to meet the needs of cooperative world development. Two of these were:

1. A "Development Security Facility" to stabilise prices of commodities against crude cycles of export earnings though "indexing" was decisively ruled out;

2. Measures to improve access to capital technology and managerial skills - and in particular an International Energy Institute, an International Centre for Exchange of Technological Information and an International Industrialization Institute.

He prefaced the need for such institutes by the remark "Over the remainder of this century, ... the division of the planet between north and south could become as grim as the darkest days of cold war. We would enter an age of festering resentment, of a resort to economic warfare, a hardening of new blocks, the undermining of cooperation, the erosion of international institutions - and failed development".

None of these promises of these Institutes has been kept. I saw Dr. Kissinger in 1983 in Morocco. I reminded him of these promises - particularly the promise in respect of the Energy Institute. He said - Write to me. I did. He graciously acknowledged and that's that.

Why I am stressing the role of one or more Energy Institutes? Every economist knows that the less developed countries with 3/4 of the world population consume only 12% of the world's supply of energy, while the developed countries with 1/4 of its population consume 80% of the total. And this imbalance is increasing with the fuel prices escalating. During President Carter's days, the US started to emphasise non-conventional energy research for the US. A by-product would have been provision of research for energy needs of developing countries also. A UN Conference was held in Nairobi but, this Conference notwithstanding, to my knowledge there still does not exist any International Centre for Energy Research and Training on the scientific side for developing countries and their scientists. What is needed is a Centre which should emphasise basic hard Science in this area. To quote the London "Economist" again; in its issue of 27 September 1980, it had this to say on the subject: "If solar energy is to provide the solution to the world's fuel crisis, that solution will not emerge from low-technology roof-top radiators. A breakthrough (will) come from applying quantum physics, biochemistry or other sciences of the 20th century. Today's technology-based industries all depend on new science".

biochemistry or other sciences of the 20th century. Today's technology-based industries all depend on new science".

Thus, without a good base in solid state and material sciences, there is no hope whatsoever of making good. An optical convertor must make use of as little material as possible; how little is determined by the penetration depth of the solar light and drift length of the excited state on which the conversion is based. For an amorphous material this depends on the density of defects and an understanding of these. Efficient and cost-effective photovoltaics thus depend on physics of solid state materials and not on a technologist's tinkering. To fill <u>part</u> of the need, the Trieste Centre has felt that it should develop and concern itself with high-level physics of energy-related materials, and in particular, with physics of absorbing and emitting surfaces. So far our Colleges in this field have had participation of around 1000 physicists. But Colleges every second year are no substitute for a full-fledged Energy Institute for developing countries.

I would like very much a Worldwide Institute for Energy, for solar energy, for photovoltaics and the like - to be one of the priority items to be created by European action.

The second area in which I would like to see action on the scientific front is in ecology and, in particular, in the area of climate studies. I do not know whether practically one can hope to change the climate; but surely it is a scandal that there is no scientific study of the climate of the Sahelian area over a long-term period. The universities in these regions have their Physics and Meteorological Departments but these Departments are weak, ill-organized and without any funds. They should be made stronger. We at this Centre are trying to take steps to ameliorate this situation but once again, this will be one among the many subjects studied here. I would wish for a new European organisation devoting itself to raising the scientific standards of the disciplines concerned.

Another area in which action is needed is the one highlighted by the International Union of Pure and Applied Chemistry in the field of fertilisers. As we all know, the total world population by the end of this century will have grown from 4 to 6 billion people, while the world's area under agriculture will increase only by 4%. In December 1982 in the Philippines, 600 topranking chemists of the world met and drew up a plan of action where chemistry could be utilised to raise the food productivity through chemical inputs in 15 years - by the year 2000 to increase world food productivity by 5%. A number of world institutes for teaching, training and research of chemists from the Third World were to be created. To my knowledge, no start has yet been made.

Continuing with ecology and considering the steady cutting down of the tropical forests, proceeding now at 2% of the forest per annum for firewood or for agricultural land, one of the anticipated disasters is the annihilation of a large fraction of species and organisms which inhabit these forests. Approximately 1.5 million kinds of organisms have been named and classified, but these include only about half a million from the tropics.

Many tropical organisms are very narrow in their geographical ranges and are highly specific in their ecological and related requirements. Thus, tropical organisms are unusually vulnerable to extinction through disturbance of their habitats. More than half of the species of tropical organisms are confined to lowland forests. In most places, these forests will be gone within the next 20 - 30 years; and with them most of the 3 million of these organisms.

With the loss of organisms, we give up not only the opportunity to study them, but also the chance to utilise them to better the human condition, both in the tropics and elsewhere. The economic importance of wild species, a tiny proportion of which we actually use, has been well documented. Suffice to say that the entire basis of our civilization today rests on a few hundred species out of the millions that might have been selected, and we have just begun to explore the properties of most of the remaining ones.

The process of extinction cannot be reversed. Its effects can, however, be moderated by finding the most appropriate methods of utilising the potentially sustainable resources of tropical countries for human benefit. The explicit relationship between conservation and development was well outlined in the World Conservation Strategy, issued jointly in 1980 by the International Union for the Conservation of Nature and Natural Resources, the World Wildlife Fund and the United Nations Environmental Programme.

In a recent issue of the "Bulletin of Atomic Scientists", P.H. Ravan has argued that if the West cannot find the means to eliminate real poverty in the ecologically devasted areas, the people living there will topple any Government; be it friendly or unfriendly! Thus, according to him, it is no coincidence that El Salvador is ecologically the most devastated of all countries of Central America and yet "the authors of the Kissinger Report pay no attention to the ecological problems which force peasants to shift to and destroy permanently, through cutting of forest cover, the productivity of their marginal lands". One may in this context ask if it is not the concern of the environmental groups also in the developed countries - of Europe - to

help to preserve this global heritage? Should they not come to the rescue of the developing countries? Should this type of global assistance not be a first charge on the International communities? Can Europe take a lead in this?

I have given you a few examples of scientific global tasks; they could be multiplied, of the need for newer institutions, newer training and research bodies, newer ecological, and scientific organisations. As I asked before; can we recommend that Europe take a lead in projecting such organisations?

While we are dreaming and speaking of such global tasks, not necessarily scientific, let me conclude by mentioning Masaki Nakajima's "Dream for Mankind". He has listed global super-infrastructure projects which may constitute elements of a "Global New Deal"; the implementation by the richer nations of the superprojects would lead to stimulation of constructive demand in manufacturing industries, as well as technological incentives, in lieu of arms production. Hopefully, this would be accompanied by increases in GNP and employment opportunity both in developing and developing countries. According to Nakajima , "Now is the time for mankind to exert a bold, new and brave, long-range vision, a vision which transcends narrow short term national interest... As the prophet King Solomon said in the Bible: "Where there is no vision mankind perishes".

As the great religions of the world teach us, in the end the most potent human actions stem from man's ethical sense. I am a firm believer in man's moral and spiritual state and I shall conclude with the words of a European mystic who thus expressed the international ideal of Family of Man in the 17th century - John Donne - "No man is an island, entire of itself; every man is a piece of the continent, a part of the main; if a clod be washed away by the sea, Europe is the less, as well as if a promontory were, as well as if a manor of thy friends or of thine own were; any man's death diminishes me, because I am involved in mankind; and therefore never send to know for whom the bell tolls; it tolls for thee."

Name	Nations (Areas) Involved	Outline of Proposal
1. Greening of deserts	North African Nations and Arab States	Greening of the deserts in the Sinai and the Arabian peninsula
2. Collection station for solar heat		Erect a large-scale installation for the collection of solar energy in a remote part of the World. Total investment in land, pipelines, and ment in land, pipelines, and accessory equipment would reach $20 to $50 trillion. Its total annual output would be equivalent to 200 billion barrels of oil.
3. Electric power generation using sea currents		There are 12 promising areas along undeveloped ocean shores extending from the equator to the temperate zones. Maximum generating potential of one area, 35 million kW. Total for 12 areas about 200 million kW.
4. African central lake	Central African nations	Control the flow of the Congo River by building a dam to create a vast lake in Congo Chad regions of Central Africa to improve natural conditions in the area.

Conference on South-South and South-North Cooperation in Sciences
Trieste, 5 - 10 July 1985

"All honour to science which explores the Universe and solves its mysteries. All honour to it as it examines the constitution of life. All honour to it as it elucidates the working of the mind-body organism. All honour to it as it seeks to alleviate pain. All honour to it as it enlarges the providence of the earth and all honour to it as it ensures better communications between human beings and societies".

With these words, the United Nations' Secretary General, Mr. J. Pérez de Cuéllar, opened, on 5 July 1985, the Conference on South-South and South-North Cooperation in Sciences in the Lecture Hall of the International Centre for Theoretical Physics (ICTP) of Trieste (Italy). This conference was organized by the Third World Academy of Sciences, in order to bring together, for the first time ever, representatives of Science Academies and Research Councils of the Third World along with the representatives of Science Academies in Industrialized Countries, to discuss the problems of development of Sciences in the Third World and to examine various modalities of South-South and South-North collaboration in this regard. Participation was by invitation only.

The specific objectives of the Conference were as follows:

- To identify various science projects in which South-South and South-North cooperation is most profitable, and to examine possibilities of finding financial support for such projects.
- To strengthen cooperation among Science Academies and Research Councils of the South and to promote their role in the development of science in the Third World.
- To strengthen cooperation between Academies of the South and Academies of the North.
- To identify high-level scientific research performed by Third World scientists as a modality of South-North cooperation in the advancement of science.

After the speech of Mr. Pérez de Cuéllar, the first Secretary General of the United Nations who ever came to Trieste, the President of the Third World Academy of Sciences (TWAS), Prof. Abdus Salam (Pakistan), Nobel Laureate for Physics and Director of the International Centre for Theoretical Physics (ICTP), gave the floor to Dr. Hans Blix, Director General of the International Atomic Energy Agency (IAEA), Prof. I. Kaddoura, Assistant Director General of UNESCO, Mr. A.R. Khane, Secretary General of UNIDO, Sir Director General of UNESCO, Mr. A.R. Khane, Secretary General of UNIDO, Sir John Kendrew, President of ICSU and Prof. Fermin A. Bernasconi, Director General of the Intergovernmental Bureau for Informatics (IBI).

One of the most important achievements of the Conference was that participants shared the experience of others from different regions of the world, in a variety of local problematics and in different environments. Much information was given by the UN Agencies, by the World Bank, Governmental Agencies in industrialized countries, by ICSU and other scientific unions and many other organizations and, in particular, on international scientific networks and on existing and proposed regional centres for science. Proposals in relation with the future role of the Third World Academy of Sciences was put forward by the African, Arab, Asian and Latin-American working groups. Other groups met and discussed the possible collaboration with TWAS in the framework of their scientific disciplines. The study-groups covered the following: (a) agricultural, chemical, biochemical and nutritional sciences, (b) biological and medical sciences, (c) physical and mathematical sciences and (d) earth and environmental sciences. Their recommendations, which all aim at building up science communities in developing countries, will be considered by TWAS.

The programme of lectures covered a wide range of subjects under the following headings: South-South Cooperation - Problems and Modalities; Modalities of South-South Cooperation through Academies and Science Councils for Developing Pure Science and Science in Application; the Role of International Organizations and Science Foundations in Building-up Science in the South; the Role of International Networks; the Role of existing Science Centres and Newly-Proposed Ones; the Role of High-Level Scientific Manpower in Developing Countries. Other lectures were held on science and culture, science, technology and development.

In his concluding remarks at the last session of the Conference, the president of TWAS, Professor Abdus Salam, invited the Academies and Research Councils of the South to persuade their Governments to value science, and the Academies of the North to help their colleagues in the South in a purposeful manner. TWAS will do whatever it can possibly do within the limits of its financial resources.

The Conference was attended by 234 delegates from Academies and Research Councils from the following countries:

Algeria	Gabon	Libya	Switzerland
Argentina	Germany, FR	Madagascar	Syria
Austria	Ghana	Malaysia	Tanzania
Bangladesh	Guatemala	Morocco	Thailand
Belgium	Honduras	Nepal	Togo
Bolivia	India	Nigeria	Tunisia
Brazil	Indonesia	Norway	Turkey
Burkina Faso	Iraq	Pakistan	United Kingdom
Cameroon	Italy	Peru	Uruguay
Canada	Ivory Coast	Portugal	USA
China	Japan	Saudi Arabia	USSR
Colombia	Jordan	Singapore	Venezuela
Congo	Kenya	Spain	Viet Nam
Cuba	Korea DPR	Sri Lanka	Yugoslavia
Egypt	Korea Rep.	Sudan	Zimbabwe.
France	Kuwait	Sweden	

The proceedings of the Conference will be published by the World Scientific Publishing Co. in Singapore in early 1986.

The address of the Secretary General of the United Nations as well as the concluding remarks by the President of the Third World Academy of Sciences are given below.

Opening Address
by Mr. J. Pérez de Cuéllar

Professor Salam, Distinguished Academicians, Ladies and Gentlemen,

It is a great pleasure for me to open this meeting of the Third World Academy of Sciences. Standing before this distinguished gathering, I feel a sense of contact with the scientific leadership of the developing countries. This is an exhilarating experience for me.

No one who is familiar with the situation of underdevelopment is Asia, Africa and Latin America and aware of its roots can question the proposition that what the Third World needs is not only economic and social transformation but also an intellectual renovation. The key to it lies in the cultivation of the sciences, of course, but the pursuit will remain uncertain if there is not a regrowth of the scientific spirit combined with a sense of human values. I am, therefore, deeply appreciative of the opportunity you have given me to address this meeting. What I am going to say will be in general terms, advisedly; I have too much regard for your independence as scientists to want to impinge on it by imposing a bias on your discussions.

Even though we are gathered here in a Third World context, I remain conscious of the fact that Science as such has no national affiliation. The supposition that only a specific cultural tradition is conductive to science finds no support in historical evidence. The history of science, indeed, involves the history of diverse civilizations. From the time of the Babylonians through Greece, China, India and the Arab-Islamic civilization to the modern age, the scientific enterprise has shown no dependence on any particular cosmology or social system. In choosing your vocation, therefore, you have become citizens of the world, cosmopolitan in outlook but, mentally and spiritually, you have not migrated from you own societies.

As far as science is concerned, the important distinctive feature of modern times is not to my mind the emergence of something that did not exist before. It is, rather, the systematic organization of the scientific activity. As a result, what was formerly episodic has become continuous and cumulative. This seems to have a dual effect on the practitioner of science. It both circumscribes and enriches him. Within the world of science, the scientist does not enjoy the kind or degree of autonomy that disciplines like philosophy or poetry confer upon their practitioners. The poet of the philosopher is much less subject to pressures: he can carve out his own domain and the greater his mastery of the craft, the more he will be recognised as sovereign over it.

The scientist, on the contrary, finds his place in a constantly evolving network of research and discovery; he can turn his back on the relevant findings and activities of others only at peril to his pursuit. Furthermore, it is the sheer intellectual challenge of a problem which is the main spur of his activity; while, if he is lucky, the solution is his, the problem at least is suggested by others. Insofar as it is an operative organization, science maintains its own momentum and most scientists are caught in it.

This may be one of the reasons why human priorities sometimes tend to be forgotten in the scientific pursuit. The scientist does not always enjoy the freedom and the mental leisure to stand back and reflect on the question whether or not the solution of the problem which proccupies him will significantly lessen human suffering and enhance human dignity. In saying this, I do not have the slightest intention of denigrating the scientist's sense of social responsibility. Leaders of science themselves bewail the misdirection of science and the misuse of the scientific talent that is represented by the on-going quest for ever more destructive weapons. With the fear and the insecurity it has caused and with the senseless waste of material assets that it inevitably entails, the arms race is a chastening demonstration of the necessity of reorienting the scientific and technological outlook towards the goal of human betterment. It is no doubt a historical fact that the invention of newer weapons of war has absorbed technicians throughout the ages and in all societies. Our age, however, has demonstrated that, when carried too far, it reaches the absurd limit of threatening the very existence of the human species and perhaps even the continued habitability of the planet.

continued habitability of the planet.

I believe that there are three phenomena of the current human situation which should serve as eye-openers about the direction of the scientist's mission. The first is what I just mentioned: the continuous refinement of the technology of destruction. The second is the degradation of the environment and the tension between human society and its natural surroundings. The third is the continued prevalence of poverty, ignorance and avoidable disease in large parts of the world at a time when humanity disposes of enough resources and skills to redress the situation. The last may superficially appear to be an economic and administrative problem but I need hardly labour the point that it does involve a challenge to the scientific community, particularly of the developing countries.

Though these three phenomena are regrettable, they can, if fully appreciated, have the effect of stimulating scientific activity in or for the Third World in the right direction. As we are gathered here, the thought must be uppermost in our minds that the present is a most propitious historical moment for human society to encourage a more purposeful and less indiscriminate use of science and technology. I feel impelled to repeat that the addition of new dimensions to the arms race, the hazards of industrialization without proper care, the pollution of air and water, the depletion of natural resources, the world's food supply lagging behind the growth

of population and the persistence of widespread disease in developing countries - all these bring home the truth to us that we, scientists as well as non-scientists, have to chart a course different from what was taken at a time of exuberance over scientific discovery and invention.

In the world of the imaginative arts, the theory of art for art's sake was discredited long ago. Perhaps in the world of science too, the theory of science for the sake of science should not be allowed to take root. All honour to science which explores the universe and solves it mysteries, all honour to it as it examines the constitution of life, all honour to it as it elucidates the working of the mind-body organism, all honour to it as it seeks to alleviate pain, all honour to it as it enlarges the providence of the earth and all honour to it as it ensures better communications between human beings and societies - but no honour to science which has no compassion and is heedless of man's hope and man's fear: the fear particulary in our age of the whole human species committing suicide.

You, the scientists of developing countries, can play a very influential role in this reorientation. The very fact that you are confronted with illiteracy, poverty and disease in your countries lends its own significance to your activity. I realize that you do not command the facilities that industrialized societies offer to your colleagues. However, you also have certain privileges. The cultural traditions which have originated in the Third World, whatever their strengths and weaknesses, did inculcate respect for learning and scholarship. Because of this and also because of the fact that your smaller number gives you a position of prominence in your own societies often greater than what your peers from developed nations enjoy in theirs. You can wield a powerful influence over the cultural development of your countries. The educative effect of the cultivation of science even on non-scientists can be felt more in countries which have recently embarked on the long process of development. The victories you win in your own chosen spheres can constitute a demonstration of the triumph of rationality and empiricism. It is not altogether naïve to hope that the search for objectivity, the avoidance of exaggeration, the discipline of testing hypotheses through experiment and observation required by the scientific pursuit will have a spill-over effect and help lend a balance to the mental outlook and culture of your societies. I may even be a factor in the building of institutions which lead to political maturity and a stable democratic order. These are your privileges and these are your responsibilities as well. Both, of course, imply your full engagement in the great tasks of development. Never did science have to respond to such compelling human necessieties and never did it have a more beneficent mission to perform as in developing countries today.

At this meeting you will devote your discussions to the subject of the collaboration of North and South for the development of sciences in the Third World. This is a very important aspect of the wider question of economic and social development and of narrowing the gap between the rich and the poor on which the United Nations has been striving its utmost to initiate a purposeful North-South dialogue. It was within the framework of these efforts that the United Nations Conference on Science
been striving its utmost to initiate a purposeful North-South dialogue. It was
within the framework of these efforts that the United Nations Conference on Science and Technology, held six years ago, adopted the Vienna Programme of Action. Many of you were central participants in that Conference. You are no doubt aware of the manifold difficulties we face. Primarily, these arise from opposed perceptions. I feel, however, that in your own defined sphere the process might be much smoother. This optimistic expectation is based on the fact that scientists all over the world constitute a fraternity. They speak the same language, share the same thought patterns and, I believe, are equally interested in the development of science and in ensuring the widest access to its fruits. I need hardly assure you that I will be deeply interested in your conclusions.

It seems to me that one way of stimulating greater scientific co-operation between the North and the South would be for scientists and those engaged in preparing national development plans in the Third World jointly to identify with precision the problems whose solution requires the application of the latest results of scientific research without creating severe problems of social adjustment. The development of agriculture and the conquest of avoidable disease are broadly known to be the priorities for most of the developing countries. However, it is only scientists who can define with clarity the relevance of the latest research and the

gaps that still need to be filled. The judgments of social planners about the feasibility of utilizing modern discoveries will be sounder if they are arrived at after full discussions with scientists.

The very exercise will involve much greater exchange than exists at present not only among the scientists of the developing countries but also between them and economic planners. I believe it will also arouse the deep and sympathetic interest of the scientists of the North who share the human concern to alleviate suffering in the world.

I will conclude by saying that the present situation of mankind calls for a reorientation of science towards what are really human priorities. In extending to you my warmest wishes for a productive conference, I am voicing the hope that your discussions will lead towards that most desirable goal.

Concluding Remarks
by Professor Abdus Salam

The first General Conference of Third World Academies and National Research Councils is coming to a close today. I wish to summarise briefly and assess what we have achieved. First of all, we must, once again, express our appreciation to the Secretary General of the United Nations for having come and opened the Conference and giving it the visibility which we needed. Secondly, we must thank the Italian Government and, in particular, Minister Andreotti, for having made it possible. I heard from Professor Zichichi this morning that Minister Andreotti has very kindly agreed to the sanctioning of 3 million dollars rather than 1.5 millions for the Third World Academy. So far as these conferences are concerned, it appears that the desire expressed by many participants is to have them regularly. It was suggested that the next conference in this series may be held in China, or in Kuwait, or in Colombia, or possibly in association with the General Conference of the International Foundation for Science in the Panamas in October or November 1987.

There were three tasks which we had set ourselves to accomplish from this meeting. These were: to begin to know each other personally; to share experiences of science-building in our various societies; and to forge instruments for collective strength for scientific enterprise in the South. These tasks had two objectives - to enhance the health of science in the Third World so that Science in the Third World becomes a respected part of International Science and to devise policies so that science can make a developmental impact on our societies, as well as globally.

Of the three tasks, the first two have been amply achieved in the last five days. I believe we have come to know each other personally and we have

Of the three tasks, the first two have been amply achieved in the last
five days. I believe we have come to know each other personally and we have shared experiences of science-building. These shared experiences are probably the most important achievement we have had. We were given a vast amount of information in the Conference, particularly by the UN Agencies, by the World Bank, by Governmental Agencies in the developed countries, by ICSU and other Scientific Unions and by various other enterprises from whom we have heard in the last few days. We have learnt of networks as well as international and regional centres for Science.

There were some positive gains during this meeting; one was the highlighting of the need for inter-regional Academies of Sciences and the function of a new one - the African. We also agreed on setting up a consultative committee of Presidents of all Academies and Councils in the Third World for future consultations which may, in time, develop into an Association of Third World Academies. These are positive gains. But what we did not have time to consider in any detail were the modalities of collaboration, particularly of the South and South. This could have taken the form of collaboration in Science Teaching, in Instrumentation, in Exchanges, in opening up of prestigious laboratories in the South to teams from the South countries. We must meet again for this.

As far as South-North collaboration is concerned, no new initiatives were suggested at the meeting although there was a very expressed desire that the Academies of the North may approach their Governments for help with purposeful ideas of collaboration with the South in sciences. It is a sad fact that by and large, and barring remarkable exceptions like IUPAC, the Science organisations in the North have not taken the tasks of helping their deprived colleagues in Science seriously enough.

One of the important new initiatives at this meeting was the identification of tasks for the Third World Academy. When the Academy was founded, we had conceived it as an action-oriented Academy, devoting itself to building up the health of science in developing countries and to search for talent. During the course of this meeting, a larger number of tasks of a consultative and advisory nature have been suggested for it. These tasks are, first of all, a set of responsibilities towards regional and global science for the South, including enhancement of South- South and South-North collaboration, as well as the highlighting of global projects like enhancing the Science element of the Drought, Desertification and Food Deficit project for Africa, and the creation of new international and regional centres of science. So far as the African project is concerned, the Academy will be taking steps, at a meeting to be held this coming Saturday, 13 July, with the National Academy of Sciences of the USA, and the Italian National Research Council and our African colleagues, to start a dialogue on this.

A second set of tasks for the Academy which have been spoken about but not discussed in detail, are tasks relating to Science and Government - emphasizing to the governments of the Third World the importance of science and the need for its development through help to the National Academies and National Research Councils.

Finally, there is the whole range of ideas relating to science and society. Why are our Third World societies placing less emphasis on science; why are fewer young men and women going into science subjects; why are enrollments by and large falling in Science subjects; why are there so few science foundations in our countries? It was suggested that these tasks - Global Projects, Science and Government, Science and Society - were to be taken as Advisory Tasks by the Third World Academy.

Let me make it very clear that the Third World Academy is a very weak organisation, with the bulk if its funds coming at the present time from Italy and some from Canada. Let me be frank. This is not a healthy situation. The Academy will undertake action-oriented tasks for health of Science as well as set up working groups with advisory purposes for policy discussion and help in the new tasks you have asked us to undertake. But we do not believe in doing things half way. Whatever we can do properly, we shall. We shall not undertake things we cannot do properly, due to lack of funds, when we feel we can not make an impact.

Let me make my final remarks. When all is said and done, the promulgation of a new scientific order is something which we in the South have a stake in and it is we who must carry it through. Nothing that the North can do, nothing that the Third World Academy can do, can substitute what you, the Academicians and the Councillors from the South can achieve. It is your governments to whom you all have to suggest that they value science. We owe it to the scientists, particularly the young in our own countries. In the Holy Quran, Allah says: Allah never changes what is with a nation unless they try to change it themselves. Unless that resolve goes with us today, nothing will happen and science will remain as weak and friendless as it is today.

To our friends from the North, I would like to say; our world has been polarised between the scientific haves and the scientific have-nots. This gap is widening so far as the sciences are concerned. We all passionately believe that science is international. This is one of the proudest claims for Science we make. Even if for no other reasons than moral ones, those provileged in the North must actively help their colleagues in the South in a purposeful manner.

May I be forgiven for thinking in the following terms: that the physics institutions in developed countries may consider contributing in their own ways according to the norms of the well-known United Nations formula, whereby most developed countries have pledged to spend 1% of their GNP resources for world development. In the end, it is a moral issue whether the better segments of the physics community should be willing to look after their own deserving but deprived colleagues, helping them not only materially to remain good physicists, but also joining them in their battle to obtain recognition within their own communities as valid professionals who are important to the development of both their country and the world.

Let me end by quoting from a great mystic of the 17th century - John Donne - a man who believed in the moral state of man and the international ideal: "No man is an island, entire of itself; every man is a piece of the continent, a part of the main; of a clod be washed away by the sea, Europe is the less, as well as if a promontory were, as well as if a manor of thy friends or of thine own were; any man's death diminishes me, because I am involved in mankind; and therefore never send to know for whom the bell tolls; it tolls for thee".

Letter from Professor Abdus Salam to ICTP Scientists

This letter was sent after Professor Abdus Salam had attended a roundtable session on "Development: the Human Dimension" at Istanbul (2-4 September 1985).

15 September 1985

Dear Colleague,

I. I am enclosing a copy of a speech I was recently asked to give at a Roundtable Session on "Development: the Human Dimension" in Istanbul. In the audience there were mainly planners, administrators and finance ministers. There were very few scientists. Those present had hardly every considered the role of science for development.

After my presentation, the Director General of the International Labour Organization (ILO), who had earlier presented plans for an ILO meeting to be held next year in Geneva for planners and development experts, announced that they will also be seeking scientists for these future meetings. There was a similar reaction from others at the Roundtable.

II. This set me thinking whether we, as a community, have really prepared ourselves to play a role in development for our countries. For this, at least two
II. This set me thinking whether we, as a community, have really prepared
ourselves to play a role in development for our countries. For this, at least two things are necessary:

1. We, as a community, should be engaged in enhancing Physics and Mathematics education at the secondary, polytechnical, and college levels, as well as teaching and research at the university level. We should be engaged in the battle for bringing science consciousness to our countries.
2. If possible, we should be paying attention in our research work to problems of Physics and Mathematics connected with our locale; for example, geophysical problems involving climatic, environmental, atmospheric, ionospheric and soil studies, or problems of physics of local materials and communications and the like.

III. In this context, for the last 21 years, the International Centre at Trieste has striven, to the best of its ability, to ameliorate the neglect of science and scientist in developing countries. It has tried, in its humble way, to enhance their individual work. This is the cornerstone of all we wish to build on. But I do feel the time has come when we must start worrying about the other side of the coin - in respect of devotion towards the two types of developmental effort which I have outlined above, by those for whom the Centre cares. We would appreciate hearing from you if you have been active in these matters. Such feed-

back is important for the Centre's support, much of which derives from international development agencies.

IV. As a matter of policy, in future, the International Centre will value participation in its activities by those who have helped in the developmental sphere in their own countries and will give them priority. In all application forms, there will be a column requesting such information.

V. As you are aware, through the generosity of the Italian Government, we now have a special grant for helping with regional and country endeavours. Concerning this you may write, with your ideas and requests, to Professors Jan Nilsson or Mohammad Hassan (Executive Secretary, Third World Academy of Sciences) at the Centre.

With my very best wishes for the success of your personal work as well as for your work for the enhancement of Physics and Mathematics and their utilisation in your own countries.

Abdus Salam

Address by Professor Abdus Salam at the Inaugural Session of the Roundtable Session on "Development: the Human Dimension", Istanbul, 2-4 September 1985

I wish to extend my appreciation to the United Nations Development Programme (UNDP) for asking me to participate in this Roundtable on the human dimension of the development process. I shall take as axiomatic the thesis that without highly-motivated and highly-trained manpower, no lasting development can take place. My purpose in coming today is to try to highlight the role of a much-neglected community, that of scientists - so highly neglected that they did not figure in the first draft of the programme. Technologists did, but scientists did not. I nearly declined the invitation before science for development was accepted as a legitimate subject to speak on.

My own experience of dealing with development-related Science derives from directing a United Nations run International Centre for High Level Physics located at Trieste. Since its inception in 1964, this Centre has had the privilege of welcoming of the order of 25,000 visits, of experimental and theoretical research physicists, nearly 13,000 of them working in developing country research institutes and universities.

Since I am speaking in Turkey, I wish to relate my remarks to the situation in Turkey, to that in nearby Egypt and to my own country - Pakistan. These three are not too small countries with population levels ranging between France and Japan and five to ten times larger than Sweden's. During the last 15 years, we at Trieste have welcomed 325 visits of physicists from Turkey, 375 from Pakistan and around 600 from Egypt.

I shall speak frankly; as a friend, I hope I shall not be misunderstood. Let me begin by recalling the year 1799: against the opposition of the Ulema - and surprisingly even of a section of the military establishment - Sultan Selim III introduced the subjects of algebra, trigonometry, mechanics, ballistics and metallurgy into Turkey. He imported French and Swedish teachers for teaching these disciplines. His purpose was to rival European advances in gun-founding. Since there was no corresponding emphasis on research in these subjects, Turkey could not keep up with the newer advances being made elsewhere. The result was predictable: Turkey did not succeed. Then, as now, technology, unsupported by science, will not flourish.

As my second example, take the situation in Egypt at the time of Muhammad Ali, thirty years after the episode with Selim III I have just recounted. Muhammad Ali in Egypt had his men trained in the arts of surveying and prospecting for coal and gold, in Egypt. This attempt was unsuccessful but it did not strike him, nor his successors, to train Egyptians on a long term basis in the basic sciences of geology or of related environmental sciences. Thus, till this day, there is not one high-level Desertification Research Institute in the entire

sub-continents of North Africa or the Middle East (except in Israel). When we recently organised a course on the Physics and Mathematics of the desertification process, we had to import teachers from Denmark - with their experience with the wastes of Greenland!

My third example is again from Egypt, where, I am told, 30 million dollars was spent in setting up a factory for the manufacture of thermionic valves. The factory was built in the same year that transistors were perfected and began to invade the world markets. The recommendation to set up the thermionic valve factory was naturally made by foreign consultants. It was, however, accepted by Egyptian officials who were not particularly perceptive of the way science was advancing, and who presumably never consulted the competent physicists in their own countries.

Why do we neglect Science for development? First and foremost, there is the question of national ambition. Let me say it unambiguously. Countries of the size of Turkey, or Egypt, or Pakistan, have no science communities geared to development because we do not want such communities. We suffer from a lack of ambition towards acquiring science, a feeling of inferiority towards it, bordering sometimes even on hostility.

In respect of ambition, let me illustrate what I mean by the example of Japan at the end of the last century, when the new Meiji constitution was promulgated. The meiji Emperor took five oaths - one of these set out a national policy towards science - "Knowledge will be sought and acquired from any source with all means at our disposal, for the greatness and security of Japan". And what comprised "knowledge"? Listen to the Japanese physicist, Hantaro Nagaoka, specialising in magnetism - a discipline to which the Japanese have contributed importantly, both experimentally and theoretically since. Writing in 1888 from Glasgow - where he had been sent by the Imperial Government - to his Professor, Tanakadate, he expressed himself thus: "We must work actively with an open eye, keen sense, and ready understanding, indefatigably and not a moment stopping. ... There is no reason why the Europeans shall be so supreme in everything. As you say, ... we shall ... beat those yattya bottya (pompous) people (in Science) in the course of 10 or 20 years".

Among the developing countries today, from our experience at Trieste, we can perceive just five which do value science, whatever else be their hang-ups against developing. These countries are, Argentina and Brazil in Latin America, and China, Korea and India in Asia. Barring these five, the Third World, despite its realisation that science and technology are the sustenance, and its major hope for economic betterment, has taken to science - as contrasted to technology - as only a marginal activity. This is, unfortunately, also true of the aid-giving agencies of the richer countries and also of the agencies of the United Nations, including UNDP.

including UNDP.

Assuming that you agree with me that Science has a role for development, why am I insistent that science in developing countries has been treated as a marginal activity? Two reasons:

First: policy makers, prestigious commissions (even the Brandt Commission), as well as aid-givers, speak uniformly of problems of technology transfer to the developing countries as if that is all that is involved. It is hard to believe but true that the word "science" does not figure in the Brandt Commission report. Very few within the developing world appear to stress that for long term effectiveness, technology transfer must always be accompanied by science transfer; that the science of today is the technology of tomorrow and that when we speak of science it must be broad-based in order to be effective for applications. I would even go so far as to say; if one was being machiavellian, one might discern sinister motives among those who try to sell to us the idea of technology transfer without science transfer. There is nothing which has hurt us in the Third World more than the recent slogan in the richer countries of "Relevant Science". Regretfully, this slogan was parroted in our countries unthinkingly to justify stifling the growth of all science.

Second: science transfer is effected by and to communities of scientists. Such communities need building up to a critical size in their human resources

and infrastructure. This building up calls for wise science policies with four cardinal ingredients - long-term commitment, generous patronage, self-governance of the scientific community and free international contact. In addition, in our countries, the high-level scientist must be allowed to play a role in nation-building as an equal partner to the professional planner, the economist and the technologist. Few developing countries have promulgated such policies; few aid agencies have taken it as their mandate to encourage and help with the building up of the scientific infrastructure.

Why Science Transfer? What is the infrastructure of sciences I am speaking about and why? First and foremost, we need scientific literacy and science teaching at all levels, and particularly at the higher levels, - at least for the sake of the engineers and technologists. This calls for inspiring teachers, and no one can be an inspiring teacher of science, unless he has experienced and created at least some modicum of living science during some part of his career. This calls for well-equipped teaching laboratories and (in the present era of fast moving science), the provision of the newest journals and books. This is the minimum of scientific infrastructure any country of any size must provide for.

Next, should come demands on their own scientific communities from the developing country government agencies and their nascent industries, for discriminatory advice regarding which technologies should be acquired.

Still next, for a minority of the developing countries, there is the need for indigenous scientists to help with their applied colleagues' research work. For any society, the problems of its agriculture, of its local pests and diseases, of its local materials base, must be solved locally. One needs an underpinning from a first-class base in sciences to carry applied research in these areas through. The craft of applied science in a developing country is made harder, simply because one does not have available next door, or at the other end of the telephone line, men who can tell you what one needs to know of the basic principles, relevant to one's applied work.

I spoke earlier of indifference towards Science. When I was recently consulting my Turkish colleagues, I was told that this came sometimes even from the engineering community - a community which, in Turkey, enjoys reputation and status. I was surprised by this, for many reasons. Firstly, in Pakistan, my experience is that a lack of appreciation of the possible role of scientists stems from the shortsightedness of planners and economists and not engineers. (The same remark was made to me incidentally by Brazilian scientists).

Secondly, I was surprised because in the history of recent fundamental advances of Physics, a crucial role has been played by engineers. Thus, for example, Y. Nishina, the man who first brought high-level physics to Japan and who was the teacher of the two Japanese Nobel Laureates in Physics, H. Yukawa and S. Tomonaga, was an electrical engineer by profession. P.A.M. Dirac, the creator of quantum mechanics who, in my opinion, is the greatest figure in physics of the 20th century, was trained as an electrical engineer. Eugene Winger, who won a Nobel Prize for Physics, started life as a chemical engineer.

To reinforce my remarks, let me recall that in 1961, I attended the centennial celebrations of the founding of Massachussetts Institute of Technology, perhaps the most important technological school of the United States. To my surprise, it was the engineers at this school who wanted the modicum of science to be increased in their curricula.

But one aspect of neglect of Science, one can not gainsay; this is of neglect, as demonstrated by numbers. In the whole Arab world, there are around 1,500 scientists altogether, who are engaged in creating science. Of these, 55% come from one country, Egypt. Of these, one quarter are physicists - altogether some 150 individuals. On the normal averages, two percent of these will be very good. And during their youthful working life, this two percent will wish to go where their work will flourish and be appreciated. Do you blame them? The same type of figures obtain in Turkey - the same for Pakistan. Extrapolating from international norms - which prevail in Japan or Israel - the numbers in Turkey should be of the order of 6,000. Believe me, Turkey or Egypt or Pakistan will not go

bankrupt if they produced say, 1,000 physicists, and provisioned them, and kept them - for institutions which I shall presently mention.

But before I speak of these, I should perhaps speak of the situation in neighbouring Greece - till recently a developing country in the definition of UNDP, but now in the category of the developed. Greece has recently applied for and secured the membership of the Centre for Nuclear Research at Geneva - the largest and the most prestigious European organisation for Particle Physics Research, with an annual budget of a quarter of a million dollars. Greece displayed the ambition of joining the big league in Science and one can visibly see as a result the maturity which Greek Physics has acquired and its transformation year after year. How this maturity will reflect itself in the area of development, will, of course, depend on the policies which Greece will pursue in employing these men. But the physicists will be there, at any rate.

Let me come back to Turkey and the development of institutions which can be created and which will need Turkish Physics manpower. I know from personal experience of working with them, that Turkish physicists are some of the most imaginative physicists in the whole developing world. They undertake difficult problems in Physics consciously - and this is something I respect. I had the privilege of visiting this country a short while back when I was honoured to be received by President Kenan Evren. I suggested to him that, in my opinion, what Turkey needed in its national plans and priorities was something analogous to the bell Telephone Laboratories in the United States in the field of communications. This Laboratory has produced six Nobel Laureates who have contributed to basic Physics, besides including in their roster of inventions, transistors and their technology. I estimate that the Turkish or Egyptian or Pakistan analogue to the Bell Laboratories for Communications would cost 40 million dollars to build and around 4 million dolars yearly, to run. I believe it can be done with the highest level of quality, and that one can find those who could create it in Turkey. May I hope that this and similar Science projects will soon come to fruition in the developing world?

Letter from the Participants in the Conference and Workshop on the Physics of Nonconventional Energy Sources and Material Science for Energy to the Director of the ICTP

Hundred and four participants signed the letter which we reproduce hereunder, at the closure of the mentioned Conference.

Dear Professor Abdus Salam,

We, the following participants attending the Workshop on the Physics of Nonconventional Energy Sources and Material Science for Energy, and other guest scientists, hereby express our sincere appreciation to you.

scientists, hereby express our sincere appreciation to you.

It is now exactly twenty-five years since you put forward the idea of the creation of a centre to cater for the development of science in the developing countries. That was in 1960, when you represented Pakistan at the General Conference of the International Atomic Energy Agency in Vienna.

With the generous assistance from the Italian Government and with the moral support from many other bodies, your dream has not only come true, but has now grown into a unique and most successful venture within the UN system. Indeed, you have greatly helped to bring the world together. This fact is eloquently attested to by the great number and the diverse nationalities of scientists who have, over the years, come to the ICTP to participate in various programmes.

Your hypothesis that the development of technology calls for the development of basic scientific knowledge is now widely accepted as a guiding principle for world development. In fact, if by 'peace', we mean a situation in which lasting prosperity is achieved, you have helped to pave the way for the realisation of a lasting peace for the entire humanity.

While expressing our sincere appreciation and gratitude to you for your untiring efforts towards the upliftment of the developing countries, we wish you continued physical and spiritual prosperity.

Physics and Development Weekly Programme (1985)

The weekly lectures on Physics and Development have been held regularly. They are listed below.

30/1 Prof. R. Rosei (University of Trieste), "Research Area of Trieste, Present and Future Activities".

7/2 Prof. O. Svelto (Polytechnic of Milan), "An Overview on Laser Applications".

14/2 Dr. P. Fellows (Oxford Polytechnic, UK), "Protein Rich Food from Green Leaves".

15/2 Dr. P. Fellows, "Appropriate Food Technology".

22/2 Prof. U. Leone (Director, UNSDRI, Rome), "The Role of the Research in Development".

28/2 Dr. A. Alam (Pakistan), "Science Policy for the Developing Countries".

7/3 Prof. A. Dymanus (The Netherlands), "Science and Development in a Small Country".

12/3 Prof. B. Cizely and Prof. J. Stanovnik (Yugoslavia), "Present International Economic Crises and the Prospect of Sout-South Cooperation".

25/4 Prof. D. Nielsen (USA), "Soil Physics and Agricultural Development".

2/5 Prof. D. Gabriels (Belgium), "Physical Processes in Soils".

7/5 Prof. G. Pennisi (Rome), "Politics of Development in Africa and South of Sahara".

22/5 An Afternoon Workshop on "Physics, Economics and Development", organized in collaboration with the Development Research Centre, Ljubljana (Yugoslavia).

4/6 Prof. G. Temmer (USA), "An American Physicist's View of the Nuclear Weapons Race and Disarmament".

18/6 Prof. E. Martuscelli (CNR, Naples, Italy), "Recent Development in Polymer Physics".

27/6 Prof. L. Emmerij (ISS, The Hague, Netherlands), "Economic and Social Policies: The Perspectives of Developing Countries".

28/6 Prof. L. Emmerij, "Economic and Social Policies: The Perspectives of Industrialized Countries".

18/7 Prof. S. Wadia (India), "Hiroshima and After: The Need for Nuclear Disarmament" (slide show).

23/7 Prof. H.B.G. Casimir (The Netherlands), "Physics and the Origin of Modern

23/7 Prof. H.B.G. Casimir (The Netherlands), "Physics and the Origin of Modern Technology".

25/7 Prof. H.B.G. Casimir, "The Present Role of Physicists in Industrial Development".

5/9 Prof. M. Jameel (Pakistan), "Some Illusions on Nuclear Proliferation".

12/9 Prof. S.C. Garde (Nigeria/India), "Physics Education in Africa: Statistical Overview".
Prof. J. Flechon (France), "Solar Energy for Developing Countries".

19/9 Prof. A. Mufti (Pakistan), "How to Succeed in Research and Development Work in a Developing Country - An Example in Pakistan".
Prof. J. Flechon, slide show on "Solar Energy for Developing Countries".

17/10 Dr. L.K. Shayo (ICTP/Tanzania), "The Role of Mathematicians in Developing Countries".

21/10 Prof. W.A. Blanpied (NSF, Washington), "Pioneer Physicists in Developing Countries: The Case of India".

The ICTP Donation Programme of Books and Scientific Equipment

For some time already, the ICTP receives scientific books and periodicals from libraries and individual scientists who, mainly for lack of storage space, wish to give them away. These stocks of books which are of great value to many libraries in developing countries are distributed by the Centre which pays for all shipping costs. In 1984, the ICTP distributed 24,000 books, journals and proceedings to approximately 250 institutions in developing countries.

A similar operation, for scientific equipment this time, has been launched last year. In response to an appeal by Professor Abdus Salam, leading laboratories in Europe now put their surplus equipment at the disposal of the ICTP for distribution among the institutions in developing countries. The Rutherford Appleton Laboratory (UK), the Seibersdorf Laboratory (Austria), The CEN of Saclay (France), the Nuclear Research Centre (Federal Republic of Germany) as well as the CERN (Switzerland) are now contributing to this programme.

Professor H. Dalafi (ICTP) is in charge of the Donation Programme. He maintains lists of equipment for consultations. Those interested are invited, while at the ICTP, to select and submit their request which will then be examined by a Committee appointed for this purpose. They may in some cases be even able to visit CERN for an on-the-spot examination of the equipment. Shipping charges are borne by the ICTP.

Symposium of ICTP Arab Friends Society, 10–12 July 1985

The ICTP Arab Friends Society, SARF, held its first inter-Arab Symposium at the ICTP from 10 to 12 July 1985. This imposing gathering of the major Arab scientific figures was made possible through the generous support of the ICTP and ISAS-SISSA. This activity is the first of its kind to draw participants from the whole Arab world. It was attended by 48 Arab scientists coming from 13 Arab countries. The theme of the Symposium was the status of the Physical and Mathematical Sciences in the Arab World.

The Symposium started with an inaugural ceremony on Wednesday afternoon, July 10. This ceremony was chaired by Professor Abdus Salam who gave also the opening address. Dr. A. Hamoui spoke on behalf of SARF, and Prof. P. Budinich delivered the address of the Presidency of SISSA. There then followed addresses by the following scientific leaders from Arab countries: A.A. Ashom (Egypt), M.M. Khalil (Iraq), F.A. Daghestani (Jordan), D. Ben Sari (Morocco), S.A. Al-Athel (Saudi Arabia), A. Kettani (Saudi Arabia) and N.K. Argiub (Tunisia). Dr. M.A. Rasheed, Director General of the Arab Bureau of Education for the Gulf States, sent in a written address which will appear in the Proceedings.

The inaugural session was highlighted by the presentation of the Golden Shield of the Kuwait Foundation for the Advancement of Science to Professor Abdus Salam by its Director General, Dr. A.A. Al-Shamran.
of the Kuwait Foundation for the Advancement of Science to Professor Abdus Salam by its Director General, Dr. A.A. Al-Shamran.

In their interventions all those scientific leaders of the Arab World have praised very highly the idea of the Symposium. They considered that it will lead to closer ties among Arab scientists and to more fruitful cooperation between Arab scientific institutions. They especially emphasized the sense of confidence which such meetings give to the Arab scientific community. They have all acknowledged and loded very highly the great support which the Centre has been providing for the cause of science in the Arab World. To them, the Symposium represented a ripe fruit of this great investment. It came then as no surprise that they were unanimous in calling for closer and wider cooperation between the Centre and the Arab countries.

Another theme which these illustrious participants have emphasized is that of Arab-Italian cooperation in science. This was one of the tentative topics originally contemplated for the Symposium. All the above distinguished speakers have stressed the importance of developing such cooperation and of evolving new channels for carrying it out. The following recommendations were unanimously endorsed.

a) The importance of setting up an Arab Physics and Mathematics Education Network (ARDMEN) was emphasized and the role of its projected Newsletter was stressed.

b) It was asserted that SARF has a very important role to play in Arab science; especially, in view of its relationship to the ICTP. It was recommended that SARF should further develop this relationship.

c) The importance of activities like the physics and mathematics olympiads was universally acknowledged. SARF was encouraged to set up and develop such activities.

d) SARF was urged to take the lead in coordinating the activities of similar bodies in the Arab world.

e) It was universally moved to express to Professor Salam and Professor Budinich the sincere gratitude of all participants for their generosity which made this meeting possible.

It was also agreed to issue proceeding containing all the contributions presented at the Symposium. These will be edited by Humam B. Ghassib and M.H. Saffouri. Dr. F. Daghestani, President, Royal Scientific Society of Jordan, has graciously offered to have his Society cover the cost of printing these proceedings.

OXFAM

We have recently received a report on "OXFAM at work throughout the world in the year May 1984 - April 1985" which gives details on the grants provided by that Organization. Those wishing a copy of of the report should write to:

OXFAM
Banbury Road,
UK - OXFORD, OX2 7DZ

Tel.: 0865 56777
Telex: 83610

Excerpts from the report:

"During this period, OXFAM allocated £38 million to 1,960 projects in 74 countries, including £23 million to Ethiopia, Sudan and Somalia. Brief descriptions are listed below, together with expenditure on development education, campaigning and assistance in this country. More detail can be provided by OXFAM's Information Department.

The funds which make OXFAM's worldwide help possible - to finance all the grants listed here - are raised mainly in the UK and the Republic of Ireland by many thousands of volunteers of all ages. This year many donations came in from groups and individuals overseas too, especially for the African famine programmes. A whole range of imaginative fund-raising ideas bring in the money. The largest fund raiser is the OXFAM shop network run by hundreds of volunteer groups around the country selling mainly donated stock. A small staff of paid organisers is on hand to give help and advice. In addition, many people give regularly through the Pledged Gift scheme, by banker's order or covenant, or in response to special appeals. Some funds are given for specific projects on a joint funding basis by the Overseas Development Administration, the EEC and other agencies including sister organisations overseas. ODA and other organisations have also contributed disaster funds.

Over the years OXFAM has streamlined its procedures for making grants. We act quickly when the need demands it, but we must ensure that all applications are sound, so that contributors' money is wisely used to the greatest effect. A standard application form is therefore provided.

No project is supported until it has been visited by our own representative. Only in circumstances of emergency can this rule be broken. So when an organisation or group requires help form OXFAM, they approach the Field Officer for the area; or if they write to Oxford, the application is sent out to the Field Director. Other applications may result from the discovery of a need by the Field Director during his/her travels.

The Field Director will discuss a request fully with those responsible, offer advice based on OXFAM's worldwide experience, and help prepare the required material that may appear formidable to a small project. He/she will then seek such local advice as he/she may need before forwarding the application and his/her recommendation to Oxford, where it is processed, background information is built up, the need analysed and the request considered.

OXFAM's Council of Management, as trustees, are legally responsible for every grant made, but they have delegated certain powers to the Director and staff to make grants between committees. The Field Directors also have authority to make small discretionary grants.

When a situation requires urgent action, grants may be made after telephone discussion between the Director and the Chairman of the committee concerned".

TRANSFER OF KNOW-HOW THROUGH EXPATRIATE NATIONALS (TOKTEN)

TOKTEN, a UNDP scheme whereby expatriate professional nationals are given an opportunity to contribute to the development goals of their country of origin, has been advertised regularly at the ICTP. TOKTEN Global Newsletter Vol. 2 No. 4 reports that TOKTEN's programme has now spread to seventeen countries (Argentina, Bangladesh, Benin, China, Dominica, Egypt, Ethiopia, Greece, Grenada, Guyana, India, Pakistan, Philippines, St. Lucia, Sri Lanka, Trinidad and Tobago, and Turkey). Details of the scheme can be obtained from:

TOKTEN Secretariat
Office of the Resident Representative
UNDP, P.O. Box 407
ANKARA, Turkey

or

c/o the Co-ordinator, TOKTEN
UNDP, NEW YORK, N.Y. 10017
USA

TOKTEN has organized a review workshop in Cairo, Egypt, on 13-17 January 1985. We quote hereafter the brief report published in the Newsletter.

"The third international TOKTEN Workshop convened in Cairo, Egypt during 13-17 January 1985. The objective of the Workshop was to exchange experiences and synthesize operations in a variety of national settings throughout the countries with on-going programmes and try, in a modest way, to assist where possible a number of other countries interested in the concept emerging from a common rationale to utilize expatriate professional nationals in their development goals.

goals. In the Inaugural Address by H.E. Dr. Mustafa Kamal Helmy, Deputy Prime

In the Inaugural Address by H.E. Dr. Mustafa Kamal Helmy, Deputy Prime Minister and Minister of Higher Education and Scientific Research, and in the Address by H.E. Mr. Albert B. Salama, Minister of Immigration Affairs and Egyptians Abroad, the active interest of the Egyptian Government was underlined - TOKTEN had become for them a national policy.

In the message of Mr. Bradford Morse, Administrator, UNDP, Mr. Morse said that he feels proud of the TOKTEN initiative: "In its quiet way, the TOKTEN programme has now spread to seventeen countries who have committed almost $6 million in resources to this cost-effective activity. Another dozen countries are expected to join in the coming months. One thousand TOKTEN consultancies have been successfully completed to-date. I believe that all persons connected with TOKTEN, particularly the representatives of Governments and all UNDP field offices, can feel very gratified at this progress".

The message continued, "In a fast changing world, technical co-operation requirements are also changing and our responses have to be flexible, prompt and effective. Following upon the pioneering work by TOKTEN, UNDP is now considering other modes of providing unpaid professional services whereby the human resources needed can be deployed for work on priority problems. This

is therefore an appropriate time for the planners and practitioners of TOKTEN to meet and exchange experiences, in order to maintain the dynamism of the scheme and introduce innovative new elements".

The five-day Workshop looked at the question of brain-drain in the third world countries and reviewed on-going programmes' progress over the years, while others pointed out their particular anxieties for implementing the project in their countries. There were questions of supply and roster formulation, administrative modes, the question of eradicating sensitivity and sceptical attitudes, level of professional expertise required, repatriation, funding requirements, receptivity, will to return.

It was the general consensus that there exists a tremendous potential of highly qualified expertise amongst expatriates which, if utilized at home, was unquestionably invaluable. The formulation of rosters at local and Headquarter level was considered essential. The flexibility of the programme in that it could be moulded to meet individual country needs was underlined at the Workshop. An exchange of experiences was invaluable in this respect.

The Workshop was organized jointly by the government of the Arab Republic of Egypt and UNDP in co-operation with the Academy for Scientific Research and Technology, Cairo. The countries represented included Argentina, Bangladesh, Benin, Cape Verde, China, Egypt, Ethiopia , Greece, Guinea, Guyana, Haiti, India, Jordan, the Philippines, Somalia, Sri lanka, Sudan, Syria, Turkey and Vietnam. Organizations from the UN system were also represented (the TOKTEN Global Unit, UNDP Division for East Africa, UNDP Office for Project Execution, United Nations Industrial Development Organization, United Nations Fund for Population Activities, Food and Agriculture Organization, International Labour Organization, United Nations Educational, Scientific and Cultural Organization, International Executive Service Commission, Inter-Governmental Committee for Migration, as well as the World Bank".

Solid State Research
Visiting Scientists at ICTP in 1986

W. ANDREONI, Institut de Physique Expérimentale, Lausanne, Switzerland - 2 months.
T. ARAI, Argonne National Laboratory, Argonne IL, USA - June 86 to June 87.
C. BOCCHETTA, ICTP - 1 November 1985 to 31 October 1986.
K. CHATURVEDI, Dept. of Physics, Patiala University, India - late 1986 to early 1987.
M.P. DAS, Dept. of Physics, Sanbalpur University, India - January 1986 to January 1987.
J.M. DONG, Institute of Theoretical Physics, Academia Sinica, Beijing, People's Republic of China - 2 years.
J.M. DONG, Institute of Theoretical Physics, Academia Sinica, Beijing, People's Republic of China - 2 years.
M.K. EL MOUSLY, Dept. of Physics, Ain Shams University, Cairo, Egypt - 3 months.
G. GARCIA-CALDERON, ICTP (Mexico) - 1 September 1985 to 28 February 1986.
HUANG YUN, Dept. of Physics, Beijing University, People's Republic of China - April to August.
JIAN CHENG LIN, Institute of Theoretical Physics, Academis Sinica, Beijing, People's Republic of China - 2 years.
E. MARTINA, Departamento de Física Teórica, Universidad Autónoma de México - 9 months.
H. MIESENBOECK, Universitäts Linz, Austria - 6 months.
G. MUKHOPADHYAY, ICTP (Institute of Technology, Bombay, India) - 3 July 1985 to 2 July 1986.
M.J. PONNAMBALAM, Dept. of Physics, Bayero University, Kano, Nigeria - 3 months.
K.L. SEBASTIAN, Cochin University, India - 3 months.
K.K. SINGH, Dept. of Physics, Delhi University, India - May 1986 to January 1987.
F. VERICAT, IFLYSIB, La Plata, Argentina - from 5 December 1984 to June 1986.
XIA JIAN BAI, Institut de Physique Appliquée, Lausanne, Switzerland - 26 September 1985 to 25 March 1986.

Mathematics Research
Visiting Scientists at ICTP in 1986

S. ASHGAR, Dept. of Mathematics, Quad-i-Azam University, Islamabad, Pakistan - 6 months.
A.R. BESTMAN, Federal University of Technology, Bauchi, Nigeria - October 86 to June 87.
BINGGEN ZHANG, Shandong College of Oceanography, People's Republic of China - 3 months.
K. CHAUDHURI, Jadavpur University, Calcutta, India - 3 months.
H. DZINOTYIWEYI, Dept. of Mathematics, University of Zimbabwe, Harare - February to April 1986.
J.O.C. EZEILO, Dept. of Mathematics, University of Nigeria, Nsukka - 3 months.
YU-YU FENG, China Univ. of Science and Technology, Hefei, People's Republic of China - 6 months.
Q. IQBAL, University of British Columbia, Vancouver, Canada - 1 January to 31 March.
JANG JIAHE, Dept. of Mathematics, Academia Sinica, Beijing, People's Republic of China - 20 March to 20 June.
LI SHUJIE, Dept. of Mathematics, Academia Sinica, Beijing, People's Republic of China - January to September.
LI YI-SHEN, Dept. of Mathematics, China University of Science and Technology, Hefei, People's Republic of China - 3 months.
S. MAKARIOUS, Dept. of Applied Mathematics, Ain Shams University, Cairo, Egypt - April to September.
V. MUDRINSKI, Novi Sad, Yugoslavia - 9 months.
J.R. MVUNGI, Dept. of Mathematics, University of Zimbabwe, Harare - January to March 1986.
F.I. NJOKU, Dept. of Mathematics, University of Nigeria, Nsukka - 1 January to 30 June.
P. NOWOSAD, I.M.P.A., Rio de Janeiro, Brazil - 3 months.
W. OGANA, Dept. of Mathematics, University of Nairobi, Kenya - July 86 to January 87.
C.C. OKEKE, Dept. of Computer Sciences, University of Nigeria, Nsukka - 3 weeks in January.
N. PARHI, Dept. of Mathematics, Berhampur University, India - May to October.
N.H. PAVEL, Universitatea "Al. I. Cuza", Iasi, Romania - June to August.
S.C. RASTOGI, Dept. of Mathematics, University of Nigeria, Nsukka - April to October.
M. SAEED-UL-ISLAM, Dept. of Mathematics, Bayero University, Kano, Nigeria - July to September.
M. SITARAMAYYA, School of Mathematics, University of Hyderabad, India - May 86 to January 87.
M. TOOMANIAN, Dept. of Mathematics, Tabriz University, Iran - October 86 to June 87.

High Energy Research
Visiting Scientists at ICTP in 1986

G. ALDAZABAL, Centro Atómico Bariloche, Argentina - December 1985 to December 1986.
L. AMETLLER, Dept. de Física, Universidad de Barcelona, Spain - 1 October 1984 to 1 October 1986.
K. ANANE-FENIN, Dept, of Physics, University of Cape Coast, Ghana - 11 September 1985 to 10 March 1986.
Y. ANINI, Physics Dept., Bir zeit University, West Bank, Jordan - 1 November 1985 to 31 October 1986.
A. ANSELM, Leningrad Nuclear Physics Institute, USSR - 1 month.
A.R. ASSAR, ICTP - 1 October 1985 to 1 April 1986.
D. BALDOMIR, Dept. de electricidad y magnetismo, Universidad de Santiago, Spain - January to December.
E. BERGSHOEFF, Brandeis University, Waltham, MA, USA - 5 September 1984 to 9 September 1986.

J. BLANK, Nuclear Centre, Charles University, Prague, Czechoslovakia - 1 month.
E. BOGOMOLNY, Landau Institute for Theoretical Physics, Moscow, USSR - 1 month.
K. CHETYRKIN, Institute for Nuclear Research, Academy of Sciences, Moscow, USSR - 1 month.
H. DALAFI, ICTP - 1 September 1985 to 31 August 1986.
A. DIAZ, Bell Laboratories, Murray Hill, N.J., USA - January 1986 to January 1987.
V.K. DOBREV, Physics Institute, Technische Universität, Clausthal, Fed. Rep. of Germany - 3 months.
C. DOMINGUEZ, Dept. of Physics, Universidad Santa Maria, Valparaíso, Chile - 7 July 1985 to 7 April 1986.
S. DUBNICKA, Institute of Physics, Bratislava, Czechoslovakia - 2 weeks.
A. ETTE, Dept. of Physics, University of Ibadan, Nigeria - 3 months.
N. GOPALSWAMY, Institute of Astrophysics, Kodaikanal, India - 3 months.
M. HAVLICEK, Nuclear Centre, Charles University, Prague, Czechoslovakia - 1 month.
A. IGNATIEV, Institute for Nuclear Research, USSR Academy of Sciences, Moscow, USSR - 1 month.
B.L. JOFFE, Institute of Theoretical and Experimental Physics, Moscow, USSR - 1 month.
H. KAISER, Institute for High Energy Physics, Zeuthen, German Democratic Republic - 1 month.
H.R. KARADAYL, Physics Dept., Technical University, Istanbul, Turkey - 1 month.
V. KOREPIN, Leningrad Mathematical Institute, USSR - 1 month.
M. LOKAJICEK, Institute of Physics, Prague, Czechoslovakia - 1 month in September.
J. MacDONALD, School of Mathematical and Physical Sciences, University of Brighton, UK - 1 year from January 1986.
K. MAEDA, SISSA, Trieste, Italy - 16 December 1985 to 15 December 1986.
J. NETO, ICTP - 28 July 1984 to 31 July 1986.
S. OKOYE, Faculty of Physical Sciences, University of Nigeria, Nsukka - January to June.
M. POLLOCK, Research Institute for Fundamental Physics, Kyoto, Japan - 14 March 1985 to 13 March 1986.
R. RAMACHANDRAN, Physics Dept., Indian Institute of Technology, Kanpur, India - 15 June 1985 to 14 May 1986.
M. SAFFOURI, ICTP.
D. SAHDEV, Dept. of Physics, Pennsylvania University, USA - 1 October 1984 to 30 September 1986.
H. SCHLERETH, Niels Bohr Institute, Copenhagen, Denmark - 1 February to 31 May 1986.
E. SEZGIN, ICTP - 1 October 1984 to 30 September 1986.
H.J. SHIN, Physics Dept., Kyung Hee University, Seoul, Korea - 10 July 1985 to 10 July 1986.
H.J. SHIN, Physics Dept., Kyung Hee University, Seoul, Korea - 10 July 1985 to 10 July 1986.
P. SHKULA, Dept. of Physics, Southampton University, UK - 6 months.
E. SOKATCHEV, Institute of Nuclear Research and Nuclear Energy, Sofia, Bulgaria - 2 October 1985 to 2 January 1986.
M. SOM, Instituto de Física, Universidade Federal, Rio de Janeiro, Brazil - 3 months.
C. VAYONAKIS, School of Physics, University of Sussex, Brighton, UK - 4 October 1984 to 2 January 1986.
P. WIEGMANN, Landau Institute for Theoretical Physics, Moscow, USSR - 1 week.
R. ZHANG, Physics Dept., University of Tasmania, Hobart - 19 September 1985 to 19 September 1986.

THE VATICAN OBSERVATORY ANNOUNCES A SUMMER SCHOOL IN

OBSERVATIONAL ASTRONOMY AND ASTROPHYSICS

CASTEL GANDOLFO, ROME, ITALY – 10 JUNE TO 10 JULY, 1986

APPLICATIONS: Students in upper level university classes or in their beginning years of graduate studies who have mastered the fundamentals of astrophysics and are considering the possibility of future careers in astronomy or astrophysics are invited to apply on the attached forms by *30 November 1985*. Proven skills in mathematics or physics at the university level plus demonstrable signs of genuine interest in research are the prime qualities sought for in candidates. Twenty to twenty-five students will be selected and it is planned that at least one-third would come from developing countries. Otherwise, selection will be made without reference to race, religion, national origin, sex, or physical handicap.

FINANCES: Students from developing countries will receive scholarships to cover at least 75% of all costs including travel. Other students will be expected to pay their travel and living costs but economical living and meal arrangements will be made. Lunch each day will be offered *gratis* to all. There are no other costs associated with the school.

FACULTY: Dr. Victor M. Blanco, Cerro Tololo Interamerican Observatory, La Serena, Chile.
Dr. Martin F. McCarthy, S.J., Vatican Observatory, Vatican City State, Director of the School.
Dr. Vera C. Rubin, Carnegie Institution of Washington, Washington, D.C., USA.
Assisted by the Astronomers and Staff of the Vatican Observatory.

TOPICS: Galaxies and the Distribution of Matter in the Universe
Spectral Classification of Stars and Its Physical Basis.

TOPICS: Galaxies and the Distribution of Matter in the Universe
Spectral Classification of Stars and Its Physical Basis.

DESCRIPTION: Since the reform of the Calendar in 1582 there has been a long tradition of research in observational astronomy at the Vatican, highlighted in recent decades by various Study Weeks on such topics as stellar populations, active galactic nuclei, spectral classification, and cosmology. With a desire to pass on these traditions and also to nourish modern observational astronomy among young aspirants, the Vatican Observatory initiates a series of Summer Schools in observational astronomy. In addition to the principal topics to be given by the invited faculty students will have the opportunity to discuss research with members of the faculty and with the observatory staff whose research interests are listed in the enclosed brochure. Two lectures will be given each morning to be followed by laboratory exercises, library research, and seminars in the afternoon and evenings on five days per week. During free time the cultural and recreational facilities for which the Castelli Romani are renowned will be made available. No formal course credits will be given but statements of work accomplished can be supplied. Students must have a working knowledge of English, which will be the official language of the school. Faculty and staff members can assist students, as required, in other languages.

Dr. George V. Coyne, S.J.
Director, Vatican Observatory
V-00120 Vatican City State

UNESCO Regional Offices

At the request of the scientists attending the activities of the ICTP, we publish in this issue the addresses of the UNESCO Regional Offices. The Addresses of the Permanent Missions to UNESCO as well as those of the Permanent Missions to the IAEA will be published in the next issue.

Mr. A. Bekoe
Director
Unesco Regional Office of Science
and Technology for Africa (ROSTA)
P.O. Box 30592
NAIROBI
(Kenya)

UNESCO NAIROBI
Tel.: 25861/25868
Telex: 22275

Mr. G. Malek
Director
Unesco Regional Office of Science
and Technology for Latin America
and the Caribbean (ROSTLAC)
1320-24 Avenida Artigas
P.O. Box 859
MONTEVIDEO
(Uruguay)

UNESCO MONTEVIDEO
Tel.: 411807/405734
Telex: 22340

Mr. S. Derkatch
Director
Unesco Regional Office of Science
and Technology for South and Central
Asia (ROSTSCA)
Unesco House
Jor Bagh 17
(Lodi Road)
Jor Bagh 17
(Lodi Road)
NEW DELHI 110003
(India)

UNESCO NEW DELHI
Tel.: 618092/618093
Telex: 2611UNDEVPRO

Mr. V. Prakash
Director
Unesco Regional Office of Science and
Technology for South East Asia (ROSTSEA)
United Nations Building
2nd Floor
Jalam Thamrin 14
273/JKT Tromolpos
JAKARTA
(Indonesia)

UNESCO JAKARTA
Tel: 321308
Telex: 44178 UNDEVPROIA

The Director
Unesco Regional Office of Science and
Technology for the Arab States (ROSTAS)
7, Place de Fontenoy
B.P. 307
75700 PARIS
(France)

UNESCO PARIS
Tel.: 5681000
Telex: 204461 PARIS

Mr. H. Teller
Unesco Representative for Science and
Technology
Office of the Unesco Representative for
Science and Technology
5-15-3 Jianguomenwai
Waijiaogongyu
5-15-3 Jianguomenwai
Waijiaogongyu
BEIJING
(People's Republic of China)

UNESCO BJ
Tel.: 521725/522828
Telex: 210150 ESCBJ CN

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 on initiatives in their home countries. Suggestions and criticisms should be addressed to: A.M. Hamende, ICTP.