

GALILEO  
BUILDING

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# INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

NEWS FROM ICTP

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## NEWS FROM THE ICTP

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### THE 20th ANNIVERSARY OF THE INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS

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On 4 October 1964, the International Centre for Theoretical Physics started its activities with an extended course on Plasma Physics. This first activity was celebrated in a meeting entitled "Twenty Years of Plasma Physics" organized by several prominent physicists who had taken part in the 1964 courses either as Directors or Lecturers, such as Profs. C. Oberman (Princeton, USA) and Prof. W.W. Thompson (USA) or as participants such as Prof. R.N. Sudan (USA) and Prof. B. McNamara (Livermore, USA). However the actual celebration of the 20th Anniversary took place on 12 October 1984 in a week where three meetings were held at the Centre simultaneously; i.e. the General Assembly of the International Union for Pure and Applied Physics, the International Conference on Physics for Development, and the Symposium on the State of Physics and Mathematics in Africa. The Right Honourable G. Andreotti, Minister for Foreign Affairs of the Government of Italy had kindly accepted the invitation to visit the ICTP on this occasion. Before the ceremony itself, the Minister met for about one hour with a group of 50 scientists from Africa, Asia and Latin America, who expounded their views on the role of the ICTP in relation to the problems of scientific and socio-economic development of their home countries.

At 11:30 a.m., Professor Abdus Salam, Director of the ICTP since 1964, opened the session in the Large Lecture Hall of the Centre. Dignitaries from the local political, administrative, and academic scene were there, as well as more than 300 scientists.

In his address, Professor Abdus Salam welcomed Minister Andreotti and conveyed his gratitude to the Italian Government from the entire community of scientists from the Third World for having made the creation of the Centre a reality and for its unique devotion to world development. For the future, Professor Abdus Salam expressed the hope that the ICTP be given a mandate and the means from the Department for Cooperation to Development of the Italian Ministry of Foreign Affairs, to help not only the work of individual physicists, as in the past, but also to build up physics and mathematics communities in the developing countries through the core of the 400 present and past Associate Members of the ICTP, and to stimulate new research centres with the help of the IAEA and UNESCO.

Professor A. Zichichi, member of the ICTP Scientific Council thanked, in his keynote speech, Minister Andreotti for his constant commitment to the promotion of science and culture in the Third World.

He then described in detail the achievements of the ICTP in its 20 years of operation. The contribution of the Centre to science includes original work on symmetries in elementary particle physics, supergravity, and supersymmetry, theory of gravitation and particularly electroweak gauge theory for which Professor Abdus Salam has been awarded the Nobel Prize for Physics in 1979. In condensed matter physics, scientists of the ICTP have contributed to significant advances in the theory of the processes of crystallization and fusion, the electronic and vibrational states in disordered systems as well as in the theory of the structure of dense plasmas, liquid metals and molten salts. In plasma physics, major scientific results include fundamental contributions to the study of destruction of magnetic surfaces in Tokamaks and that of collisional shocks in space plasmas. Most of the top physicists of the world have visited the Centre or collaborated with it, including some 20 Nobel Laureates.

In the view of Professor Zichichi, the presence of a prestigious research institution such as the ICTP, in Trieste, has enhanced the international image of Italy in relation to developing countries. A large number of Italian physicists have been given an opportunity to participate in the high-level programmes and keep abreast with the latest progress in physics and in mathematics. The existence of the Centre in Italy has simulated many international initiatives such as the Italy-Nigeria agreement for the construction of a University in Nigeria, the creation in Trieste and in India of a UNIDO Centre for Biotechnology, the establishment in Trieste of a Research Area, of the International School for Advanced Studies, and of the Third World Academy for Sciences. Also the visits of some 11,000 physicists from developing countries in twenty years have contributed to the reputation of Italy as a genuine partner in cooperative ventures in the Third World.

The impact of the ICTP on the advancement of science in developing countries is not less impressive according to Professor Zichichi. The Centre has, through its Associate and Federation Schemes, instituted a powerful means of counter-acting the brain-drain. It has also contributed in a most decisive way to the nucleation of new scientific subjects of particular relevance for developing countries. Such subjects, to quote only a few, include topics such as Monsoon Dynamics, Physics of Desertification, Physics of Oceans and Atmosphere, Condensed Matter Physics, Laser Physics, Biophysics, Physics and Energy, Soil Physics, Physics of Communication, Physics of Microprocessors. The Centre has not hesitated to shift from fundamental physics to subjects at the interface of pure science and its application, with a strong accent on modern high-technology. Due to its encouragements, research communities have recently been created in developing countries where nothing else existed before.

For the future, Professor Zichichi recalled that the Minister Andreotti had emphasized to him recently that a "new initiative was needed to build up, not only individuals and their work - as the Centre has done so far so successfully - but entire communities in developing countries." Therefore, a network of International Centres devoted to various aspects of physics and mathematics was now needed, with the ICTP providing the necessary coordination. This new action should be undertaken in cooperation with the newly established Third World Academy for Sciences.

Professor Zichichi then summarized in yearly financial terms the requirements of the ICTP:

1.5 million US\$ for the consolidation and extension of present activities - including the provision for scientific staff, 3 million US\$ for the consolidation and extension of the training-for-research programmes and of the Associate and Federation schemes; 2 million US\$ for the creation of training and demonstration laboratories in micro-electronics, laser physics, fiber optics, and for the consolidation of the ICTP programme for training in Italian Laboratories; and 2 million US\$ for the financing of the network of International Centres in the Third World. He concluded by stating that the ICTP had fulfilled the needs of Science, of Italy and of the developing world.

In his reply to Professors Salam and Zichichi, Minister G. Andreotti confirmed the constant interest of his Government in the Centre, a symbol of efficiency for the betterment of North-South relations. He had personally followed its development since its creation and noted its continuous expansion despite temporary difficulties which had been overcome since. He paid a tribute to its Director, Prof. Abdus Salam, his collaborators and all those who have given their contribution for the success of the Centre. He also noted with pleasure that the growth of the Centre had not witnessed a proliferation of bureaucracy, as is often the case in other organizations, and that the operational flexibility had been retained. He noted as well that the ICTP had widened its scope so as to encompass the fields of physics which are essential for the cultural, social and economical development of Third World countries.

In his view, scientific initiatives which are by no means less important than food and industrial aid, must be a priority item in the policy of the Italian government for the cooperation to development, as they will result in the building up of endogenous know-how, which, together with the contribution of high technology, will contribute to local autonomous development. The profound transformation which is presently affecting the industrialized countries of the world could well widen the gap between North and South if no sufficient attention was paid to international scientific collaboration.

For Minister Andreotti, the ICTP represents a model for scientific cooperation and every effort should be made to encourage the creation of important scientific communities in developing countries. In his opinion, newly established National Research Councils in African countries and the Third World Academy for Sciences were important steps towards this collaboration. He felt that the ICTP should be provided with the proper means for the strengthening and diversification of its activities so that scientists will be in a position not only to contribute to the development to their home country, but also to play a role in international issues, for example, such as that of reduction of armaments. He then announced that, in reply to Professor Zichichi's exposition, he would propose a budget of 10 million US\$ (i.e. 1.5 million more than Professor Zichichi's) for the 1985 programme of the ICTP, to the Inter Ministerial Committee of the Government of Italy.

He concluded by assuring Prof. Abdus Salam that his government will always support the ICTP not only because of its achievements, but also because the ICTP has had faith in the Italian Government.

Other personalities addressed the audience: Prof. M. Zifferero (IAEA) who expressed the gratitude of the Directors General of the IAEA and UNESCO to the Minister and the Italian Government, Prof. Abdus Salam and all those who have made the ICTP a success; Professor P. Budinich, Director of the International School for Advanced Studies and Deputy Director of the ICTP until 1978, who underlined the international role of the city of Trieste in the cultural and scientific life; Prof. R. Marshak, co-author of the 'Three Wise Men Report'\*; and Professor F. Allotey of Ghana, President of the ICTP African Friends Society of Physicists and Mathematicians.

#### THE IUPAP GENERAL ASSEMBLY AND THE INTERNATIONAL CONFERENCE ON PHYSICS FOR DEVELOPMENT

8 - 13 October 1984

This year the International Union for Pure and Applied Physics had selected the ICTP as a base for its General Assembly. On the other hand, the ICTP had, a year ago, planned a conference on physics conferences as a follow-up of its weekly lectures programme on Physics and Development which has been in operation since the beginning of 1982. It was natural to hold both meetings at the same place and on the same dates in order to maximize the interaction between the members and delegates of such a prestigious institution as IUPAP, the participants in the ICTP conferences who had been invited from developing and from industrialized countries and the Africans whose international symposium was due to start on 12 October.

In fact, on the two afternoons when IUPAP did not schedule any of its General Sessions, a common scientific session was covered with talks on Science and Industry (P.R. Aigrain), The Unification of Fundamental Forces (Abdus Salam), Optical Communication in Brazil (J.E. Ritter), The manufacture of Silicon-Based Material (A.E. Vasudeva-Murthy), and Micro-electronics Research in Canada (J.W. McGowan). The programme included three General Sessions, (Physics and Technology for Development, followed by the Role of Physics in Development, Problems of Research and Education in Physics as Applied to Development), and five workshops (Physics of Materials, Lasers, Micro-electronics, and Communications Physics, Physics and Energy, the Role of Physics in Managing and Protecting the Environment, Physics and Medicine), and a Round Table on the possible action in favour of Physics and Education in developing countries.

As a result of these discussions, the participants put forward the following recommendations:

1. To work for the strengthening of international cooperation in physics and, in particular, the application of physics for development in all appropriate individual, institutional and collective modes.
2. To support the continuation, strengthening and appropriate expansion of the activities of the Centre.
3. That scientific bodies (such as the APS, the EPS, and the JPS) promote the placement and financing of physicists from developing countries in academic and industrial laboratories and report their plans and results to the Chairman of the Commission on Physics for Development of IUPAP.
4. A joint letter from the Chairman of the Commission on Physics for Development of IUPAP and the Director of ICTP be written to the physical societies in developed countries requesting them to take the lead within their countries in strengthening and expanding institutional commitments to and links with physicists and physics institutions in developing countries.
5. To encourage physicists with successful experience in pre-university science education, in developed and developing countries, to share their approaches and projects with colleagues in other countries, individually and through their professional societies.
6. To give special encouragement to graduate students and post-doctoral scientists from developing countries to study and become proficient in the more relevant disciplines of basic physics, while being made cognizant of the applications of these disciplines to technology and development; and that those graduate students and post-doctoral scientists from developing countries can study about and be able to contribute to relevant areas and their applications in physics.

\* a feasibility study submitted in 1962 to the Director General of the IAEA, Dr. Eklund, by Profs. Van Hove, Tiomno, and Marshak, which became the basis for the creation and operation of the ICTP

7. To support the emerging initiatives towards horizontal "South-South" cooperation through international organizations and directly from developed countries to establish networks between international and regional centres for research and development, along the lines suggested by the ICIP.

Special recommendations based on the discussions and reports of the workshops on specialized areas of physics were as follows:

1. Developing countries obtain training for and support a group of physicists who, in addition to working on research programmes, will be able to advise their governments on what to buy and what not to buy.
2. Developing countries place emphasis on the training and support of their physicists in those areas of physics that may be applied to research and development on solar energy, and that developing countries, with the aid of the international community, consider the establishment and maintenance of national and regional solar energy research and development centres.
3. Developing countries devise and periodically update national energy utilization plans.
4. A study Committee of twelve members be formed to present a report within one year of its creation, and to make a presentation, three months thereafter to a Review Panel of six members.
5. That the IUPAP, ICTP, and other agencies support the newly formed Third World Association of Medical Physics whose objectives are:
  - a. to help the organization of colleges, congresses, training courses and other human resource activities in Medical Physics for the Third World.
  - b. to act as a coordinating centre for Medical Physics regional or national societies of the Third World as well as foster cooperation with those from advanced countries.
  - c. to solicit possible funding for fellowships and grants for scientists from the Third World.
  - d. to help to place scientists from the Third World and foreign scientists in the Third World in Medical Physics Programmes for the Third World.
  - e. to consider the creation and maintenance of new regional experimental research centres in Medical Physics in selected developing countries.
  - f. that the IAEA expand the scope of its physics activities in the area of ionizing radiation to include all medical uses of ionizing radiation in particular X-rays for diagnosis and therapy.
  - g. that the WHO expand the scope of its activities to include Medical Physics.

The Workshop on the Role of Physics in Managing and Protecting the Environment recommended:

the workshop on the role of physics in managing and protecting the environment recommended:

1. The use of space images and scientific methodology to identify chemistry and mineralogy and to search for water resources in various arid lands in the world.
2. The spreading of knowledge of computer techniques recently developed in the analysis of earthquake catalogues among scientists from developing countries through workshops such as the one recently organized by the ICIP.
3. The establishment of a network of ground based meteorological stations in developing countries, equipped with modern electronic devices and the training of local scientists in this area.
4. The establishment of a programme on physics applied to agriculture in developing countries, through collaboration projects between the advanced and developing countries.

116 Scientists came to the Centre specifically to attend this Conference. The delegates of the IUPAP General Assembly numbered 72 in all.

## SYMPOSIUM ON THE STATE OF PHYSICS AND MATHEMATICS IN AFRICA

In August 1983, some thirty African scientists taking part in the summer programmes of the ICTP created the ICTP Friends Society of African Physicists and Mathematicians. The Society counts now more than 200 members. The Symposium on the State of Physics and Mathematics in Africa is the first initiative of the Society which opted for Trieste as a natural place for its deliberations. The meeting was held from 8 - 16 October and its sessions were tailored so that participants could attend parts of the IUPAP General Assembly as well as the International Conference on Physics for Development. Prof. F. Allotey (Ghana) is its President, and Prof. C. Nwachuku (Nigeria) its Secretary. They were responsible for the programme which included presentations on regional and international cooperation, on teaching of mathematics and physics at all levels, as well as discussions of scientific papers. As a result of the symposium, participants recommended the following action in the near future:

1. To organize colleges/workshops in Africa on local and environmental problems (i.e. Physics of Climate and Applications to Agriculture and Environment - East Africa, 1985; Mathematical Modelling, with Applications to Local Problems - West Africa, 1986). These activities should cater to about 60 African participants for a 3 to 4 week period.
2. To organize at least one regional activity a year in Africa aimed at smaller groups from the region, and concentrating on topics of local interest.
3. To get support from International and National bodies for African physicists and mathematicians to take part in training and re-training programmes such as the ICTP Scientific Activities, Italian Laboratories Programme, SISSA programme, and other similar programmes.
4. That a Centre for physics and mathematics, with close ties to the ICTP, be established in Africa.
5. That a Regional Instrumentation Centre for the maintenance of scientific equipment and for training and re-training of technicians be set up in Africa. The purpose is to avoid costly duplication of expensive equipment.
6. The compilation of a comprehensive "Who's Who in African Physics and Mathematics" in order to facilitate interaction between individuals and groups in their field.
7. That an exchange programme between African institutions be instigated in order to exploit the internal manpower resources available in the continent.
8. To encourage the establishment of National Institutes for Physics and Mathematics with the goal of laying the ground-work for a scientific and technological take-off in Africa.
9. To inform would-be employers of the specific needs that physicists and mathematicians can fill, and to restructure existing courses to fill these needs without losing the core subject material.
10. By the use of questionnaires and other teaching tools, to control the performance of teaching in existing schools and universities.
11. To stimulate the publishers of textbooks for school and university use to provide good quality books at reasonable prices.

The success of this symposium and the consensus of the participants on the recommendations give good grounds for future activities.

## NOBEL PRIZE LAUREATE FOR 1984, PROFESSOR C. RUBBIA AT THE ICTP

The names of the 1984 Nobel Prize Laureates in Physics were announced on 17 October. On that day, Professor C. Rubbia from CERN, who shares the prize this year with Dr. S. Van der Meer (CERN) for their discovery of the W and Z particles, was at the ICTP for his first lecture as a Nobel Laureate. The discovery of the W and Z particles confirms the "Electroweak" theory for which Profs. Abdus Salam, S. Weinberg, and S. Glashow, won the Nobel Prize for in 1979. Prof. Rubbia was welcomed by Profs. Abdus Salam, L. Bertocchi, P. Budinich, and all the physicists and staff of the ICTP.

Prof. C. Rubbia, born in Gorizia, near Trieste, in 1934, earned his degrees at the University and Superiore of Pisa, Italy, Harvard University, and Geneva. He has worked in Rome, CERN, Batavia (Illinois/USA), and Brookhaven National Laboratory (USA). Since 1976 Prof. C. Rubbia is actively involved in the development of the accelerator-collider at CERN. Since 1972, he also lectures as a Professor of Physics at Harvard University.

#### ANNUAL MEETING WITH REPRESENTATIVES OF THE ITALIAN GOVERNMENT

The annual meeting with the Representatives of the Italian Government took place on 30 November 1984. Its purpose was to review the activities of the ICTP in 1983 and 1984 and to examine its programmes for the future. The meeting also provided an opportunity to examine the proposal of Minister Andreotti to increase the financial contribution of the Government of Italy to the ICTP in 1985. From the discussion, it appears that a sizable part of the increased funds will be transferred to the ICTP for approved special projects only. The funds will be allocated by the Department for Cooperation to Development of the Italian Ministry of Foreign Affairs. The meeting was attended by: Dr. M. Visconti, (ENEA), Dr. C. Gasperoni, (Italian Ministry of the Treasury), Dr. E. Ricotta, (Department of Cooperation to Development), Dr. R. Ruggiero, (Italian Mission to IAEA in Vienna), Dr. A. Martinazzoli, (Department of Cooperation to Development), Dr. C. Morselli, (CNR), Dr. A. Forti (UNESCO), Mr. C.R. O'Neal (IAEA), Prof. Abdus Salam (ICTP), Prof. P. Budinich (SISSA), Dr. L. Stasi (SID), Prof. G. Furlan, (University of Trieste and ICTP), Prof. L. Bertocchi, (ICTP), and Dr. A.M. Hamende, (ICTP).

#### VISIT TO THE CENTRE OF DELEGATION FOR THE UNIDO CENTRE FOR BIOTECHNOLOGY

A new International Research Centre will soon take off in Trieste, the UNIDO (United Nations Industrial and Development Organization, based in Vienna), International Centre for Biotechnology. At the same time, a centre equal to this in importance will be created in India under the same UNIDO sponsorship.

Delegates from 20 countries met in Trieste from 3 to 5 December to discuss the next operational steps and to appoint the project leader. On the last day of the meeting, the delegation visited ICTP and were introduced to its activities by Professor P. Budinich, who took this opportunity to offer the scientific cooperation of the Centre to this new endeavour for the benefit of the Third World.

#### ANNUAL MEETING OF THE SCIENTIFIC COUNCIL

The 18th meeting of the Scientific Council of the ICTP was held on 3 December 1984 under the Chairmanship of Prof. S. Lundqvist (SWEDEN). The Scientific Council of the ICTP is an advisory body to the Director General of the IAEA and of UNESCO and is presently composed of Prof. A. Al-Aqeel (KUWAIT), Prof. Fang Li Zhi (CHINA), Prof. Malu Wa Kalenga (ZAIRE), Prof. M.A. Markov (USSR)\*, Prof. R. Marshak (USA)\*, Prof. E. Posada (Colombia), Prof. H. Schopper (SWITZERLAND)\*, Prof. Yash Pal (INDIA), Prof. C. Zeeman (UK), Prof. A. Zichichi (ITALY)\*, Prof. M.N. Rosenbluth (USA).

The Scientific Council paid a tribute to Prof. A. Kastler (FRANCE), Prof. P.A.M. Dirac (FRANCE), and Sir George Deacon (UK) who all passed away in 1984.

Prof. Kastler, Nobel Laureate, had chaired the scientific Council from 1971 to 1982, and had directed the programmes in atomic, molecular and laser physics. His decisive influence in French governmental circles has made it possible to hold colleges in science teaching and non-conventional energy in the French language on a regular basis.

Prof. Dirac, Nobel Laureate, was a great friend of the ICTP and had been invited several times as a distinguished guest. The Centre had organized a symposium on "The Physicist's Conception of Nature" in 1972 on the occasion of his 70th birthday.

Sir. George Deacon, had been the Director of the College of Physics of Oceans and Atmospheres in 1975, the first of a series of colleges which are now held every second year on subjects pertaining to the Physics of the Environment and of Natural Resources.

\*Were unable to attend

The Council expressed its appreciation for the activities carried out by the Centre since its last meeting in December 1983 as well as for the programmes for 1985.

Much of the one-day discussion dealt with the strengthening of the scientific staff at the Centre and future initiatives aimed at helping scientific communities in developing countries. It also dealt with the setting-up of small demonstration laboratories as a back-up to the programmes in microprocessor physics and technology, lasers and communication physics.

In addition to the members of the Council the following were present: Dr. H. Blix, (Director General of the IAEA), Dr. M. Zifferero, (IAEA), Mr. C.R. O'Neal, (IAEA), Dr. V. Zharov, (UNESCO), Dr. A. Forti, (UNESCO), Prof. Abdus Salam, (ICTP), Prof. P. Budinich, (SISSA), Prof. L. Bertocchi (ICTP), and Dr. A.M. Hamende, (ICTP).

All scientists present at the Centre were invited to dinner with the members of the Council at the ICTP cafeteria.

#### POST-DOCTORAL FELLOWS AT THE ICTP

The following physicists have joined the ICTP this year:

- OMAR E. FODA :** (Egypt) - PhD. Purdue University, Indiana, USA. He is currently working on various aspects of the anomaly-free type superstring models.
- BERGSHOEFF, ERIC:** (The Netherlands) - PhD. Leiden, The Netherlands, formerly worked at Brandeis University, USA, and is presently working on supersymmetry and supergravity in both four and higher dimensions and supersymmetric skyrmions.
- SAHDEV, DESHEEP:** (India) - PhD. from Western Reserve University, USA. He is currently working on investigating the mechanism for spontaneous symmetry breaking in Kaluza-Klein theories by studying compactifications on to non-symmetric internal spaces.
- SARMADI, M.H.:** (Iran) - PhD. University of Pittsburgh, USA. He is currently working on the possibility of flattening the 4-dimensional space-time in Kaluza-Klein theories by including the one loop quantum fluctuations. Also studying higher dimensional anomalies and Kaluza-Klein cosmologies.
- VAYONAKIS, G. :** (Greece) - PhD. University of Sussex, UK. He is currently writing a review article for "Surveys in High Energy Physics" on ground unified theories, phase transitions and cosmology. Special interest in higher dimensional theories and their cosmology.

#### PRIZES AND MEDALS

##### LOMONOSOV GOLD MEDAL

In 1983, Prof. Abdus Salam was awarded the Lomonosov Gold Medal, the highest award of the USSR Academy of Sciences. Prof. Abdus Salam was awarded this medal for his outstanding work in physics, and will receive it at the Annual General Assembly of the USSR Academy of Sciences in Moscow on 26 December 1984.

##### GOLD MEDAL OF THE BANGLADESH ACADEMY OF SCIENCES

Professor Shamsheer Ali, Professor of Physics at Dhaka University, has been selected for the award of the Gold Medal of the Bangladesh Academy of Sciences for the Senior Group in the field of Physical Sciences.

Professor Shamsheer Ali, a nuclear physicist, is a Senior Associate Member of the ICTP. His collaboration with the Centre has started at its inception.

The Centre extends its warmest congratulations for this award.



### THE ICTP ANNUAL PRIZES

The Institution of the ICTP Annual Prize was approved by the Scientific Council of the Centre in 1982. The Prize consists of US\$ 1,000, an ICTP medal and a certificate in which major contributions of the prize winner is mentioned.

The 1983 Prize, which was in honour of Professor Alfred Kastler in the field of Solid State, Atomic, and Molecular Physics, was awarded to Dr. Ganapathy Baskaran from the University of Madras, India, in recognition of his contribution in the field of Solid State Physics. The Prize Ceremony took place at the Centre in May 1984, during the Solid State Spring College.

The 1984 Prize is in honour of Professor M. Sandoval Vallarta (MEXICO) who chaired the Scientific Council of the Centre from 1964 to 1971. He died in 1977. This year's prize is given in the fields of High Energy Physics, Nuclear Physics and Plasma Physics. Dr. Ricardo M.O. Galvao (BRAZIL) has been elected this year in recognition of his contribution in the field of Plasma Physics.

### SCIENTIFIC ACTIVITIES SINCE OCTOBER 1984

From 10 September to 19 October, the autumn college on the troposphere, stratosphere, and mesosphere took place at the Centre. The extended course was directed by Profs. Sir Granville Beynon (Univ. College of Wales, Aberystwyth, Wales, UK), A.H. Cook (Univ. of Cambridge, Cambridge, UK), A.P. Mitra (National Physical Lab., New Delhi, India). The purpose of the College was to provide a general introduction to the properties of the neutral atmosphere, and lectures were included on dynamics, chemistry, minor constituents and electrifications, as well as radio propagation. Special attention was given to methods of measurement and applications to pollution and tropical thunderstorms, and the Middle Atmosphere Programme was discussed.

Main Topics were Measuring techniques and measurements; Radiowave propagation in the lower atmosphere; Dynamics, mass motions, tides, waves; Numerical modelling; Pollution; Atmospheric electricity, tropical thunderstorms; Chemical composition, minor constituents, Middle atmosphere programmes

Some 110 scientists working in atmospheric and geophysics participated in this extended course; 97 of them represented developing Member States.

In continuation of its activities in applicable mathematics, the Centre held a workshop on dynamical systems from 22 October to 9 November. Professors E.C. Zeeman (Mathematics Institute, University of Warwick, UK) and J. Palis (IMPA, Rio de Janeiro, Brazil) were the Directors of this activity. J. Palis (IMPA, Rio de Janeiro, Brazil) were the Directors of this activity.

A follow-up to the summer school held in August 1983, the main purpose of the Workshop was to bring together the scientists (from all over the World) that most profited from that activity to discuss the results of their current research and to give them the opportunity to conceive new plans. To help fulfil this purpose, in addition to the researchers participating, a few outstanding scientists were also invited; these included the physicist M. Feigenbaum and the mathematicians D. Sullivan, S. Newhouse and K. Schmidt.

The Main topics discussed were Bifurcation theory; Ergodic theory; Holomorphic dynamical systems; Strange attractors and chaos; Asymptotic measures; Catastrophe theory

67 mathematicians contributed to the workshop activities, 48 of them from developing Member States.

The workshop was followed by an autumn college dedicated to semigroups, theory and applications (12 November - 14 December). This course was directed by Profs. H. Brezis (Univ. of Paris, France), M.G. Crandall (Univ. of Wisconsin, USA) and F. Kappel (Univ. of Graz, Austria). The aim of the course was to introduce the theory of semigroups and evolution equations, to survey part of the current related knowledge, to draw attention to research problems and to show how to use the abstract results in practical questions related to partial and functional differential equations.

Main Topics included Basic theory of linear semigroups; Theory of nonlinear semigroups; Semilinear evolution equations; Semigroups applied to partial differential equations; Semigroups applied to delay equations; Control theory; Problems in mathematical physics and mechanics

Of the more than 135 scientists taking part in this extended course, 73 were from developing countries.

In all, during 1984, over 2,075\*\* scientists have visited the Centre, accounting for approximately 1,850 man/months. The percentage of visitors from developing Member States was 49.9; these, however, accounted for 75.5% of the total man/months.

SOLID STATE FELLOWS AND VISITING SCIENTISTS - 1985

B. Alascio (Argentina)	- January - June
A. Alam (Pakistan)	- January - March
T. Araf (USA)	- January - November
M. Daniel (India)	- March - May
M. K. El Mously (Egypt)	- 6 months
J. O. A. Idiodi (Nigeria)	- January - July
A. Mookerjee (India)	- January - June
G. Mukhopadhyay (India)	- July - June 1986
M. Olvera de la Cruz (Mexico)	- October - September 1986
P. Perez (Chile)	- August - July 1986
H. Puzkarski (Poland)	- 3 months
K. R. Subbaswamy (India)	- January - February
J. S. Thakur (India)	- January - December
F. Vericat (Argentina)	- January - December
r. Vericat (Argentina)	- January - December

\*\* these figures are subject to year end review.

LONG TERM HIGH ENERGY VISITORS

1. Ametller, L. Spain 1 Oct 84 - 1 Oct 85  
 Dept. de Fisica  
 Universidad de Barcelona  
 Barcelona  
 Spain

2. Aref'eva, I. USSR 1 month 1985/86  
 Steklov Math. Institute  
 Vavilova Street 42  
 117 066 GSP1 Moscow  
 USSR

3. Aulakh, C. India till 6/10 85  
 c/o ICTP  
 Trieste

4. Bergshoeff, E. Netherlands 4/9/84-4/9 85  
 Brandeis Univ.  
 Waltham, MA  
 USA

5. Chetyrkin, K. USSR 1 month 85 or 86  
 Inst. for Nuc. Res.  
 Academy of Sciences  
 60th October Anniversary Prospect 7a  
 Moscow 117312  
 Moscow 117312  
 USSR

6. Chukwumah, G. Nigeria 6 mths from March 85  
 Physics Dept.  
 Univ. of Nigeria  
 Nsukka  
 Nigeria

7. Dalafi, H. Iran SSA till 1985  
c/o ICTP  
Trieste
8. Diney Khan, M. Mongolia 10/11/84 - 10/2/85  
Academy of Sciences  
Ulan Bator  
Mongolia
9. Dobriev, V.K. 4 mths in 84/85  
Physik Inst.  
Technische Universitat  
Clausthal  
Fed. Rep. Germany
10. Dong, Fang-Xiao China 4 months to include HE W/S 1985  
Inst. High Energy Physics  
Box 918  
Beijing  
People's Rep. China
11. Dong, Ming-De China 2 months in 1985  
Inst. Theoretical Physics  
Box 2735  
Beijing  
People's Rep. China
12. Dutta, M. India 2 wks in Feb or Oct 1985  
Physical Science Inst.  
Calcutta  
India
13. Eissa, N. Egypt six weeks in 1985  
Physics Department  
Al Azhar University  
Nasr City, Cairo  
Egypt

14.	Foda, O. c/o ICTP Trieste	Egypt	till 31/7 85
15.	Hara, Y. Inst. of Physics Univ. of Tsukuba Ibaraki Japan	Japan	1-2 mths in 1985
16.	Hussain, F. Dept. of Physics Quaid i Azam University Islamabad Pakistan	Pakistan	tentatively 6 mths 85
17.	Kallies, W. Sektion Physik Humboldt Universitat Berlin DDR	DDR	1 month spring 85
18.	Kapoor, R. Indian Institute of Astrophysics Bangalore 560 034 India	India	1 month after 13 April 85
19.	Kapuscik, E. Ins. of Nuc. Physics ul. Radzikowskiego 152 31342 Karkow Poland	Poland	1 month 1985
20.	Khan, I. c/o ICTP Trieste	Pakistan	31/1 85

21. Koh, I.G. Korea 2 mths Jan-Feb 85  
Blackett Laboratory  
Imperial College  
London  
UK
22. Li, Tie-Zhong China 4 months to include HE W/S 1985  
Inst. High Energy Physics  
Box 918  
Beijing  
People's Rep China
23. Lukierski, J. Poland 4 mths during 85  
Physics Institute  
Wroclaw  
Poland
24. Mallik, S. India 1 mth March or April 85  
Dept. of Physics  
University Berne  
Berne  
Switzerland
25. McInnes, B. Australia 2 months April/May 85  
NUS  
Dpt. of Mathematics  
Singapore 0511  
Rep. of Singapore
26. Mihalache, G. Romania 1 mth Spring 85  
Dept. of Th. Phys. & Math.  
Univ. Bucharest  
Romania
27. Mukku, C. India 1 Jan - June 1985  
c/o ICTP  
Trieste

- |     |   |          |                       |    |
|-----|---|----------|-----------------------|----|
| 28. | Neto, J.<br>c/o ICTP<br>Trieste   | Brazil   | 28/7/84-29/7/85       | 21 |
| 29. | Palev, T.<br>Institute of Nuclear Research<br>and Nuclear Energy<br>Boul. Lenin 72<br>Sofia<br>Bulgaria | Bulgaria | 1 month spring 85     | 22 |
| 30. | Pasupathy, J.<br>Centre for Th. Studies<br>IIT<br>Bangalore<br>India                                    | India    | 1 mth Feb or Mar 85   | 23 |
| 31. | Pollock, M.<br>Res. Inst. for Fundamental Physics<br>Kyoto<br>Japan                                     | UK       | from March 85         | 24 |
| 32. | Raczka, P.<br>Physics Dept.<br>University of Warsaw<br>Warsaw<br>Poland                                 | Poland   | 1 mth Nov or Dec 1984 | 25 |
| 33. | Saffouri, M.<br>c/o ICTP<br>Trieste   | USA      | till March 85         | 26 |
| 34. | Sahdev, D.<br>Dept. of Physics<br>Pennsylvania Univ<br>Philadelphia, PA<br>USA                          | India    | 1 Oct 84-Oct 85       | 27 |

35. Samiullah, M. India 1 mth summer 85  
Physics Dept.  
Yarmouk Univ.  
Irbed  
Jordan
36. Santamarina, J. Chile 3-6 mths in 1985  
Inst. of Physics  
Universidad Austral  
Valdivia  
Chile
37. Sarmadi, M. Iran till 31/12 1984  
c/o ICTP  
Trieste
38. Sezgin, E. Turkey 1/10/84-30/9/86  
c/o ICTP  
Trieste
39. Shaposhnikov, M. USSR 1 mth Nov/Dec 1984  
Inst. for Nuc. Res.  
60th October Anniversary Prospect 7a  
117311 Moscow  
USSR
40. Sobouti, Y. Iran 6 mths from May 85
40. Sobouti, Y. Iran 6 mths from May 85  
Shiraz Univ.  
Iran
41. Srivastava, T. UK 15 June - 30 Sept. 85  
University  
School of Mathematics  
Leeds LS2 9JT  
England



42. Tarski, J. Poland 2 mths during autumn 84  
c/o ICTP  
Trieste
43. Vayonakis, C. Greece 4/10/84-3/10/85  
School of Physics  
Univ. of Sussex  
Brighton  
UK
44. Xue, Pei-You China 4 months to include HE W/S 1985  
Inst. High Energy Physics  
Box 918  
Beijing  
People's Rep. China

CALENDAR OF ICTP ACTIVITIES FOR 1985

- 21 January - 22 March COLLEGE ON LASERS, ATOMIC AND MOLECULAR PHYSICS  
Organizers: G. Amat, R. Bonifacio, A. Dymanus, P. Schaefer, O. Svelto.
- 25 - 29 March SECOND WORKSHOP IN NUCLEAR PHYSICS AT INTERMEDIATE ENERGIES  
Organizers: S. Boffi, C. Ciofi degli Atti and M. Giarni
- 15 April - 10 May COLLEGE ON SOIL PHYSICS  
Organizers: D. Gabriels and E. Skidmore - (including a Conference on  
"Energy flux at the soil atmosphere interface")
- 13 - 18 May WORKSHOP ON QUALITY CONTROL OF X-RAY EQUIPMENT  
Co-organized with European Federation of Organizations of Medical  
Physics (EFOMP) - Information from Dr. A. Benini, Servizio Fisica  
Sanitaria, Ospedale Maggiore, 43100 Parma, Italy
- 13 - 24 May WORKSHOP ON MATHEMATICS IN INDUSTRY  
Organizers; H. Neunzert, C. Storey, A.B. Tayler
- 20 - 23 May TESTS OF ELECTROWEAK PHYSICS - POLARIZED PROCESS AND OTHER PHENOMENA  
Organizers: B.W. Lynn, N. Paver and C. Verzegnassi
- 27 May - 21 June SPRING COLLEGE ON PLASMA PHYSICS: "CHARGED PARTICLE TRANSPORT IN  
PLASMAS"  
Organizers: ICTP Plasma College Committee, headed by W. Grossmann
- 11 June - 19 July SUMMER WORKSHOP IN HIGH ENERGY PHYSICS AND COSMOLOGY - (including a  
Conference on Grand Unified Theories)  
Organizers: G. Furlan, R. Inigo, J. Pati, D. Sciama, Q. Shafi
- 24 June - 6 September SUMMER WORKSHOP IN CONDENSED MATTER PHYSICS  
Organizers: P.N. Butcher, S. Lundqvist, N.H. March, E. Tosatti, M. Tosi

- 1 - 5 July SIXTH TRIESTE INTERNATIONAL SYMPOSIUM: "FRACTALS IN PHYSICS"  
Organisers: S. Lundqvist, L. Pietronero, E. Tosatti and M. Tosi
- 12 - 30 August WORKING PARTY ON MECHANICAL PROPERTIES  
Organizers: G. Caglioti and J.P. Hirth
- 27 - 30 August SEVENTH TRIESTE INTERNATIONAL SYMPOSIUM: "HOPPING TRANSPORT"  
Organizers: Committee, headed by P.N. Butcher
- 2 - 20 September CONFERENCE AND WORKSHOP ON THE PHYSICS OF NON-CONVENTIONAL ENERGY  
SOURCES AND MATERIAL SCIENCE FOR ENERGY  
Organizers: G. Furlan, N. Mancini, A.A.M. Sayigh, B.O. Seraphin
- 23 - 27 September TOPICAL MEETING ON KALUZA-KLEIN AND SUPER-KALUZA-KLEIN (TENTATIVE)  
Organizers: B. de Wit, M. Duff, J. Schwarz and E. Witten
- 30 September - 4 October TOPICAL MEETING ON PHASE SPACE APPROACH TO NUCLEAR DYNAMICS  
Organizers: M. Di Toro, W. Nörenberg, M. Rosina and S. Stringari
- 7 October - 1 November WORKSHOP ON SEMI-GROUPS AND APPLICATIONS (Follow-up to 1984 College)  
Organizers: H. Brezis, M. Crandall and F. Kappel
- 7 October - 1 November THIRD TRIESTE COLLEGE ON MICROPROCESSORS: TECHNOLOGY AND APPLICATIONS  
IN PHYSICS  
Organizers: C. Verkerk
- 3 - 4 weeks in November WORKSHOP ON DYNAMICAL METEOROLOGY  
Organizers: (tentative) J. Latham, and R.P. Pearce
- 4 November - 6 December COLLEGE ON REPRESENTATION THEORY OF LIE GROUPS  
Organizers: J. Rawnsley, E. Venentini
- 9 - 13 December WORKSHOP ON GRADED DIFFERENTIAL GEOMETRY  
Organizer: J. Eells

#### OUTSIDE ACTIVITIES

- 10 June - 5 July LATIN AMERICAN REGIONAL COLLEGE ON MICROPROCESSORS: TECHNOLOGY AND  
APPLICATIONS (Bogotá, COLOMBIA)  
Organizers: C. Verkerk, E. Posada and J. M. Trujillo Vargas
- .. November INTERNATIONAL WORKSHOP ON SAND TRANSPORTATION AND DESERTIFICATION IN  
ARID LANDS (Khartoum, SUDAN)  
Organizer: M. Hassan  
ARID LANDS (KHARTOUM, SUDAN)  
Organizer: M. Hassan

#### HOSTED ACTIVITIES

- 10 - 13 April CONFERENCE ON ACTIVE GALACTIC NUCLEI  
Organizers: SISSA and the Trieste Observatory
- April (3 days) CONFERENCE: NEW AVENUES IN THE USE OF PHYSICAL METHODS FOR DATING  
AND CHARACTERIZATION OF ARCHAEOLOGICAL FINDINGS  
Organizers: SISSA

#### 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. This informal "News" will be issued four times per year. The next issue is scheduled for March 1985.