



International Centre for Theoretical Physics

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Professor Abdus Salam, Director of the International Centre for Theoretical Physics receiving the honorary D.Sc. degree from Dr. Rodolfo Martin Campero, Rector of the University of Tucumán, Argentina, on 27 May, 1991, in the Main Lecture Hall of the ICTP.

Honorary D.Sc. Degree to Professor Abdus Salam

Professor Abdus Salam, Director of the International Centre for Theoretical Physics and President of the Third World Academy of Sciences, was honoured with the diploma of Doctor of Science, Honoris Causa of the University of Tucumán, Argentina. As Prof. Abdus Salam could not travel to Argentina, the ceremony took place in the Main Lecture Hall of the ICTP, Trieste, on 27 May 1991. The Rector of the University of Tucumán, Argentina, Dr. Rodolfo Martin Campero, gave the honorary D.Sc. degree to Professor Abdus Salam. In this function another prestigious certificate of Honorary Member of the Dante Alighieri Society of Tucumán, Argentina, was also given to Professor Abdus Salam by Dr. Alberto Contí, President of the organisation.

The University of Tucumán was honoured to propose the name of

Professor Abdus Salam to the Norwegian Nobel Prize Committee as a candidate of the University for the Nobel Peace Prize for 1991. The University for the Nobel Peace Prize for 1991.

Dr. Campero, Rector of the University, read the citation for the degree. The original citation is given as it is:

*"Professor Abdus Salam,
Ladies and Gentlemen,
Humanity aspires to follow the
footsteps of great men.*

*Every effort which society makes is
an attempt to decrease the gap which
exists between perceived imperfection
and real perfection.*

*And just as some personalities have
sometimes seemed tragic throughout the
history of the peoples, how many times
has humanity emerged triumphant and
strengthened by creative genius and by
the force of some noble spirit.*

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The National University of Tucumán, as a reaffirmation of those unchanging values of peace, liberty and justice towards mankind, has desired to confer the degree of Doctor Honoris Causa in this academic act, on Professor Abdus Salam, who serves as a distinguished example to all.

We can therefore understand why we are not only recognising the scientific work carried out by our prestigious Doctor Honoris Causa but also and above all the fact that he spends his time devoted to this cause.

It is of special significance that our University comes into daily contact with the deep gap which separates the countries of the North and those of the South and these marked contrasts merit the preoccupation and dedication of all nations to overcome them definitively.

This is the link which calls us to generate in all the corners of the globe equal opportunities to exploit equally and with solidarity the material and spiritual wealth which science, technology, education and work offer us.

These are the concrete questions which will make the empire of liberty and justice effective.

Thus, in an amalgamation of those elements which must constitute in a harmonious integration the essential pillars on which the international community of the 21st century will be built, we will find the possibility of cultivating peace in the hearts of men.

We know that the impossibility of access to technological development for the countries of the Third World is an enormous obstacle for the crystallisation of these aspirations.

It is for this reason that he who works in order to widen the frontiers of science must know that only if his work is perfected can it be an instrument to ennoble the individual.

Putting it in this way in the very centre of the universe as a first and last human, economic and scientific effort, does it acquire the authentic conditions for a person to find a suitable environment for the full expression of his potentialities.

If, to the untiring search for truth through science, equipped with the ethical and solidaristic content which we

mentioned, we also attribute the permanent preoccupation for the conquest of peace, we have characterised the personality of Professor Abdus Salam.

In a world marked by violence in its most dreadful forms, where war, hunger, drugs, or oppression are only shadows of reality, men like the one whom we are honouring today, keep the fire of hope burning and acquire the dimension of a vigil which maintains alert the conscience of humanity.

It is for this reason that it was our desire to hand over personally the title of Doctor Honoris Causa to Professor Abdus Salam, with which our National University of Tucumán recognises his merits and takes pride in counting on this academic but fundamentally spiritual association with this excellent man of sciences and untiring fighter for peace.

This has also motivated our University to propose the name of Professor Abdus Salam to the Norwegian Nobel Prize Committee as a candidate of our University for the Nobel Peace Prize for 1991.

We thus believe that in so doing, we will serve as an example to other universities to do the same.

Professor Abdus Salam
Men like you enrich humanity.

I hope that God will ensure that all your efforts will find fruit so that future generations can enjoy a world in which being and doing assume harmony in the universe.

This gives us the responsibility of following this aim more energetically but I am sure that with examples such as the one you have given us our task will not be

so difficult and will be crowned with success.

Many thanks."

After receiving the diploma from the hands of the Rector of the University of Tucumán, Argentina, expressed his gratitude for the distinction bestowed on him and briefly recounted his reminiscences of his early visit of Argentina and later acquaintance with the Argentinian scientific reality. — ♦

Debate over Global Warming: North Blames South

Courtesy of Courier,
March 29-April 4, 1991.

A recent report on global environment has touched off a heated debate that the North is trying to unjustly put a share of the blame for global warming on the South. The 383-page report, "World Resources 1990-91", has been prepared by the Washington-based World Resources Institute (WRI) in collaboration with the United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP).

Indian environmentalists Anil Agarwal and Sunita Narain of the Delhi-based Centre for Science and Environment (CSE) have complained that the report is politically motivated to perpetuate the current inequality between developed and developing countries in the use of the earth's environment and its resources.

Excessive accumulation of carbon dioxide, methane, chlorofluorocarbons (CFCs) and nitrous oxides in the atmosphere due to human industrial, agricultural and forestry activities have significantly contributed in warming up the global climate by trapping more radiant heat of the earth into the atmosphere (through Greenhouse effect). Scientists believe if the current trend continues warmer climate will increase the intensity of storms and cyclones, floods and droughts, melt polar ice caps raise the sea level and inundate human habitats and crop lands. The island nation of the Maldives may disappear while large portions of land masses of Bangladesh, India, Egypt and other low lying countries may be lost. For Bangladesh the effect will be disastrous because a greater number of people will have to be supported on a far weaker economic base.

In a study, Anil Agarwal, Director of



Professor Abdus Salam, Director of the International Centre for Theoretical Physics receiving the prestigious certificate of Honorary Member of the Dante Alighieri Society of Tucumán, Argentina, from Dr. Alberto Conti, President of the organization.

CSE and Sunita Narain say that by advancing the argument that the Third World should share the blame for global warming the WRI report seeks to protect the interests of the industrial nations which are the major polluters. They say instead of forcing the industrialised countries to drastically cut down their emission of 'Greenhouse gases' Western environmentalists seek to put serious brakes on development of many developing countries by limiting their ability to produce energy from coal (that produce carbon dioxide) and undertake rice production and animal care programmes (which produce methane). This is an excellent example of 'environmental colonialism', they added.

What's worse, the WRI report is likely to influence the deliberations of the proposed climate convention which seeks to restrict the emission of 'greenhouse gases'. Developed countries may find an excuse to refuse to pay for ecological reparations. In the London meeting of the parties to the Montreal Protocol of 1987 developed countries did not commit adequate fund to phase out CFCS, they argue.

WRI in its report has calculated that in 1987 the United States contributed one billion tonnes of carbon equivalent to 17.6 percent, Brazil 10 percent, China 6.6 percent and India 3.9 percent each. It says 50 countries accounted for 92 percent of the world's total in warming potential in 1987. The report further says when all countries are considered Asia is the largest contributor among the major regions of the world, followed by North and Central America and Europe. It says six countries — USA, USSR, Brazil, China, India and Japan — are the largest contributors to the atmosphere's warming potential. Three of them have heavy industrialised economies, three do not.

The report says that the Lao People's Democratic Republic has the highest per capita (10 MT) Greenhouse net gas emission, followed by Qatar with 8.8 MT, United Arab Emirates 5.8 MT, Bahrain 4.9 MT and Canada 4.5 MT. The United States, the USSR and Japan rank 9th, 25th and 42nd respectively as polluters on such a count. The report says high rates of deforestation account for elevated ratings in some countries like the Lao People's Democratic Republic and energy consumption and gas flaring account for high ratings in energy-producing countries like Qatar, USA and Kuwait.

The WRI report also shows that developed countries emit far smaller

amount of Greenhouse gases per unit of economic output than developing countries. The United States emits heat equivalent to 200 grams of carbon for each dollar of its gross national product while Indonesia emits nearly nine times as much for each dollar of its gross national product. It is thus argued that in establishing a fair international basis for limiting Greenhouse gas emissions both per capita and per GNP emissions will need to be taken into account.

Anil Agarwal questions the figures used by WRI and say 'heavy emphasis has been placed on carbon dioxide production due to deforestation and methane production from rice fields and livestock as compared to carbon dioxide production from fossil fuel like oil and coal'. Since developing countries are more responsible for the former this emphasis tends to overplay their contribution while underplaying that of the developed countries. Quoting from recent official statistics on deforestation in Brazil and India the Indian environmentalists say WRI statistics are backdated and unreliable.

The deforestation rate in developed countries in that vast tract of forests destroyed by acid rain remains unaccounted for. According to one estimate more than a fifth of the forest area in Europe had been damaged by acid rain by 1986. This, together with North America, equalled to roughly 10 percent of all non-tropical forest area.

The Indian environmentalists argue the methane issue raises further questions of justice and morality. Can we really equate the carbon dioxide contributions of gas guzzling automobiles in Europe and North America or, for that matter, anywhere in the Third World with the methane emissions of drought cattle and rice fields of subsistence farmers in West Bengal or Thailand? Do these people not have a right to live? But no effort has been made in WRI's report to differentiate between the 'survival emissions' of the poor and the 'luxury emissions' of the rich.

Quoting from the findings of a research conducted in India CSE environmentalists also challenge the claim that rice fields emit methane to the extent it has been described in the WRI report.

The WRI-UN report claims this because "its data are based on bad science, mathematical jugglery and politically motivated use of half baked environmental information, all of which makes a mockery of human values and concept of one worldism" alleged Agarwal.

Agarwal points out that large quantities of carbon dioxide and methane produced through human activities every year are absorbed by the earth's environment. Carbon dioxide is largely absorbed by the world's ocean and methane by the earth's toposphere. Therefore, the issue is not how much carbon dioxide or methane each country produces but how much of each of these gases is produced over and above the earth's natural ability to cleanse the atmosphere.

In other words, no country can be blamed for the gases accumulating in the earth's atmosphere until each country's share in the earth's cleansing ability has been apportioned on an equitable and fair basis. India, therefore, gets 16 per cent of the earth's natural sinks for carbon dioxide and methane. Describing these emissions, which will be absorbed by the earth, as 'permissible emissions', CSE finds that India is producing carbon dioxide just equal to six per cent of the world's natural sinks and methane equal to 14 per cent of the natural sinks. The same is true of China, Pakistan, Sri Lanka, Egypt, Kenya, Nigeria, Tanzania, Zimbabwe and Chile. But almost all eastern countries are emitting well beyond their permissible shares of carbon dioxide and methane sinks. In Europe, only Portugal and Albania are emitting carbon dioxide within their permissible shares. It is, therefore, Western wastes and wilful overconsumption of the world's natural resources that is polluting the earth and threatening the environment, CSE argues.

CSE has given its own calculation according to which the Western nations must buy the unused permissible emissions of countries like India. Using a figure of \$15 per 1000 tonnes of carbon dioxide emitted, which will raise the price of oil by a mere 10 per cent (in 1986 prices), a minute amount when compared to the economic damage that global warming could cause, India should annually get \$8.3 billion dollars from the West.

Similarly, China, Pakistan, Nigeria, Bangladesh, Egypt, Kenya, Tanzania and Sri Lanka would get \$11.3 billion, \$2.08 billion, \$1045 billion, \$1.07 billion, \$0.77 billion, \$0.42 billion, \$0.40 billion and \$0.25 billion, respectively. The top 15 polluting nations would have to pay individual developing countries a total of \$20 billion dollars annually.

CSE argues, such a system of "tradeable emissions" would be an ideal market economy solution to control global warming. It would work both

ways by giving countries like India the monetary incentive not to promote activities which increase its greenhouse gas emissions and keep their emissions as low as possible, while it would provide countries like USA with a sufficient financial disincentive to reduce their emissions, which threaten to destabilise the world's ecology, as fast as possible. USA would have to pay developing countries \$6.3 billion, Japan \$1.43 billion, UK \$1.24 billion, West Germany \$0.92 billion, Canada \$0.67 billion and Australia \$0.42 billion. USSR also turns out to be a major polluting country, the CSE report claims.

Allen Hammond, Editor and Chief of WRI in a letter to the Indian Express conceded that Agarwal is correct in that the WRI report does not distinguish between survival emissions and luxury emissions, but says that such distinction essentially involves political judgement

which are beyond the scope of WRI. Agarwal says the WRI chooses to make political statements when it suits it but sticks to science when it does not.

The recent study of Anil Agarwal and Sunita Narain strongly upholds the point of view of the South against one-sided assertions of the North. Developing countries are greatly disadvantaged because technologically they lag far behind the developed countries to adopt improved processes for production of energy to increase consumption of their citizens.

Agarwal and Sunita assert, the manner in which the global warming debate is being carried out is sharpening and deepening the North-South divide. Given this new-found interest in the so-called 'our common future and future generations', it is time for the Third World to ask the West, 'whose future generations are we seeking to protect, the

Western world's of the Third World's?'

Anil Agarwal and Sunita Narain have substantiated the Third World viewpoint by data, and it is hoped that their work will be helpful in advancing the cause of the developing countries. Dr Kazi Zakar Hossain, an environmentalist of Bangladesh said last year it is the responsibility of the developed countries to drastically reduce greenhouse gas emissions since they are the worst polluters. They have no right to put a brake on the development activities of the developing countries for no fault of theirs.

UNEP Executive Director Dr Mostafa K Tolba said in Dhaka last year that global issues should be solved with the spirit of cooperation and that confrontation will not help. But it does not mean that the Third World should trust baseless propaganda of the North.

Task Group Proposal to the International Commission for the Lithosphere Three Dimensional Modelling of the Earth's Lithosphere/Asthenosphere and of Seismic Sources in Selected Regions and ICEM

I. History

In the Centre Pilot Project on Earth Structure, Pilot Project Leader G.F. Panza and UNIDO Consultant F. Schwab have designed a large-scale, long-term project for mapping the earth in three dimensions. Focused at the International Centres at Miramare, this work is based on the use of the most powerful of modern "supercomputers"; those of the massively-parallel and vector-processor types. Extensive, world-wide computer network communications are used to access this computational hardware, and to provide rapid communication and data transfer among the local centres of the project task group. The formation of this task group has been in progress since the end of 1989, and will be complete by the end of this year, at which time the present group of 69 scientists will have been extended to about 100.

Consistent with the U.N. mandate of the Centres, these are either scientists from the Third World; or, within the task-group activities, are scientists from developed countries who are devoting their efforts to training researchers from developing countries in the highly specialized techniques being developed specifically for this mapping project. At the Centres in Miramare, the numerical algorithms and the computer software for these techniques are being developed. This will also be the location for training

in the fundamentals and usage of these methods and programming.

To obtain official, international sanction for the activities of the Center task group, a proposal was submitted to the Inter-Union Commission (IUGG-IUGS) for the Lithosphere in December of 1990. This sanction was granted in May, 1991 and the task group is now operating under the auspices of the International Lithosphere Program; specifically, under the theme of the ILP that is to be its contribution to the United Nations' International Decade for Natural Disaster Reduction. Funding for the operations of the task group's Third-World members is being sought at this time from the UN-IDNDR, which requires that this second proposal be channelled to the UN by the IUGG, ILP, or IASPEI (International Association for Seismology and Physics of the Earth's Interior). We have already gained specific agreements for this from the last two organizations, and are confident of obtaining agreement from the IUGG in the near future. With official approval of the proposal from the UN, we will then be in a position for our local centres to approach their national, IDNDR committees for the actual, long-term funding required by our project work. For anyone interested in this task group and its work, a Bulletin is distributed every three months with full news and

details.

II. Task-group membership

Under the ILP task-group guidelines, a Chairman (G.F. Panza), a Vice Chairman (F. Schwab), 15 "Members", and an unlimited number of "Corresponding Members" are allowed. As Members we have designated the task-group leaders of the local centers; those scientists supporting these leaders have been designated Corresponding members. The official ILP directory for the Centre task group is: Three-Dimensional Modelling of the Earth's Lithosphere/Asthenosphere (Tectosphere), and of Seismic Sources, in Selected Regions.

Task group Chairman:

Giuliano Francesco Panza, Research Line Leader

International Center for Earth, Environmental and Marine Sciences and Technologies (ICEM c/o ICTP).

Task group Vice-Chairman:

Fred Schwab, Consultant to UNIDO International Center for Earth, Environmental and Marine Sciences and Technologies (ICEM c/o ICTP).

Task group members (who are responsible for the activities at each of the local centers), with Associated Corresponding Members, (ACM):

Alpine-Himalayan belt and associated rifts

Task-group Chairman (G.F. Panza)
International Center for Earth, Environmental and Marine Sciences and Technologies (ICEM c/o ICTP)
(ACM: G. Costa, F. Vaccari, P. Suhaldoc).
D. Guptasarma, Director,
National Geophysical Research Institute, Hyderabad, India
(ACM: S.S. Rai, D.S. Ramesh, M. Gollapally).
M. Qaisar,
Pakistan Institute of Nuclear Science and Technology (PINSTECH)
Islamabad, Pakistan
(ACM: M.B. Shahid, T. Mahood).
M. Tilahun,
Department of Geology, Addis Ababa University, Addis Ababa, Ethiopia
(ACM: K. Endale, A. Bekele, K. Gebrekristos).
V. Cervený,
Charles University, Prague.
H. Kern, Mineralogisch-Petrographisches Institut und Museum,
Universität Kiel, Kiel, Germany.

Pacific rim

Y.T. Chen, Director, Institute of Geophysics, State Seismological Bureau, Beijing, P.R. China
(ACM: C.Y. Wang, P.D. Wang, Y.L. Shi).
H.L. Zhou, Director, Department of Earth Sciences, Graduate School of Academia Sinica, Beijing, P.R. China
(ACM: Z.Q. Guo, D.P. Wei, Z.Q. Wang, W. Jin).
H.T. Hsu, Director, Institute of Geodesy and Geophysics, Academia Sinica, Wuhan, P.R. China
(ACM: W.J. Mao, G.Y. Li, X. Li, H. Zhou).
J. Zhu, Director, Chengdu College of Geology, Institute of Geology and Geophysics of Earth's Interior, Chengdu, P.R. China
(ACM: R. Sun, B. Zhou, M. Zhao).
A.L. Levshin, International Institute of Earthquake Prediction Theory and Mathematical Geophysics, USSR Academy of Sciences, Moscow, USSR
(ACM: B.G. Bukchin, L.I. Ratnikova, A.V. Kiryushin).
N.N. Biswas, Geophysical Institute, Fairbanks, Alaska.
Task-group Vice-Chairman (F. Schwab)
Institute of Geophysics and Planetary Physics, University of California, Los Angeles, California, U.S.A.
(ACM: R. Mehlman, J. Somers).
B.J. Mitchell, Chairman, Department of Earth and Atmospheric Sciences,
Saint Louis University, Saint Louis,

Missouri
(ACM: Z.H. El-Isa—also representing the Department of Geology,
Jordan University, Amman, Jordan).
J. Frez,
Centro de Investigación Científica y de Educación Superior de Ensenada,
Ensenada, Baja California, Mexico
(ACM: J. Madrid, J. Gonzales, F. Suarez, L. Delgado, G. Diaz de Cossio, J. Carlos).
A. Nava, Universidad de Colima, Colima, Mexico.
F.J. Sanchez-Sesma, Instituto de Ingeniería, Universidad Nacional Autónoma de México, México, D.F., México
(ACM: M.A. Bravo, L.E. Perez-Rocha).
E. Kausel, Director, Departamento de Geología y Geofísica,
Universidad de Chile, Santiago, Chile.

III. Task group statement for the ILP project

In building the Third-World, application task group for our three-dimensional mapping project, thus far we have been quite successful relative to geographical coverage and the combination of scientific specialties of our group members; however, to accomplish our purposes we expect approximately to double the size of the task group. Thus, much of our initial effort will be devoted to this organizational development.

The task-group purpose is the three-dimensional mapping of structure and seismic sources in selected regions of the earth. Owing to the magnitude and complexity of the project, we plan to treat the two major divisions of the project sequentially: first, in a limited number of selected regions of the earth, three-dimensional modelling of the lithosphere and asthenosphere will be performed as independently as possible from source considerations; second, with the results of this study in hand, in the same, selected regions of the earth, the detailed, three-dimensional modelling of seismic sources will be added to the study. Attention will be concentrated on structures near the Pacific rim and the Alpine-Himalayan belts.

Our investigations will be based on the comparison of experimentally recorded seismograms with those computed theoretically. In general, an earth structure thus determined will be strongly dependent upon the fixed specification of the parameters of the theoretical source; and the source parameters determined in this way will be strongly dependent upon the fixed specification of the parameters of the theoretical structure. Accurate structural

models in three dimensions are a fundamental prerequisite for a realistic modelling of seismic sources. In studies of the lithosphere and supporting asthenosphere, anelasticity of the structure is usually treated in an approximate manner. We introduce the exact treatment of anelasticity and thereby obtain important advantages: the anelastic effects above, at, and below the source, and the comparable effects below the receiver are introduced; also, scattering effects of lateral heterogeneity are treated more accurately. The combination of these advances in our research strategy will definitely improve the accuracy with which source parameters can be retrieved from seismological data. In fact, it will be possible to determine source processes which are as free as possible from the biases arising from inadequate modelling of wave propagation in heterogeneous media.

At the present stage of theoretical and computational developments in seismology, accurate, fine details of seismic sources cannot easily be retrieved from the available data. The ability to treat accurately the propagation of waves through three-dimensionally heterogeneous structures is the essential requirement for performing resolution tests in the modelling of the rupture process in focal regions. Such tests are crucial to determine the effects on wave propagation, of the vertical and lateral heterogeneity of the structure in the source region. Only with this information in hand, can we hope for accurate determination of the rupturing process of the seismic source, still one of the least well-known phenomena in seismology. Since an immediate attack on the problem of accurate, simultaneous inversion for structural and source parameters seems premature, we have opted for a more conservative approach of treating first structures and then source. The experience gained in this phase of the project will be the basis for an attempt to construct a simultaneous-inversion scheme capable of handling, with the required detail, structural and source-parameter retrieval. On a more detailed level, the final stage of our project is a large-scale attempt to exploit the computational benefits of massively-parallel hardware — specifically, the model CM-2 Connection Machine for constructing three-dimensional mappings in the earth. The project was initiated by designing and beginning the development of specialized, Connection Machine software for the high resolution now possible in application work in 3-D

modelling in the earth. To carry out the actual mapping, it was obvious that a large task group of dedicated investigators would be required once this special software were fully tested. A large amount of administrative and organizational effort has been, and will continue to be, put into the development of this task group so that the local centers will be recruited, the required data gathered, and the preliminary reduction for initial structural models will be well toward completion by the time the Connection-Machine software is ready for routine use. At that time it is our plan to have the investigators from a given local center visit our task-group software-development center at Miramare (Trieste). There they will be trained in the use of the specialized software, and will then apply it to their problem as the final stage in obtaining the best possible three-dimensional resolution in structures and sources.

IV. Task group statement for the UN-IDNDR project

Three-Dimensional Modelling of the Earth's Lithosphere, and of Earthquake Sources, Applied to the Reduction of Human Casualties and Property Loss in the Third World,

Principal Investigators: task-group personnel J. Frez, G.F. Panza, F. Schwab.

In connection with the International Decade for Natural Disaster Reduction, our proposal addresses the problem of pre-disaster orientation: hazard prediction, risk assessment, and hazard mapping.

We can reduce loss of life and property damage by highly detailed, specific seismic prediction. To map seismic ground motion in active areas, we do not have to wait for earthquakes to occur in likely focal regions; instead, with the knowledge of accurate three-dimensional structures and probable, complex source mechanisms, we can immediately compute seismograms at all sites of interest. The database can then be updated continuously by comparison with incoming, new experimental data.

We plan to treat the two major divisions of the project sequentially: first, in selected, active regions of the earth, three-dimensional modelling of the lithosphere will be performed, as independently as possible from source considerations, to obtain successive improvements on our initial 3-D structural models (that are based on all of the currently available information); second, with this information in hand, and in the same, selected regions of the earth, the detailed, three-dimensional

modelling of seismic sources will be added to the study. The ability to treat accurately the propagation of waves through three-dimensionally heterogeneous, anelastic structures is the essential requirement for performing resolution tests in the modelling of the rupture process in focal regions. This procedure will allow us to determine source processes which are as free as possible from the biases arising from inadequate modelling of wave propagation in heterogeneous, anelastic media.

Training will be an important aspect of the project. We have recruited several existing groups of high-level scientists to contribute to the training and development of new, outstanding groups of scientists in developing countries. Scientific training and commitment to developing nations throughout the world are aspects of the project that fit within the scopes of the research centers and universities with which the Principal Investigators are affiliated.

Since many of the earthquakes having an impact on human life occur in the Alpine-Himalayan belt and associated rifts, and on the Pacific rim, we will initially concentrate on parts of these regions. In particular we will concentrate on parts of Pakistan and Mexico where two centers of our study are located; respectively, in Islamabad and Ensenada. The greatest emphasis will be given to the study of selected areas in Mexico, starting with Mexicali and then continuing in sequence with Mexico City and Tijuana. Mexico City is, of course, the largest natural laboratory in the world for studying destructive effects of earthquakes. In Pakistan, we will apply our procedure for the estimation of seismic risk in and around the Islamabad/Rawalpindi region.

Third -World Pool of Talent and ICEM Funding

Very many of the regions listed above fall into the category of developing countries, and this will require special efforts to implement our project with research institutions in those areas. There is a large pool of highly-trained seismological, geophysical and geological talent in these Third-World now, but often without sufficient facilities, funding and the appropriate scientific interaction needed to pursue the level of work herein proposed. The key institution in our proposed project is therefore the International Centre for Earth, Environment and Marine Sciences and Technologies (ICEEM) at Miramare

(Trieste). This UN educational, training and research center has as its mandate purposes to approach the basic problems of earth sciences and a global scale, and to involve primarily the active participation of Third World scientists and students in monitoring and studying the dynamic behaviour of the lithosphere. Thus ICEEM provides the ideal framework upon which to base the proposed project.

With ICEEM being oriented towards practical training and updating of knowledge of scientists and students from developing countries, ICEEM funding is available for long term support for visit to center by project members from developing countries. The purpose is that they engage in frontier research using modern facilities, techniques and methodologies, and will therefore constitute the seeds for formation of advanced research centers in their home countries. The plan also calls for these centres then to form permanent strong scientific network, with the center in Miramare providing UN support for the continuing interaction. The UN-IDNDR funding for which we are now proposing, has the purpose of supporting the project work which is done at the Third-World research centers. ♦

AIP Prize for Industrial Applications of Physics

This award recognizes outstanding contributions by individuals to the industrial applications of physics. Awarded biennially on behalf of the AIP (American Institute of Physics) Corporate Associates, its rationale is to publicize the value of physics research in industry, to encourage physics research in industry, and to enhance students' awareness of the role of physics in industrial research. The prize, supported by the General Motors Corporation and other Corporate Associates, consists of US\$ 7,500 and a certificate citing the contributions made by the recipient or recipients.

Nominations are open to United States residents or those who have worked primarily in U.S.-based industry. Although nominees need not at the time of nomination be working in industry, the contribution for which they are cited must have been made while employed in industry. The industrial application of physics recognized may be a product or a process, or have such potential. The prize is intended primarily to recognize

the contribution of an individual but can be shared by more than one person where circumstances warrant. The application of the contribution must have resulted in a significant industrial development within the ten years prior to the award.

Space-Time Physics Maxwell Fellowship of the French Académie des Sciences

Thanks to a gift from the Maxwell Foundation, the Académie des Sciences will offer in 1992 a fellowship aimed at supporting a visit in the group of Prof. T. Damour, Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette, France. The candidates are expected to work, during their visit, on the physics of space-time in its broadest sense, e.g. from string theory and quantum gravity to gravitational waves and cosmology. The maturity level of the candidates should be at least that of confirmed post-docs. The duration of the visit and the salary can vary according to the seniority of the candidates: examples would be 9 months at ca. 13,000 FRF/month for a post-doc, of 6 months at ca. 20,000 FRF/month for a more senior candidate. While full mastery of English will be necessary, some knowledge of French will be useful. Applications from European candidates will be particularly welcome.

Applications with C.V., copies of the most significant publications and, for post-docs, the names of two referees, should be addressed, before 15 September 1991, to:

Prof. Guy Ourisson
Délégation aux Relations Internationales
Académie des Sciences
23 quai de Conti
75006 Paris
France.

Conferences and Lectures

On Thursday, 2 May, Ms. Fatima Laytimi, post-doctoral student at the ICTP Mathematics Section, gave a talk at the University of Trieste — “Courbes des trisécantes à une courbe elliptique de P³”.

Humboldt Research Fellowships

Humboldt Research Fellowships for foreign scholars

Six hundred research fellowships are granted annually to highly qualified scholars holding a doctorate and not yet having reached the age of 40, enabling them to carry out research projects of their own choice at research institutes in Germany.

Applications may be submitted at any time by scholars from all nations and academic disciplines (no quotas); selection meetings are held every March, June/July and November.

Sponsorship period: initially 6-12 months; extensions of up to 24 months may be granted on application. Up to four months of this period may be spent at research institutes in other European countries (up to six months at any German research institute elsewhere in Europe).

Monthly research fellowship rates: between DM 3,000 and DM 3,800 net; additional assistance: travel expenses, grants for married accompanying partners and children's allowances, an initial allowance, grants for language courses etc.

Application requirements: an academic degree comparable to a doctorate (Ph.D., C.Sc. or equivalent), high academic qualification, academic publications, a specific research plan, a good command of the German language (humanities and social sciences scholars) or at least a good command of English (natural scientists).

Humboldt Research Awards for foreign scholars

Up to 150 Humboldt Research Awards are granted annually to internationally recognized foreign scholars under the following programmes:

- Natural scientists from the USA;
- Humanities scholars worldwide;
- Humboldt Research Awards on the basis of reciprocity (all disciplines; agreements already exist with counterparts in Belgium, Denmark, France, Japan, Spain, Sweden and the Soviet Union. Negotiations are being conducted with counterparts in other countries).

Nominations for awards may be made at any time by eminent German scholars; direct applications are not accepted; no age limit; selection

meetings are held 2-3 times a year, normally in March, June/July and November; Award winners are invited to spend a research stay of 4-12 months at German institutes.

Total value of awards: between DM 20,000 and DM 120,000.

Nomination requirements: full/associate professor or equivalent standing, internationally recognised research record.

Max Planck Research Awards for foreign and German scholars

At least 20 Max Planck Research Awards annually for internationally acknowledged non-German and German scholars who intend a long-term, project-orientated joint research.

Nomination: must be made by heads of German universities or research establishments; at any time, for scholars from all disciplines and countries; priority will be given to scientific cooperations between German and non-European scholars.

Sponsorship period: max. three years.

Total value of award: DM 100,000; for short periods of research at partner-institutes, travel to partner-institutes, joint academic conferences, workshops etc. as well as any necessary additional funds for purchase of material or payment of assistants.

Nomination requirements: internationally recognized research work; planned joint research with a foreign partner.

Research Fellowships for German scholars

One hundred and fifty Feodor Lynen Research Fellowships are granted annually to highly qualified German scholars holding a doctorate and aged up to 38, enabling them to carry out research projects of their own choice at institutes of former Humboldt guest-researchers abroad.

Applications: at any time, for all disciplines and countries; selection meetings are held every March, June/July and November.

Sponsorship period: 1-4 years.

Monthly research fellowship rates: DM 2,000 – DM 2,200 net (joint financing by the Humboldt Foundation and the host institute is desired); additional assistance: expatriation allowance, travel expenses, grants for the accompanying spouses, grants towards material costs (DM 200 per month), grants towards health insurance costs, nomination of a scholar as academic tutor in Germany, home-leave after a stay of

two years abroad, reintegration assistance upon repatriation to Germany.

Application requirements: doctorate, high academic qualification, formal invitation by a former Humboldt Fellow or Award Winner, academic publications, a specific research plan, a good command of English or the language of the host country.

Thirty research fellowships are granted annually by the Japan Society for the Promotion of Science (JSPS) and the Science and Technology Agency (STA) for highly qualified German scholars aged up to 35 (in exceptional cases up to 38), to carry out research projects of their own choice at research institutes of Japanese universities (JSPS) or non-university research establishments in Japan (STA).

Applications may be submitted at any time by scholars from all academic disciplines except Japanology.

Sponsorship period: 12-24 months (JSPS); 6-24 months (STA).

Monthly research fellowship rates: 270,000 Yen; additional assistance: housing allowance (up to 100,000 Yen), travel expenses, grants towards health insurance costs, intensive tuition in Japanese, "familiarization allowance", grants towards material costs. The fellowship corresponds to a salary of an assistant professor in Japan.

Application requirements: doctorate (JSPS, STA) or equivalent qualification proved by publications (STA); a good command of English or Japanese; otherwise cf. Feodor Lynen Research Fellowship.

Additional information:

Selection Division: Dr. Hellmut Hanle / Dr. Eberhard Nies;
for Max Planck Research Awards: Dr. Bettina Druschke;
Jean-Paul-Straße 12
D-5300 Bonn 2
Germany.

Visits to ICTP

Istituto Carli, Trieste

A large group of students from the "G.R. Carli" Institute for Commerce in Trieste, visited the ICTP on 9 May. Before touring the premises and the Microprocessors Laboratory, they had an interesting debate with the Deputy Director, Prof. L. Bertocchi, about the impact of the ICTP on the town and vice-versa.

Dr. C. Raghavan

Dr. Chakravarti Raghavan, Editor of SUNS Bulletin, Switzerland, and Ex President of Press Trust of India, came on a visit to the Centre on 18th May, 1991. He had a meeting with officials on the various activities of the Centre, ICS and TWAS. He also visited the Library and Laser Laboratory of the Main Building of the International Centre for Theoretical Physics (ICTP).

USSR Commission for UNESCO

Ms. Roza I. Otounbayeva, President of the USSR Commission for UNESCO, Ambassador Extraordinary and Plenipotentiary, Member of the Collegium, Ministry of Foreign Affairs of the USSR, and Dr. V.A. Kouzminov, Chief of ROSTE, UNESCO, Venice, visited the ICTP on 31 May, 1991.

She met Professor Abdus Salam and discussed the scientific exchange between the USSR and ICTP as well as problems of scientific and educational policies. After the meeting, she visited the Library and Laser Laboratory in the Main Building.

Swedish Ambassador to IAEA

Minister Sten Ask, Swedish Ambassador to Vienna and Member of the Board of Governors of the IAEA, came on a private visit to the Centre on 20 June. He had a meeting with Officials on the various activities of the centres in the Miramare area.

Activities at ICTP May-June 1991

Title: *Fifth Workshop on perspectives in nuclear physics at intermediate energies*, 6-10 May.

Organizers: Professors S. Boffi (National Institute of Nuclear Physics, Pavia, Italy), C. Ciofi degli Atti (National Institute of Nuclear Physics, Rome, Italy) and M. Giannini (National Institute of Nuclear Physics, Genoa, Italy), in collaboration with an International Advisory Committee.

Lectures: The quark model, the Baryon-baryon interaction and the magnetic moments in nuclei. Nonperturbative quark and gluon interactions in QCD. QCD-motivated potential model and its application for many-quark system. Energy dependence of colour transparency. Colour screening: why and where. SU(2)-colour

superconductivity. Looking for colour transparency in (e, e'p). Theory of colour transparency. Quantum effects and colour transparency of nuclei. Hadron structure and sum rules — recent results from deep inelastic lepton scattering. Deep inelastic scattering at $x > 1$. Correlations and deep inelastic scattering on nuclear systems. Semihard interactions in high energy nuclear collisions. Shadowing in DIs and dilepton-production on nuclei. Shadowing effects in deep inelastic scattering on nuclei. The FNAL E665 experiment. Meson-baryon form factors derived from deep inelastic lepton scattering. Scattering of GeV electrons by nuclear matter. Colour transparency and correlation effects in electron-nucleus scattering. Medium modification of the empirical effective interaction. (e, e'p) up to CEBAF's energies. Precise study of nucleon responses in He₃(e, e'p). Quasi-elastic electron scattering and nucleon's properties in nuclear medium. Final state interactions in inclusive electron scattering. Nucleon momentum distribution in nuclei from the asymptotic scaling function. CEBAF — the accelerator and experiment facilities. The physics at CEBAF with high resolution spectrometers. The triple coincidence reaction $^{12}\text{C}(e, e'pp)$ in the delta excitation region. Two-nucleon emission in electron scattering. Pion absorption at 1 GeV/c. Light-cone calculation of the deuteron photo disintegration. Mesonic degrees of freedom in the electromagnetic longitudinal response function. A colour-dielectric model and the nucleon-nucleon potential. Medium effects in exclusive (e, e'p) data. Soliton description of the heavy flavour hyperons. The SU(3) Skyrme model. Hyperons in the topological soliton model. Towards an understanding of final state interactions in QCD. The relative probability of recoilless-production in nuclei in the PWIA. Phenomenological relativistic study of hypernuclei. Production of strange quarks from nuclear matter and their polarization — backward lambda production by pions on nuclei. Exotic nuclei and antisymmetrization. Experimental plans at the proton cooler ring COSY. Antinucleon physics at LEAR and beyond. Some problems of exclusive annihilation processes in the antiproton and antineutron systems. Positive energy subtracted impulse approximation in relativistic deuteron-nucleus scattering. The structure of the nucleon studied with real photons. Total



Fifth Workshop on perspectives in nuclear physics at intermediate energies, 6 – 10 May 1991.

photoabsorption cross section in the nucleon resonance region. Electro-excitation of nucleon resonances in a relativized quark model. Eta-production on nuclei.

The Workshop was attended by 108 lecturers and participants (32 from developing countries).

Title: *Spring College in materials science on "Nucleation, growth and segregation in materials science and engineering"*, 6 May – 7 June.

Directors: Professors Chi Wei Lung (Institute of Metal Research, Shenyang, P.R. China) and E.J. Savino (Comisión Nacional de Energía Atómica, Buenos Aires, Argentina).

Directors: Professors Chi Wei Lung (Institute of Metal Research, Shenyang, P.R. China) and E.J. Savino (Comisión Nacional de Energía Atómica, Buenos Aires, Argentina).

Organizing Committee: Professors N.H. March (Chairman, University of Oxford, UK), P.N. Butcher (University of Warwick, UK), G. Chiarotti (II Università di Roma, Italy), P. Fulde (Max-Planck-Institut für Festkörperforschung, Stuttgart, Germany), F. García-Moliner (Instituto de Ciencia de Materiales, Madrid, Spain), F. Gautier (Université Louis Pasteur, Strasbourg, France), I.M. Khalatnikov (Landau Institute for Theoretical Physics, Moscow, USSR), S. Lundqvist (Chalmers University of Technology,

Göteborg, Sweden), Chi Wei Lung (Institute of Metal Research, Shenyang, P.R. China), K. Singwi (Northwestern University, Evanston, USA) and M.P. Tosi (University of Trieste and ICTP, Trieste, Italy).

Co-sponsorship of the International Centre for Science (ICS, Trieste), the Italian Direzione Generale per la Cooperazione allo Sviluppo (Ministry of Foreign Affairs, Rome, Italy) and Consorzio Interuniversitario Nazionale per la Fisica della Materia (INFN, Italy).

Lectures: Introductory overview of nucleation, growth and segregation phenomena. Nucleation and growth of second phases and related instabilities. Scanning electron microscopy and scanning transmission electron microscopy. Extended defects. Growth of phases and instabilities in chemical kinetic processes. Phenomenological theory of phase transitions. Electron probe microanalysis and Raman spectroscopy. Static and dynamic SIMS. Transport processes (including radiation enhanced diffusion). Stability of microscopic clusters. Geometry and energy of interfaces. Polygonization and recrystallization phenomena. Solidification. Radiation enhanced ordering processes. Fracture and high temperature creep failure in materials: an

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introduction. Segregation processes and embrittling phenomena (including radiation environment and temper embrittlement). Computer aided design of materials. Fractals — an elementary introduction. Fractals and pitting corrosion.

Seminars: Stress corrosion: introduction. Stress corrosion: anodic dissolution and cleavage. Ordering of voids in irradiated metals. Stress corrosion: surface mobility. Ordering of gas bubbles in irradiated metals. Sintering (theory). Effects of anisotropy. Adiabatic nucleation.

Working Group Meetings: Electron microscopy and other high resolution techniques. Ceramics, ferrites and high T_c materials. Thin films. Solidification and crystal growth. Corrosion, oxidation and other kinetic phenomena at surfaces and interfaces. Glasses and disordered alloys. Atomic transport and defects. Mechanical properties and fracture. Material characterization and computer modelling.

Working Group Seminars: Thermal instabilities during the Czochralski growth of oxide compounds crystals from high viscosity melts. Application of Raman spectroscopy as a tool for metal oxidation and corrosion

studies. Transport properties of silver based superionic conducting glasses for solid state battery applications. Conductivity of nearest neighbour interacting Hopping systems in 2D and 3D. Kinetics of crystal growth. Solidification behaviour of nickel-boron alloys during DTA and melt spinning technique. Laser quality alkali halide crystal growth and laser active colour centres. Magnetic concentration of titanium minerals in granite sands. Study of YBCO and P_2 BCO by XRD and resistivity measurements. Some aspects of the oxygen diffusion in YBCO ceramics. An overview on soft ferrite materials. The mean "size" of polyatomic boxes for a binary mixing. Critical temperatures of two phase transitions in mixtures of spherical and ellipsoidal molecules. Ising models with first and second neighbours interactions. Fast ion conducting glasses. Bismuth embrittled copper bi- and tri-crystals. The synergetic effect of AlN precipitation and sulphur segregation in high purity ion-based alloys. The effect of bismuth on the fracture strength of copper. Anodic films on noble metals. High temperature interaction between UO_2 , zirc alloy and H_2O vapour. Thermochemical behaviour of oxidizing sponge iron pellets. Surface ionisation and its applications for surface study. High resolution multipurpose electron spectroscopy for chemical analysis (ESCA). Segregation determination using the FEM in ferritic steels. Absorption, diffusion (bulk and grain boundary) terdal desorption, segregation of rare earth in refractory metal using AES, GAD, NAA, SEM and XPS. Characterization of micro defects in InP crystal. Development of transition metal joint for steam generators (reg. joint between austenitic stainless steel/ferritic steels). A.C. electrical study of polyethylene-nylon 6 blend. PbTe thin film narrow gap semiconductors. Thermo chromism in vanadium dioxide thin films. Instabilities in island metal films. Electrocrystallization. Crystallization of electrolyte solutions in dispersed systems. Distributions of impurity in crystals grown by Bridgmann method. EPR and electronic absorption studies of transition metal ions in low sysonmetry single crystals grown by solutions. EPR and electronic absorption studies of pure and impurity doped $SrTr_4H_2O$ single crystals grown by gels. Growth and characterization of fluorohalides for X-ray intensifying screens. Field emission microscopy (FEM), field ion microscopy (FIM) and scanning tunneling microscopy

(STM)— design, development and applications. High brittleness electron sources. Studies crystallization of binary aqueous solutions using a differential scanning calorimeter (DSC). Ceramics from zeolite raw materials. Local charge and high T_c superconductivity. In situ nucleation Ce-Zirconia composites. Nucleation and growth of $Zn_2Ti_3O_8$ in a zinc porcelain glaze. Crystallization kinetics and rheology and alkali metaphosphate glasses. Preparation and characterization of silver based superionic conducting glasses. Nucleation phenomena in disordered alloys. Convective-diffusive processes during Bridgmann growth of binary crystals. Void swelling in B-modified stainless steel. Metallurgical applications of SIMS (round table discussion). Corrosion of copper-aluminium alloy. The role of pits in corrosion fatigue of offshore structure steel. Non-equilibrium statistics of multiple small cracks in corrosion fatigue. Effect of gaging design on the mechanical properties of Al-Si casting. Analysis of the waste sludge of a fertilizer factory in Bangladesh. Evidence of ionic aggregation in Zwitterionic polymers by TEM. Spontaneous pattern formation on corroded metal surfaces. Fractal characterization of pitting corrosion under cyclic loading. Structural information of island metal films from ageing measurements. Kinetics of ordering in 2D systems using X-ray diffraction. Scaling properties of fracture toughness in random materials. Pitting corrosion, fractal growth. The change of fractal dimensionality in recovery and recrystallization. The application of wavelets to structure analysis. Percolation models as a basic for Monte Carlo simulations. Long period and quasiperiodic superlattices. Subsurface strained layer in the substrate of Si/sapphire system. Plasma enhanced reactive InO thin films. Hot wall epitaxy of PbSnTe on Si using CaF_2 and BaF_2 buffer layers. Thickness dependent formation of Gd-silicide compounds. ESCA investigations of Pt-Si interfaces. Properties and structure of thin films of BiTe based semiconductors. Preparation and study of the C-V curves of metal-insulator-semiconductor. Liquid phase epitaxy of III-V semiconductors, controlled by electric currents. Molybdenum and molybdenum silicide thin films. Irradiation-stimulated coalescence in discontinuous thin films. Preparation and characterization of $B-Na_{0.33}V_2O_5$ thin films via pyrolysis. Matter transport in a random alloy: a self

consistent theory. Ion transport in glasses. Continuum and quasicrystalline percolation conductivity by transfer matrix algorithms. Electronically enhanced defect processes in non-metal crystals. Dynamics of self-interstitial atoms in bcc metals. Superdislocation formation in crystals under irradiation. Nucleation and growth of new strain-free grains in hot deformed aluminium samples. Defect, segregation and grain growth in Al alloys. Fatigue on aluminium aircraft alloys, fractography, fatigue crack growth under variable amplitude loading. Precipitation study in Ni-Al alloys by electrical resistivity measurement. Study of precipitates in some Ni-base alloys. Positron annihilation spectroscopy in metallic alloys. Effect of high austenising temperature on the mechanical properties of medium carbon steels. Crystallization and properties of Li-Al-B-Ti-Zn silicate system glass-ceramic fibres. Semiconductor doped glass $CdTe_xSi_{1-x}$. Long period and quasiperiodic superlattices. Electrical properties of tellurite glasses. Precipitation in some Ni-base alloys. Study of the brittle-ductile transition by means of anelastic techniques. ZTA (Zirconia toughened Alumina) for metal machining and low temperature structural applications. Kinetic model for two-phase liquids.

The College was attended by 134 lecturers and participants (102 from developing countries).

Title: Trieste Conference on quantum field theory and condensed matter physics, 13 – 16 May.

Organizers: Professors E. Brezin (Ecole Normale, Paris, France), S. Randjbar -Daemi and Yu Lu (ICTP).

Lectures: Fractional quantum-Hall liquid — A "self-dual" state of charge and vortices. Abelian Chern-Simons theory and anyons on torus. Chiral bosons and the Hall effect edge-states. Edge states in fractional quantum Hall effects. Integrable and conformal quantum field theory and 2D statistical mechanics. Realistic calculations for semionic superconductors. 2D quantum gravity theory and simulations. Integrability and matrix models. A condensed matter analog of QCD with quarks. Toda lattice quantization. Critical exponents in the 1D Hubbard model. Conformal field theory of the single- and multi-channel Kondo effect. Simulations of 3D quantum gravity.

Short communications: Superconductivity in the anyon model. Anyon

superconductivity beyond the random phase approximation. Fractional statistics and spin on surfaces. Relativistic theories of particles and fields with fractional spin and statistics. The role of Coulomb interaction in the integer quantum Hall effect. Coulomb gas approach to quantum Hall effect. Two-dimensional spin systems in an external magnetic field and their mass spectra. The perturbative equation of state for a gas of anyons.

The Conference was attended by 66 lecturers and participants (17 from developing countries).

Title: *Third ICFA School on instrumentation in elementary particle physics, 20 – 31 May.*

Organizers: Professors P. Poropat (University of Trieste, Italy) and F. Sauli (CERN, Geneva, Switzerland), in cooperation with the International Committee for Future Accelerators (ICFA) and the Trieste Section of the National Institute of Nuclear Physics.

Lectures: Statistical analysis of experiments. Solid state detectors. Statistical analysis of experiments. Particle identification. Scintillators and scintillating fibers. Particle identification. Gaseous detectors.

Calorimetry. Detector electronics. Transition radiation.

Seminars: Imaging with X and γ rays. Experimentation at future PP colliders. Recent results in particle physics. New developments in calorimetry.

The School was attended by 60 lecturers and participants (28 from developing countries).

Title: *Adriatico Research Conference on Structural and phase stability of alloys, 21 – 24 May.*

Organizers: Professors J.L. Morán-López (Universidad Autónoma de San Luis Potosí, Mexico), J.M. Sanchez (University of Texas, USA) and M.P. Tosi (University of Trieste), with the co-sponsorship of the International School for Advanced Studies (ISAS-SISSA, Trieste, Italy).

Lectures: The frontiers of high temperature structural materials. The bond order potential and cluster expansion within the tight binding approximation. The key role played by phase stabilities in the calculation of phase diagrams using the Calphad approach. Electrical resistivity measurements in cobalt and dilute cobalt alloys following low-temperature

particle irradiation. Structure and thermodynamics of $\text{Si}_x\text{Ge}_{1-x}$ alloys from computational alchemy. Antiferromagnetic coupling of iron of FCC lattices. Ordering mechanisms in metallic alloys. First-principles computation of phase diagrams. Electron microscopy of structural transformations in alloys. Order-disorder kinetics studied by path probability method. Spatial ordering in bimetallic nanostructures. Segregation and ordering at alloy surfaces: experimental methods and results. Thermodynamics of surfaces and of antiphase boundaries. Effect of long range ordering on the magnetic and electronic properties of some transition metal based alloys. Extended defects calculations in intermetallic alloys by means of empirical many body potentials. A model of ferromagnetic behaviour for Pd-based alloys. Phenomenological studies of Bcc magnetic binary alloys.

The Conference was attended by 32 lecturers and participants (11 from developing countries).

Title: *Spring College on plasma physics, 27 May – 21 June.*

Organizers: Professors B. Buti (Physical Research Laboratory,



Third ICFA School on instrumentation in elementary particle physics, 20 – 31 May 1991.

Ahmedabad, India), U. De Angelis (University of Naples, Italy), M.H.A. Hassan (Third World Academy of Sciences, Trieste, Italy), Yu-Ping Huo (Institute of Plasma Physics, Hefei, P.R. China), S. Lee (University of Malaya, Kuala Lumpur, Malaysia), S.M. Mahajan (University of Texas at Austin, USA), P.H. Sakanaka (Universidade Estadual de Campinas, Brazil) and N.L. Tsintsadze (Georgian SSR Academy of Science, Tbilisi, USSR).

Lectures: Energetic particles and plasma stability (EPPS). Radiative transport. Hydrodynamic instability in laser produced plasmas. Nonlinear plasma states with anisotropic electron distribution. Laser beat wave accelerator. Plasma turbulence. Nonlinear phenomena in laser plasmas. Concept of the Tokamak. Particle techniques in plasma simulation. Tokamak plasma physics. High confinement (H) modes — history; theoretical models; exotica. Nonlinear MHD instabilities. The physics of simultaneous reaction and diffusion processes in plasmas. Nonlinear Tokamak physics. Negative-energy modes in collisionless kinetic theories and their possible relation to nonlinear instabilities. Turbulence and transport experiments. Ballooning transform

revisited. Neoclassical transport. Solution of nonlinear Vlasov-Poisson systems. Self focussing in wake fields. Chaos in magnetoplasmas. Optical guiding of relativistically strong laser pulses in plasma. The electrostatics of a dusty plasma. Motion of dust grains in a dusty plasma. Physics of dusty plasmas. Wave scattering in dusty plasmas. Review in transport in plasmas. Frequency upshifting at anioning front in plasmas. Double layers in a magnetized collisionless plasma. Fundamental theory of the aurora. Theory of radar scattering from dusty plasmas. Charged dust in the earth's mesopause: effects on radar backscattering. Radiation transport in laser plasmas — experiments. Effects of coherent structures on transport. Review of Landau damping. Probe theory. Applications of dusty plasma theory. Low frequency modes in dusty plasmas. Symbolic computations with emphasis on mathematics. Electron cyclotron absorption, emission and current drive. Transport processes in current-free stellarators. Collisionless breaking of dust particles. Radiation from plasmas and simulation of test particles. Oscillations and resonances in electrostatically supported dust rings. Scattering in dusty plasmas: correlated grains. Stochastic effects in dusty

plasmas. Potential-driven electrostatic ion cyclotron oscillations in a magnetized plasma column. Fluctuations in plasmas and collective effects in Bremsstrahlung. Waves and instabilities in a negative ion plasma.

The School was attended by 123 lecturers and participants (83 from developing countries).

Title: *Second School on non-accelerator particle astrophysics*, 3 – 14 June.

Organizers: Professors E. Bellotti (University of Milan and Laboratorio Nazionale del Gran Sasso, Italy), G. Giacomelli (University of Bologna, Italy), N. Paver (University of Trieste, Italy) and J. Stone (Boston University, USA), with the co-sponsorship of the National Institute of Nuclear Physics (INFN, Italy).

Lectures: The search for proton decay. Cryogenic detectors and their applications. Particles and fields: the standard model. Cosmological models of the early universe. Selected topics in underground physics. Strong electromagnetic fields in astrophysics. Cosmic sources of high energy particles. Observation of Supernova 1987A. Models of galactic dark matter. Neutrino



Spring College on plasma physics, 27 May – 21 June 1991.



Working Parties on initiation and growth of cracks in materials and on simulation of materials degradation, 3 - 14 June 1991.

oscillations and neutrino mass. Extensive air shower physics. Muon astronomy: methods and observations. Physics activities with the proposed space stations. The EAS-TOP experiment. Origin and acceleration of cosmic rays. VHE and UHE gamma ray astronomy: methodology, results, puzzles and prospects. Radiochemical solar neutrino experiments: chlorine and gallium. Neutrino oscillations in matter. Water Cerenkov solar neutrino experiments. Experimental searches for magnetic monopoles. The LEP project at CERN. Cosmic ray composition. Statistics, systematics, black lies and white lies. Experimental programme at the Gran Sasso (Italy) Laboratory. Gravitational wave experiments. Neutrino astronomy. The MACRO experiment at Gran Sasso. Conclusions and future prospects.

The School was attended by 90 lecturers and participants (41 from developing countries).

Title: *Working Party on initiation and growth of cracks in materials, 3 - 14 June.*

Organizers: Prof. C.W. Lung (Institute of Metal Research, Academia Sinica, Shenyang, P.R. China) and Dr. R.

Thomson (National Institute of Standards and Technology, Gaithersburg, MD, USA).

Lectures: Fracture and high temperature creep failure in materials: an introduction. Fatigue in ceramics. Fractals — an elementary introduction. Fractals and pitting corrosion. The crack evolution and blunting of the crack tip in a brittle materials. High temperature creep fracture: research on ceramics. Stochastic fracture in brittle materials. Brittle-ductile transitions. Fractal crack growth. Toughness and microstructure. The fractal structure of fractured surfaces. The nucleation and growth of cracks under creep-fatigue interaction. Statics and dynamics of cracks.

Seminars: New mechanism of strengthening of materials by irradiation and theory of superdislocations. Initiation and growth of cracks in bi-segregated tilt copper bi- and tri-crystals. Crack growth in solids with layered structure. Crack initiation and growth from slot under mixed mode loading.

The Working Party was attended by 67 lecturers and participants (54 from developing countries).

Title: *Working Party on simulation of materials degradation, 3 - 14 June.*

Organizers: Prof. E. Savino (CNEA, Buenos Aires, Argentina).

Lectures: Fracture and high temperature creep failure in materials: an introduction. Phenomenology and mechanism of localized corrosion. Ionic transport in localized corrosion. Performance of high temperature alloys. Extended defect and computer simulation in alloys. Models of selective dissolution processes in alloy systems including computer simulations of these processes. Percolation models of passivation in alloy systems including computer simulations of these processes. Simulation of electrochemical processes. Static and dynamic Green's function and solution of Christoffel's equation. Fracture of neutron-irradiated steels. Stress distribution in a homogeneous anisotropic solid containing a crack. Crack in metals and nondestructive detection. Computer simulation of high-resolution electron microscope image. Stress distribution in a composite solid containing an interfacial crack and a free surface and effect of lattice structure on crack growth. Nondestructive testing of austenitic steels. Improved method for nondestructive detection by means of ultrasonic signal in austenitic steels.

Work in the Informatics Laboratory.

The Working Party was attended by 29 lecturers and participants (24 from developing countries).

Title: *Adriatico Research Conference on the Physics of inhomogeneous materials*, 11 - 14 June.

Organizers: Professors H.A. Cerdeira (UNICAMP, Campinas, Brazil, and ICTP), A. Coniglio (University of Naples, Italy) and G. Grimvall (Royal Institute of Tehnology, Stockholm, Sweden), with the co-sponsorship of the International School for Advanced Studies (ISAS-SISSA, Trieste, Italy).

Lectures: Disordered materials growth: theory and experiment. Flow in porous media. Self-affine fractal growth of interfaces in inhomogeneous media. Minimum growth probabilities of the diffusion-limited aggregation clusters. From multifractals to generalized statistical mechanics and thermodynamics. Fracture as a fractal growth problem. Transport properties: exact results. Transport properties: rigorous inequalities. Multiscaling in growth phenomena. Scaling and multiscaling in self organized criticality. Intermittency on the sandpile. Microstructure and macroscopic behavior of random

heterogeneous materials. Hydrodynamic dispersion. AC properties of metal insulator composites. Inhomogeneous superconductors. Mathematical modeling of materials with randomly distributed inclusions. Percolative conductivity of aperiodic lattice by transfer-matrix algorithm. Statistical models for the fracture of heterogeneous media. Thermoelectric composites. Space-filling bearings. Random disc packing: fractal defect networks, defect free random packing and periodic structures. Vibrations of drums with irregular boundaries.

The Conference was attended by 45 lecturers and participants (20 from developing countries).

Title: *Miniworkshop on nonlinearity: fractals, pattern formation*, 11 June - 6 July.

Organizers: Professors H.A. Cerdeira (UNICAMP, Brazil, and ICTP), A. Erzan (Istanbul Technical University, Turkey) and L. Pietronero (University of Rome "La Sapienza", Italy).

Lectures: Damage spreading. Damage spreading in the Ising model and

spin glasses. The wrinkling of surfaces: geometric measure theoretic techniques. Correlations and multifractals. Fractal growth patterns: conformal mapping techniques. A theoretical framework for supervised learning in neural networks. Multifractal analysis of wave functions in quasiperiodic systems. Lattice model for adsorption and wetting of fractal and self affine substrates. Phase transitions in the intermittent map. Models of interacting polymers and theta point in two dimensions. Stability of periodic orbits in coupled map lattices. Multifractals, turbulence and the harmonic measure on DLA. Neural networks with hierarchically organized patterns. The Bethe-Peierls map. Structures and patterns in two phase fluids. Fractal analysis of mountain landscape. Dislocation dynamics and chaos. DLA: what is the problem? The Abelian models of sandpiles. Fractal approach to development of digital elevation model. Theoretical concepts in fractal growth. Polymer and surface models with vacancies.

The Miniworkshop was attended by 83 lecturers and participants (58 from developing countries). ♦

Associate Members Expected at ICTP in 1991

KEY:	AP	Atomic Physics	NP	Nuclear Physics
	BIO	Biophysics	NON-CONV.EN	Nonconventional Energy
	CLIMA	Climatology	PP	Plasma Physics
	COMPUT.PHYS.	Computational Physics	REL	Relativity
	GEO	Geophysics	SE	Solar Energy
	HE	High Energy Physics	SOIL	Soil Physics
	MATH	Mathematics	SS	Solid State Physics
	MICRO	Microprocessors		

* = Tentative date subject to confirmation.

Name	Member State	Field	Scientific Coordinator	Visit Period month/day/year
ABDEL WAHAB, M.M.	LIBYA/EGYPT	GEO	FURLAN/PANZA	7/15/91 - 8/31/91
ABOUEL SAOOD, A.	EGYPT	HE	RANDJBAR	4/11/91 - 5/22/91*
ADJEPONG, S.K.	GHANA	GEO	FURLAN/PANZA	8/15/91 - 11/15/91
AGRAWAL, R.C.	INDIA	GEO	FURLAN/PANZA	3/18/91 - 5/18/91
AHMAD, S.A.	INDIA	LASERS	DENARDO	6/17/91* - 9/6/91*
AINA, P.O.	NIGERIA	SOIL	GHIRARDI	9/9/91 - 12/9/91
AKYEAMPONG, D.A. (Senior)	GHANA	HE	RANDJBAR	7/17/91 - 8/21/91
ALAM, M.A.	PAKISTAN	SS	YU-LU	6/10/91 - 8/30/91
ALBERT, R.N.H.	EGYPT	GEO	FURLAN/PANZA	11/19/91* - 12/31/91*
AMRITKAR, R.E.	INDIA	SS	YU-LU	6/8/91 - 8/15/91
ANANTHAKRISHNA, G.	INDIA	SS	YU-LU	6/8/91 - 7/14/91*

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<i>Name</i>	<i>Member State</i>	<i>Field</i>	<i>Scientific Coordinator</i>	<i>Visit Period month/day/year</i>
ANSARI, A.	INDIA	NP	DALAFI/FONDA	7/8/91 - 9/15/91
ASGHAR, S.	PAKISTAN	MATH	VERJOVSKY/VIDOSSICH	6/1/91* - 8/15/91*
AULAKH, C.S.	INDIA	HE	RANDJBAR	6/17/91 - 9/10/91
AWANOU, C.N.	BENIN	NON-CONV.EN	FURLAN	9/1/91* - 11/30/91*
AWIN, A.M.	LIBYA	NP	DALAFI/FONDA	7/17/91 - 9/2/91
AWUNOR-RENNER, E.	SIERRA LEONE	GEO	FURLAN/PANZA	9/15/91* - 10/27/91*
BAETA, R.D.	GHANA	SS	TOSI	6/21/91* - 8/31/91*
BAHY-EL-DIEN, A.A.	EGYPT	MATH	VERJOVSKY/VIDOSSICH	7/25/91 - 9/6/91
BAIG, M.A.	PAKISTAN	LASERS	DENARDO	6/30/91* - 9/28/91*
BAKARUDIN, I.	MALAYSIA	BIO	BORSELLINO/GHIRARDI	10/5/91 - 11/25/91
BALSEIRO, C.A., (Senior)	SAUDI ARABIA/PAKISTAN	SS	YU-LU	1/11/91 - 1/20/91
BAQUERO PARRA, R.	MEXICO/COLOMBIA	SS	TOSATTI	6/20/91 - 9/3/91
BARRY, M.B.	GUINEA	NON-CONV.EN	FURLAN	8/5/91 - 9/25/91
BENKADDA, M.S.	ALGERIA	PP	HASSAN/MAHAJAN	5/24/91 - 6/10/91
BERNIDO, C.C.	PHILIPPINES	HE	RANDJBAR	7/22/91 - 9/11/91
BHANTHUMNAVIN, V.	THAILAND	LASERS	DENARDO	1/17/91 - 3/31/91
BISOI, A.K.	INDIA	COMPUT. PHYS.	NOBILE	5/8/91 - 7/6/91
BREZINI, A.	ALGERIA	SS	TOSI	6/30/91 - 8/31/91
CABO, A.G.	CUBA	SS	TOSI	7/1/91 - 8/30/91
CABRERA, G.	BRAZIL/CHILE	SS	TOSATTI	7/14/91 - 8/25/91
CAMACHO, A.S.	COLOMBIA	SS	TOSATTI	6/23/91 - 8/10/91
CHANG Chao-Hsi	CHINA	HE	RANDJBAR	5/18/91 - 8/18/91
CHAUDHARY, M.N.	PAKISTAN	MATH	VERJOVSKY/VIDOSSICH	6/3/91* - 9/1/91*
CHENDO, M.A.C.	NIGERIA	NON-CONV.EN	FURLAN	9/2/91 - 10/31/91
CHEON, I.T. (Senior)	KOREA	NP	DALAFI/FONDA	1/7/91 - 2/16/91
CHO, Y.M.	KOREA	HE	RANDJBAR	7/12/91 - 8/6/91
CHU, Y.	CHINA	HE	RANDJBAR	6/1/91* - 8/30/91*
DATTA, A.	INDIA	HE	RANDJBAR	7/1/91 - 7/20/91
DATTAGUPTA, S.K.	INDIA	SS	YU-LU	5/25/91* - 6/21/91*
DE DIOS LEYVA, M.	CUBA	SS	TOSATTI	6/5/91 - 7/30/91
DHAR, A.	INDIA	HE	RANDJBAR	6/20/91 - 7/31/91
DIALLO, M.A.	MALI	CLIMA	FURLAN/STRAVISI	7/7/91 - 8/18/91*
DISSANAYAKE, M.A.K.L.	SRI LANKA	SS	YU-LU	7/22/91 - 9/8/91
DONANGELO, R.	BRAZIL/URUGUAY	NP	DALAFI/FONDA	6/11/91 - 7/21/91
DU, Dongsheng	CHINA	HE	RANDJBAR	8/7/91 - 9/18/91*
DZINOTYIWEYI, H.A.M.	ZIMBABWE	MATH	VERJOVSKY/VIDOSSICH	6/15/91* - 9/13/91*
EBOLI, O.	BRAZIL	HE	RANDJBAR	6/9/91 - 7/22/91
EDEE, M.K.A.	TOGO	BIO	BORSELLINO/GHIRARDI	8/11/91 - 10/20/91
EGRICAN, A.N.	TURKEY	NON-CONV.EN	FURLAN	7/5/91 - 9/20/91
EKHAGUERE, G.O.S.	NIGERIA	MATH	VERJOVSKY/VIDOSSICH	8/14/91 - 9/25/91*
EL-ASHRY, M.Y.	LIBYA/EGYPT	PP	HASSAN/MAHAJAN	7/15/91 - 10/13/91*
EL-DESSOUKI, M.S.	EGYPT	NON-CONV.EN	FURLAN	7/31/91 - 9/11/91*
EL-MOUSLY, M.K.	EGYPT	SS	TOSI	6/15/91 - 9/13/91*
EL-SAYED, M.E.S.	EGYPT	BIO	BORSELLINO/GHIRARDI	7/1/91 - 8/31/91
EL-WAKIL, E.S.A.	EGYPT	MATH (Math. Phys.)	BUDINICH/GHIRARDI	7/1/91 - 8/15/91
FAKHIFAKH, Z.	TUNISIA	BIO	BORSELLINO/GHIRARDI	7/15/91 - 8/31/91
FAMUREWA, O.	NIGERIA	BIO	BORSELLINO/GHIRARDI	3/1/91 - 5/30/91
FOGLIO, M.E. (Senior)	BRAZIL/ARGENTINA	SS	TOSATTI	7/7/91 - 8/3/91
GALVÃO, R.	BRAZIL	PP	HASSAN/MAHAJAN	6/10/91 - 7/23/91
GAMAL, Y.E.	U.A.E./EGYPT	AP	DENARDO	6/30/91 - 8/11/91
GHALEB, A.	EGYPT	SS	TOSI	6/24/91 - 7/15/91
GODBOLE, R.M.	INDIA	HE	RANDJBAR	6/24/91 - 8/1/91

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Name	Member State	Field	Scientific Coordinator	Visit Period month/day/year
GRATTON, J.	ARGENTINA	PP	HASSAN/MAHAJAN	5/28/91 - 6/22/91
GUVEN, R.	TURKEY	HE	RANDJBAR	6/24/91 - 8/12/91
GUZMAN, A.M.	COLOMBIA	LASERS	DENARDO	7/2/91 - 9/1/91
GÜRSSES, M.	TURKEY	REL	DENARDO	6/29/91 - 8/10/91*
HAO, Bai-jin	CHINA	SS	YU-LU	8/20/91 - 10/20/91
HE, Shan-Yu	CHINA	MATH	VERJOVSKY/VIDOSSICH	8/19/91 - 11/16/91
HOU, Bo-Yu (Senior)	CHINA	HE	RANDJBAR	7/20/91 - 8/10/91
HU, S.J.	MALAYSIA	BIO	BORSELLINO/GHIRARDI	11/18/91* - 12/6/91*
HUSSEIN, A.M.	U.A.E./EGYPT	PP	HASSAN/MAHAJAN	6/14/91 - 7/22/91
IBRAHIM, M.	BANGLADESH	NON-CONV.EN	FURLAN	8/25/91 - 11/10/91
JAYARAMAN, T.	INDIA	HE	RANDJBAR	4/10/91* - 7/9/91
JOVANOVIĆ, D.	YUGOSLAVIA	PP	HASSAN/MAHAJAN	5/26/91 - 6/21/91
KAAHWA, Y.	UGANDA	SS	TOSI	6/24/91 - 9/24/91
KAHINDO, M.	ZAIRE	CLIMA	FURLAN/STRAVISI	9/1/91 - 11/30/91*
KAMAL, M.	EGYPT	SS	TOSI	7/10/91 - 9/10/91
KAMRAN, M. (Senior)	PAKISTAN	HE	RANDJBAR	6/15/91 - 7/25/91
KAREMERA, M.	ZAIRE	LASERS	DENARDO	1/20/91 - 4/20/91
KASSEM, M.E.S.	QATAR/EGYPT	SS	YU-LU	7/12/91 - 8/28/91
KHADKIKAR, S.B.	INDIA	NP	DALAFI/FONDA	2/1/91 - 5/1/91
KHAJEHPOUR, M.R.H.	IRAN	SS	YU-LU	7/4/91 - 8/15/91*
KHAN, I.A.	INDIA	MATH	VERJOVSKY/VIDOSSICH	4/10/91 - 7/8/91
KOLAWOLE, L.B.	NIGERIA	GEO	FURLAN/PANZA	8/1/91 - 9/12/91*
KRISHAN, V.S.	INDIA	PP	HASSAN/MAHAJAN	5/27/91* - 7/8/91*
KUMARAVADIVEL, R.	SRI LANKA	SS	YU-LU	1/15/91* - 4/15/91*
KYERE, A.K.	GHANA	BIO	BORSELLINO/GHIRARDI	8/2/91 - 10/25/91
LAKSHINA, G.S.	INDIA	PP	HASSAN/MAHAJAN	5/20/91 - 6/30/91
LEE, Cheng Chung	CHINA	SS	YU-LU	6/17/91 - 7/29/91*
LEE, S.	MALAYSIA	PP	HASSAN/MAHAJAN	4/1/91* - 5/31/91*
LI, Shujie	CHINA	MATH	VERJOVSKY/VIDOSSICH	4/3/91* - 7/2/91*
LI, Zhongyuan	CHINA	PP	HASSAN/MAHAJAN	4/10/91 - 7/7/91
LIU, Fu-Sui	CHINA	SS	YU-LU	7/1/91 - 9/29/91
LOPEZ CARRANZA, E.	PERU	SS	TOSATTI	5/12/91 - 7/26/91
MAHDAVI-HEZAVEHI, M.	IRAN	MATH	VERJOVSKY/VIDOSSICH	7/17/91 - 9/5/91*
MAHECIIA, J.E.	COLOMBIA	AP	DENARDO	1/15/91 - 4/16/91
MAJID, C.A.	PAKISTAN	SS	YU-LU	6/19/91 - 9/8/91
MANSOURI, R.	IRAN	HE	RANDJBAR	7/6/91 - 9/18/91
MARINO, E.C.	BRAZIL	HE	RANDJBAR	6/24/91 - 8/3/91
MARTIN, H.O.	ARGENTINA	SS	TOSATTI	6/6/91 - 8/8/91
MASPERI, L. (Senior)	ARGENTINA	HE	RANDJBAR	6/15/91 - 6/27/91
MBEMBA, G.	CONGO	SS	TOSI	5/13/91 - 8/2/91
MEJIA-LIRA, F.	MEXICO	SS	TOSATTI	5/13/91 - 5/25/91
MEKHFI, M.	ALGERIA	HE	RANDJBAR	6/30/91 - 7/31/91
MELEK, M.	EGYPT	HE	RANDJBAR	7/14/91 - 8/25/91*
MESKINI, N.	TUNISIA	SS	TOSI	1/15/91 - 1/20/91
MIA TELLO, R.J.	ARGENTINA	MATH	VERJOVSKY/VIDOSSICH	2/10/91 - 3/24/91
MIKHAIL, I.F.I.	EGYPT	SS	TOSI	6/17/91 - 9/27/91
MOFIZ, U.A.	BANGLADESH	PP	HASSAN/MAHAJAN	5/25/91 - 8/20/91
MONTENEGRO JOO, J.	PERU	COMPUT. PHYSICS	NOBILE	5/7/91 - 7/20/91
MORAN-LOPEZ, J.L.	MEXICO	SS	TOSATTI	5/21/91* - 6/4/91*
MOULAY, M.	ALGERIA	NP	DALAFI/FONDA	5/5/91 - 5/10/91
MOULAY, M.	ALGERIA	NP	DALAFI/FONDA	7/31/91* - 9/15/91*
MSHELIA, E.D.	NIGERIA	NP	DALAFI/FONDA	8/1/91* - 10/30/91*

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Name	Member State	Field	Scientific Coordinator	Visit Period month/day/year
NAFARI, N.	IRAN	SS	YU-LU/RANDJBAR	7/15/91 - 9/30/91
NANDWANI, S.S.	COSTA RICA/INDIA	NON-CONV.EN	FURLAN	8/24/91* - 11/22/91*
NGUYEN, B.A.	VIET NAM	SS	YU-LU	6/17/91 - 9/15/91*
NHUNG, T.V.	VIET NAM	MATH	VERJOVSKY/VIDOSSICH	7/1/91 - 8/12/91*
NIETO, J.A.	MEXICO	HE	RANDJBAR	6/16/91 - 8/31/91
NOOR, M.	PAKISTAN	MATH	VERJOVSKY/VIDOSSICH	6/27/91 - 8/30/91
NTAGWIRUMUGARA, E.	RWANDA	HE	RANDJBAR	4/22/91 - 7/21/91*
OBADA, A.	EGYPT	AP	DENARDO	6/25/91 - 8/20/91
OBI, M.E.	NIGERIA	SOIL	GHIRARDI	9/7/91 - 12/9/91
OMOTOSHO, J.A.	NIGERIA	CLIMA	FURLAN/STRAVISI	3/11/91 - 4/9/91*
OULD-KADDOUR, F.	ALGERIA	SS	TOSI	1/15/91 - 4/14/91
OYINLOYE, J.O.	NIGERIA	GEO	FURLAN/PANZA	9/4/91 - 10/16/91*
PANDEY, A.N.	INDIA	AP	DENARDO	6/15/91 - 9/12/91
PENG, Jin Sheng	CHINA	AP	DENARDO	8/1/91 - 9/12/91*
PU, Fucho	CHINA	SS	YU-LU	7/1/91 - 9/30/91
QADIR, A.	PAKISTAN	MATH	VERJOVSKY/VIDOSSICH	7/1/91 - 8/12/91*
RADJABALIPOUR, M.	IRAN	MATH	VERJOVSKY/VIDOSSICH/RANDJBAR	6/25/91 - 9/10/91
RAHMAN, M.S.	BANGLADESH	MATH	VERJOVSKY/VIDOSSICH	8/7/91 - 9/18/91*
RAJARAMAN, R. (Senior)	INDIA	HE	RANDJBAR	6/15/91 - 7/27/91*
RAO, K.S.	INDIA	SOIL	GHIRARDI	5/1/91 - 8/1/91
RAO, Sumathi	INDIA	HE	RANDJBAR	6/17/91 - 8/11/91
RAZMI, M.S.K.	PAKISTAN	AP	DENARDO	6/19/91 - 8/28/91*
RESTUCCIA, A.E.	VENEZUELA	HE	RANDJBAR	4/1/91 - 5/15/91
ROBLEDO, A.	MEXICO	SS	TOSATTI	6/10/91 - 8/10/91
ROJAS, O.	MEXICO	COMPUT. PHYSICS	NOBILE	6/10/91 - 7/6/91
ROJAS, O.	MEXICO	COMPUT. PHYSICS	NOBILE	8/18/91 - 9/28/91
RUIZ-CLAEYSSSEN, J.C.	BRAZIL/PERU	MATH	VERJOVSKY/VIDOSSICH	1/4/91 - 2/15/91
RUTLLANT, J.A.	CHILE	GEO	FURLAN/PANZA	2/11/91 - 4/13/91
SABIR, A.A.	PAKISTAN	MICRO	COLAVITA	6/1/91* - 8/15/91*
SALAWU, R.I.	NIGERIA	NON-CONV.EN	FURLAN	9/2/91 - 10/14/91*
SEADE, J.A.	MEXICO	MATH	VERJOVSKY/VIDOSSICH	6/17/91 - 9/7/91
SEBALLOS, S.	CHILE	BIO	BORSELLINO/GHIRARDI	9/9/91 - 9/27/91
SEN, A.	INDIA	PP	HASSAN/MAHAJAN	5/8/91 - 6/26/91
SEVERCAN, F.	TURKEY	BIO	BORSELLINO/GHIRARDI	7/2/91 - 9/15/91
SEVERCAN, M.	TURKEY	COMM. PHYSICS	COLAVITA/NOBILE	7/1/91* - 8/30/91*
SHAFI-DEHABAD, A.	IRAN	MATH	VERJOVSKY/VIDOSSICH/RANDJBAR	7/11/91 - 8/22/91*
SHAFIQ, M.	PAKISTAN	AP	DENARDO	1/21/91 - 3/21/91
SHARMA, S.K.	INDIA	NP	DALAFI/FONDA	6/17/91* - 7/29/91*
SILAWATSIHANANAI, C.	THAILAND	PP	HASSAN/MAHAJAN	11/11/91 - 12/27/91
SINGH, C.P.	INDIA	HE	RANDJBAR	5/17/91 - 8/15/91*
SMITH, A.J.	SIERRA LEONE	PP	HASSAN/MAHAJAN	5/27/91* - 7/8/91*
SMITH, A.W.	BRAZIL	HE	RANDJBAR	1/10/91 - 4/10/91
SOOD, P. (Senior)	INDIA	NP	DALAFI/FONDA	5/17/91 - 6/1/91
SUH, B.S.	KOREA	BIO	BORSELLINO/GHIRARDI	6/20/91 - 8/25/91
SUMATHIPALA, W.L.	SRI LANKA	CLIMA	FURLAN/STRAVISI	7/29/91* - 9/9/91*
TAO, R.	CHINA	SS	YU-LU	2/5/91 - 5/5/91
TEH, R.	MALAYSIA	HE	RANDJBAR	11/24/91 - 1/1/92
THAHEEM, A.B.	PAKISTAN	MATH	VERJOVSKY/VIDOSSICH	6/19/91 - 8/31/91
TIAN, C.	CHINA	MATH	VERJOVSKY/VIDOSSICH	3/20/91 - 6/20/91
TIRAO, J.A.	ARGENTINA	MATH	VERJOVSKY/VIDOSSICH	6/29/91 - 9/6/91
TRALLERO-GINER, C.	CUBA	SS	TOSATTI	7/26/91 - 8/18/91
UBEROI, C.	INDIA	PP	HASSAN/MAHAJAN	5/21/91 - 7/2/91

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Name	Member State	Field	Scientific Coordinator	Visit Period month/day/year
VILCA, F.	PERU	MICRO	COLAVITA	1/7/91 - 3/15/91
VIRK, H.S. (Senior)	INDIA	NP	DALAFI/FONDA	6/17/91 - 6/22/91
WANG, Ang-Sheng	CHINA	GEO	FURLAN/PANZA	8/26/91 - 10/7/91*
WANG, Yu-Zhu	CHINA	LASERS	DENARDO	5/5/91 - 8/4/91
WEISSMANN, M.	ARGENTINA	SS	TOSATTI	7/9/91 - 7/20/91
WU, Dan Di	CHINA	HE	RANDJBAR	4/15/91 - 5/27/91
XIAN, Dingchang (Senior)	CHINA	SS	YU-LU	8/1/91* - 10/1/91*
XIN, Yuanlong	CHINA	MATH	VERJOVSKY/VIDOSSICH	5/15/91 - 8/13/91
YORMAH, T.B.R.	SIERRA LEONE	SOIL	GHIRARDI	8/1/91 - 10/25/91
ZAFARANI, J.	IRAN	MATH	VERJOVSKY/VIDOSSICH/RANDJBAR	8/1/91 - 10/10/91
ZANELLI, J.	CHILE	HE	RANDJBAR	7/15/91* - 9/15/91*
ZHANG, Li-Yuan	CHINA	SS	YU-LU	7/3/91 - 9/27/91*
ZHOU, Hui-lan	CHINA	GEO	FURLAN/PANZA	8/1/91 - 9/12/91*

Calendar of Activities at ICTP in 1991

Summer School in high energy physics and cosmology	17 June – 9 August
Research Workshop in condensed matter, atomic and molecular physics	17 June – 27 September
International Conference on complex systems: Fractals, spin glasses and neural networks	2 – 6 July
Miniworkshop on strongly correlated electron systems	8 July – 2 August
Open problems in strongly interacting electron systems (Adriatico Research Conference)	9 – 12 July
Course on ocean-atmosphere interactions in the Tropics	29 July – 17 August
College on singularity theory	19 August – 6 September
Course on path integration	26 August – 2 September
Working Party on surface phase transitions	2 – 13 September
Path integration and its applications (Adriatico Research Conference)	3 – 6 September
School on dynamical systems	9 – 27 September
Conference on recent developments in the phenomenology of particle physics	23 – 27 September
School on "Use of synchrotron radiation in science and technology"	14 October – 8 November
Workshop on composite materials	28 October – 8 November
Conference on major problems of the atmospheric system and the developing countries	11 – 16 November
Workshop on "The programme on training and interdisciplinary research in atmospheric physics"	18 – 21 November
School on materials for electronics: Growth, properties, and applications	18 November – 6 December
Second International Workshop on radon monitoring in radioprotection and earth science	25 November – 6 December
Workshop on non-linear dynamics and earthquake prediction	25 November – 13 December
CANCELLED:	
Workshop on materials science and physics of non-conventional energy sources	2 – 20 September
College on microprocessors-based real time control — principles and applications in physics	7 October – 1 November
Workshop on stochastic and deterministic models	7 – 11 October
Third Workshop on telematics	4 – 22 November
Workshop on soil physics	30 September – 18 October

Calendar of Activities at ICTP in 1992

Adriatico Research Conference on polarization dynamics in nuclear and particle physics	7 – 10 January
College on computational physics	13 January – 7 February
Third Training College on physics and technology of lasers and optical fibres	27 January – 21 February
Workshop on the simulation of electronic devices in the quantum regime	3 – 14 February
Workshop on computation and analysis of nuclear data relevant to nuclear energy and safety	10 February – 13 March
College on neurophysics	17 February – 13 March
Winter College on coherent atom-radiation interactions	24 February – 20 March
Representation of Lie groups (advanced workshop)	23 March – 10 April
Adriatico Research Conference on synergetics in optics	24 – 27 March
The Essential role of science in technological progress and economic development	22 – 24 April
Spring College in condensed matter on superconductivity	27 April – 19 June
Experimental Workshop on high T_c superconductivity (advanced activities)	27 April – 19 June
Spring School and Workshop on superstrings	27 April – 8 May
Workshop on modelling of energy and environmental physics	27 April – 15 May
Trieste Conference on quantum field theory and condensed matter physics	11 – 15 May
Workshop on dynamical systems	18 May – 5 June
Seventh Trieste Semiconductor Symposium on: "Wide-gape semiconductors"	8 – 12 June
Miniworkshop on strongly correlated electron systems	15 June – 10 July
Summer School on high energy physics and cosmology	15 June – 14 August
Research Workshop on condensed matter, atomic and molecular physics	22 June – 25 September
Adriatico Research Conference on hydrogen atoms in intense electromagnetic fields	7 – 10 July
Miniworkshop on non-linearity and chaos	13 – 31 July
Working Party on disordered systems	2 – 30 August
Adriatico Research Conference on chaos and its applications	4 – 7 August
Workshop on climate variability and predictability	17 – 21 August
Workshop on vegetation-climate interaction	24 – 28 August
Course on two-dimensional quantum field theory for condensed matter physicists	24 August – 4 September
Arithmetic algebraic geometry (advanced workshop)	31 August – 11 September
College on medical physics: imaging and radiation protection	31 August – 18 September
Working Party in condensed matter	1 – 15 September
Workshop in commutative algebra	14 – 25 September
Fourth International Conference on applications of physics in medicine and biology:	
advanced detectors for medical imaging	21 – 25 September
College on methods and experimental techniques in biophysics	28 September – 23 October
WMO Workshop on limited area modelling	28 September – 2 October
Second College on microprocessor-based real-time control — Principles and applications in physics	5 – 30 October
ICTP Particle Physics Conference	19 – 23 October
School on physical methods for the study of the upper and lower atmosphere system	26 October – 6 November
Third Workshop on basic VLSI design techniques	2 – 27 November
Second Workshop on the applications of synchrotron radiation	2 – 27 November
Fourth Autumn Course on mathematical ecology	2 – 20 November
Experimental Workshop on high T_c superconductivity (basic activities)	16 November – 11 December
Three-dimensional modelling of seismic waves generation, propagation and their inversion	30 November – 11 December

For information and applications to courses, kindly write to the Scientific Programme Office.

Transportation from Trieste Airport to City Terminal

Visitors of ICTP may kindly note that, from January 1991, the bus service from Trieste Airport to the City Terminal, and vice-versa, is no longer free of charge.

It now costs 7,500 Lire.

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