

**REPORT of the ACTIVITIES PERFORMED in ITALY for the WYP -2005
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The WYP-2005 activities performed in Italy have been partially coordinated by the National Coordination Committee (NCC) under the auspices of the Italian Physical Society, in collaboration with the Italian Association of Physics Teachers (AIP) and the Italian Astronomical Society (SAiT) and partially sponsored by the MIUR (Italian Ministry of University and Research), the MIAMB (Italian Ministry of Environment), INFN (National Institute Nuclear Physics) so as by EPS through the EC WYP contract.

A large part of the events have been entirely organized by local institutions (Universities, Research Centers, INFN and CNR sections) and sponsored by different organizations and Institutions.

The funding obtained and directly managed by the National Committee and the Italian Physical Society are:

MIUR	:	200.000 Euros
MIAMB	:	20.000 “
EC WYP (EPS)	:	200.000 “

The activities can be summarized as follows:

1- ACTIVITIES PERFORMED DIRECTLY BY THE NCC and SIF

a) The Environmental Radioactivity Project

The aims of the Project were:

- *to diffuse the knowledge and the practice of environmental monitoring;*
- *to introduce the students to the scientific method, to the statistical analysis data, to the correct understanding of the concept of risk;*
- *to increase, through the work of the students, the confidence of the public opinion in the scientific approach to the nuclear problem.*

The work was devised as follows:

- *an introductory seminar (1-3 hours of front lesson) to propose the basic principles of Radioactivity and to describe the methods and the instruments used to measure it;*
- *description of, and practice with the instruments that will be used, in the classroom;*
- *students in groups of 4-5 boys/girls start to take data inside and outside the school building;*
- *with the aim of producing a map of the background natural radiation, all the sites where the data are taken will be geo-referenced with the aid of a GPS;*
- *data will be then analyzed, discussed in class with the teacher and finally forwarded to the National Project Coordinator for the final assembling of the map;*
- *50 kits composed of: Apple I-Book 12', Geiger Mullere GM-10 counter and GPS have been distributed to 50 schools all around Italy at the beginning of the school year 2005-06;*

- at the moment a 50% of the participants has produced a large amount of data covering many sites in their regions. The data are, in many cases, completed with a satellite map of the site where the measures were made.

b) The Virtual Classroom Project

The aim of this Project was:

- to offer all the schools, mainly those without a physics laboratory, an opportunity to re-introduce the "experiment" in physics teaching;
- the Web has been chosen to circulate directions for the construction of simple apparatuses made of poor materials but with high didactic contents;
- for this purpose a "Virtual Classroom" has been designed, which can be reached through the net without the use of a particular platform;
- all the software needed to access the "Virtual Classroom" lies onto a remote server, which can be reached at the address: www.aulavirtuale.wyp2005.it user name and password are required;
- the "Virtual Classroom" allows a bi-directional connection in video and audio between a Teacher, whose Class proposes an experiment, and other Classes interested in that experiment, giving an opportunity to illustrate it, to discuss the results obtained and all the instructions to replicate it;
- the tools provided by the "Virtual Classroom" in addition to the audio and video channel are slides and movies presentation facility;
- all the hardware required is a PC, a web cam, a microphone and a fast connection to the web;
- at the moment only "non public lessons" have been made to verify the behavior of the apparatuses and the reliability of the system with good results.

c) **DVD records** of experiments made in the frame of the Virtual Classroom Project. DVD's on the Galilei's experiments and on the photoelectric effect, the measurement of the speed of the light, the energy conservation; films on the life of prominent Italian physicists (Fermi, Pontecorvo, Pacinotti...).

A set of these records are distributed to the Secondary Schools and Education Departments.

d) **The international Workshop on "Physics from School to the Job Market"** organized at Varenna in June 2005, in collaboration with the Italian Association of Science Faculty Deans, to discuss the market place opportunity for physicists in Europe.

e) **The exhibition on "Beyond the Pillars of Hercules"**, at the National Congress in Catania (September 2005) and "**Learning by playing**" (Pavia, October 2005).

f) The **Celebration Day** (Villa Mondragone, Monteporzio Catone (Roma) 1 December 2005, closing the WYP-2005 in Italy, organized by SIF and the National Association of Deans of Science Faculties, getting together qualified people in physics and chemistry (among them 4 Nobel Prizes) and describing the future perspectives in Physics;

g) **SIF editorial initiatives :**

-Proceedings of the Workshop "**From Physics to the Job Market**" held at Vi Monastero, Varenna, 17-19 June 2005. The international event officially inaugurated the World Year of Physics in Italy and was organized by the Italian Physical Society in collaboration with the Association of the Italian Deans of Science. The interesting contributions both by the physicists involved in the problems of teaching at all levels as well as by representatives of the industry and the media are collected in this edition and are distributed mainly to high school teachers and to the participants.

-A collection of "**Oldies but Goldies**" of Il Nuovo Cimento that, in the WYP occasion, celebrated its 150 anniversary. The book contains a selection of papers published in the years 1855-1935, that either set the basis for new important developments or are milestones of new fields of research. A preface will briefly introduce the selected papers one-by-one.

-Proceedings of the "**Celebration Day**" (see f) above).

2- ACTIVITIES PERFORMED BY OTHER NATIONAL INSTITUTIONS and ASSOCIATIONS

a) **AIF (Italian Association of Physics Teachers)**

The WYP-2005 has been celebrated by AIF with large effort and participation of physics teachers to specific activities so as to events promoted by other Institutions. Particular attention has been paid to the participation of young students and to the diversification of events (exhibitions, competitions, performances, open and travelling Laboratories happenings, CD and DVD records).

Examples are the events organized in Padova (**Sperimentando**, (with 200 experiments) **Week end of Physics, Open Laboratories**, with the support of MIUR, INFN, local authorities, University and Municipality;

Other events: **Physics in the Street** (Sassari, Ivrea) at the vernal equinox with the involvement of schools, students and with self-made investments; **Science of Kids** (Trieste, an exhibition showing different experiences on didactic of physics); **Excursus on History and Historiography of the evolution of scientific ideas** (the data have been collected in specific CD-ROM).

A cinematographic review "**celluloid physics**" has been performed in the Ticino Region so as a collection of simple toys (**The Einstein Box**) for experiments adapted to kids.

The same initiative has been organized in Milano, so as the **Scientific Theatre**.

Together with events already mentioned elsewhere, AIF has organized a series of meetings on the **history of a school and of the corresponding collection of physics instruments**, a photographic competition on "**the physics of natural phenomena**", a performance on **Einstein: conti e racconti** (calculations and stories recorded in DVD and another one on **What is Light? That is (if you like)**).

b) **SAiT (Italian Astronomic Society)**

At a national level the SAiT celebrations were particularly dedicated to Pietro Tacchini (the centenary of his death), the founder of the Italian Spectroscopist Society, which is the origin of SAiT.

A prize entitled to Pietro Tacchini has been awarded in the occasion of the SAiT annual congress (Catania, May 2005).

Furthermore a series of meetings as well as didactic activities offered to student teachers and the main public in Florence.

Few examples:

-**Science and Magic** (i.e. the evolution of the scientific culture from the beginning of the human venture in the knowledge and the question of the way it is considered and accepted by the common public);

-**History of Science** (from the middle age to the modern society through Renaissance, Illuminism, the technology revolution)

Other events in Palermo :

-A public conference on "**Hundred years of solar physics in Italy**";

-Another series of topical seminars concerning astronomical observations at the Osservatorio Astronomico di Palermo and related to the solar system and to its astrophysical aspects;

-A public conference on "**The evolution of the Universe between myth, arts and science**" has been organized with a great public attendance.

Other conferences: "

"The Universe from Tolomeus to Einstein"

"The adventure of thought: Einstein 1905-2005"

The national week of Astronomy (April 2005) was entirely dedicated to Einstein involving students working with multimedia instruments at the Planetarium of Reggio Calabria.

c) **ICTP (International Center of Theoretical Physics)**

First of all the main activities held by the Center have been considered as part of the WYP-2005 program. (National and International meetings and Courses on Fundamental and Applied Physics, among them Conferences and Workshops on Seismic Dynamic Models of Economic and Ecosystems Physics of Weather and Climate, Quantitative Ecology, Advanced X-ray Imaging, Interacting Systems at Nanoscale, Soil Physics Accelerator Driven Systems, Physics for Renewable energies, Web Technologies and Strategies for Scientific Learning).

Other events were made in collaboration with SIF and other national Institutions:

3- LOCAL and SPECIFIC ACTIVITIES

The most important and with particular success are:

3.1 Milano :

Coordination by the local section of the Association of the History of Physics, the Department of Physics and Applied Physics of the Milano University and the local section of INFN. The activities were publicized using press, radio, TV, Internet and direct contacts and followed by thousands of persons.

Events organized: A series of Conferences on Einstein ("**Dear Professor Einstein**" reading the original papers of Einstein) and the history of science (at the Brecht Astronomy Museum); a review of scientific films and documentaries ("**Seeing Science**"); **Stages of Physics Laboratories** for young students; a **performance of Physics** showing few amazing features of physical phenomena addressed to children in primary schools.

The XXI **Congress of history of Physics and Astronomy** (Milano, November 2005) was entirely devoted to the WYP-2005. **The 3^d Milano Workshop on the Physical Sciences in the Third World** was organized in collaboration with the Bogotà University (Columbia) and held in Bogotà on June 2005 (**A social history of science and development**).

As part of the Annual Congress of the Department of Physics a presentation ("**Highlights in Physics 2005**") of the research activities of the Department was offered to students, teachers and researchers.

Very significant and successful were travelling exhibitions prepared by a specialized team of the University of Bicocca, for example:

"At the Pillars of Hercules" presented at the National Congress of SIF in Catania in September 2005 and **"From Demokritos to Quarks"** presented at the Science Meeting in Bergamo, September 2005).

Como:

The Department of Physics and Mathematics of the Insubria University has organized an exhibition on **"Physics around us: 100 years of discoveries changed our everyday life"**.

It was open (free access) to the town from December 15, 2005 to January 15, 2006 and visited by thousands of persons, especially students of primary and secondary schools.

In connection with the exhibition two particular events have been organized:

-A series of conferences open to the main public as, for example. : **"We are the Martians"**, **"The Mystery of Cosmological Constant"**, **"Einstein between Science and Physics"**, **"Nuclear physics for Arts"**, **"The importance of being named neutrino"**, **"Physics for the battle against cancer"**.

A poster competition for students of the secondary school about **"Physics around us"** was also organized with a significant success.

3.2 **Torino and Piemonte:** Coordination by the **Promoting Committee** of the Piemonte Region, in collaboration with the Torino University, the local section of INFN the Torino Politecnico, the AIF, MIUR, FIAT, Torino Science Academy, the UNESCO Center of Torino and other local Institutions and sponsored by the local Authorities and the CRT Foundation and San Paolo Company.

Some of the most important events were:

-three competitions addressed to students of the secondary schools launched by the Physics Department of the University of Torino entitled **"Einstein and the under 14 Women and Physics"**; **"Louis Lagrange for Physics"**; Prizes were awarded consisting in visiting European museums and laboratories.

-A series of meetings and conferences among which the seminar on **"Didactic and History of Physics"** (Department of Physics and AIF, Torino); the conferences on **"Time and Science"**; **"Physics in 1905"**, **"Einstein and Relativity"**, **"The Einstein Resolution"**, **"Hundred years of Brownian Motion"**; workshops on **"Physics and the Automobile"**, **"The Torino Synchrotron: physics and history"**.

-**Open and movable Laboratories** have been offered to students for experiments and measurements by the Physics Research Center (INFN, CNR, Environmental Agency) with visit to CERN and weather stations. The **"Physics in the street"** in Ivrea on the vernal equinox on March 20, 2005 was very successful so as the initiative **"Nuke is not the Devil"**, by performing national radioactivity measurements, and **"Physics at wireless sensors in the sport ground"**

A selection of exhibitions includes:

"The microscopes in Physics" and **"Physics on the wheels"** (INFN, Torino); **"Superconductive and semiconductors: quantum physics at work"** (INFN); **"Relativity in the every day life"** (Torino Politecnico), **"Fugit irreparabile tempus"** (Liceo Scientifico) (from sundials to relativity); and **"time and clocks"** (from sundials to atomic clocks); **"Einstein: a genius at work"**; **"Light and Astronomy"**; and a photo exhibition on **"Fermi, the scientist and the man"**.

Also some shows and performances on Marie Curie, Galilei, Relativity, Alice and Feynman and others on scientific topics have been very successful; CD and DVD's on different subjects like **"the 2005 Challenge** (Milestones in Physics); **"Strings and cosmological billiards"**; **"The language of measure"** were attended by a large audience so as the **WYP-2005 Bus**, circulating in the town and the **Light bow** reproducing a snowflake the light cone of the WYP2005 logo.

3.3 **Padova and Laboratori Nazionali di Legnaro (LNL)**

The LNL has been opened to a large number of schools during the **Scientific Culture Week** (April 2005) and contributed to the organization of the **"Radioactivity Project"**. The Physics Department of the University of Padova, the local sections of AIF and INFN the LNL, the Municipality of Padova have jointly organized the Exhibition **"Sperimentando 2005"**, open to the whole town with particular sections for students and teachers, from April 18 to May 8, 2005. Such an exhibition was accompanied by

number of conferences (especially devoted to WYP-2005, on the history and evolution physics, special topics on nuclear and particle physics and astrophysics so as mater sciences, energy and environment).

Specific events: **observation of Venus and sunspots** with the telescope of the Astrophyle Association; **launch of water rockets**, **ascension with a montgolfier history, physics and construction (and flying) of kites**.

A large participation (thousand of persons) was ensured with successful involvement students and teachers.

3.4 **Bologna (Modena and Emilia)**

Exhibition **"The Mystery of Gravity"**: 45 panels take the visitors through an amazing tour among the main ideas about gravity since Newton. A wealth of hands-on-experiments were offered and ready to be used. Cavendish device, pendulums, free-fall area, grav machine allow the curiosity of the public to go beyond the imagination.

3.5 **Napoli: Città della Scienza ("The City of Science")**

About 40 Conferences on physics have been offered to the town with the participation about 5 thousand people.

The conferences were organized in the frame of some exhibitions as, for example **"The microscopes of the Physics of INFN"** (April 2005) and during the weeks of scientific culture such as **"The Spring of Science"** at the occasion of special seminars addressed to teachers (**"3 days for school"**).

Special exhibitions have been devoted to topics like **"Beautiful mind"**, visited by more than ten thousand students so as competitions for schools with the sponsorship of MIUR-SIFA awarding as a prize, the visit to European museums.

Competitions on **"Scientific Theatre"** were very successful so as the participation **UNIDANSA 2005 in Barcellona** (UAB University, May 2005) with performance on **"The physics of dancing"** by a napolitan team (such performance has been repeated at Città della Scienza)

Another performance on **"The physics of trapeze"** was played at Città della Scienza and at the Science Festival in Genova.

3.6 **Palermo**

Besides the organization of the exhibition **"Pietro Tacchini and solar physics in the 20th century"**, in the frame of the national events promoted by the SAiT, a series of dedicated Conferences have been organized, namely: **"Einstein philosopher and epistemologist"**; **"From the light quanta to the home energy"**; **"Einstein, the mathematician and the scientist"**; **"Astrophysics and Relativity"**, **"Relativity and Cosmology"**; **"Physics of nanosystems and technological applications"**, **"Alice: a performance on physics and insight physics"**, **"Einstein 1905: the genius at work"**

An important exhibition, just after the National Congress of SIF (in Catania) attracted a large audience (students, teachers, common public) organized by the Physi

Department of Palermo, has been "**The square wheels**" with a number of curious and amazing physics phenomena.

3.7 **Messina** (Sicily)

A part of the significant participation to the national project on "**Radioactivity**" a number of events in collaboration with MIUR, AIF and INFN have been organized among which the following:

-A celebration of the "**scientific and human figure of Ettore Majorana**"; International Meeting on "**Einstein and Relativity: 100 years after**"; a series of Conferences on relativity and quantum mechanics with the participation of a large number of students and teachers also from humanistic faculties.

-The students of secondary schools were involved in the design and the realization of **sundials** and **solar clocks**, and 4 CD's of different subjects regarding scientific (Aristoteles, Archimedes, Leonardo da Vinci, Galilei, Marie Curie, Einstein), the atom, the man in the space, the solar system, the black-holes, the earthquakes, the Tsunami and the antimatter.

-A series of workshops and seminars at different secondary schools were organized concerning the **evolution of physics in the last century**, with a large participation of students. Of particular interest the direct astronomical observations with a telescope extended to young people and common public involved in discussions and debates on science and knowledge.

MISCELLANEA

A **special stamp** has been issued by the **Poste Italiane** in the occasion of the International Conference on "**Space-time in action: 100 years of relativity**", held in Pavia on 29 March-2 April 2005 and organized by the local Department of Theoretical Physics.

The stamps were cancelled at the national congress of SIF in Catania and in many other occasions during the WYP-2005 celebration.

The Pirelli Group has launched, besides the traditional Pirelli Awards, a special prize called **Pirelli Relativity Challenge**, meant especially for teachers, researchers and academics, to explain Einstein's special relativity by means of a 5 minutes multimedia presentation. The best submission has been awarded of 25.000 Euros,

Ravenna

Workshops on "**Physics and Humanity**"; "**Nuclear and atomic methods and knowledge conservation and restoration of cultural heritage**"; "**Cosmology of the cross-over of Science**"

Sardinia (Cagliari)

Events organized at POLARIS

"Fantastic Physics" in Pula (Cagliari) : at the scientific and Technological Park Sardinia; **"Forms and formulas"**(meeting a scientist); **"The 2nd Principle Thermodynamic, and the 3rd and the entropy"** (a performance at the Pula Theatre); **"Marvels, paradoxes and mysteries of Electromagnetism"**(Conference with special experiments)

Cala Govone

International Conference on **"Constrained Dynamics and Quantum Gravity"**(September 2005); **LABORAD** (in the frame of the Radioactivity Project)

Rome (Dept of Physics)

Films (documentary) **"Bruno Touschek and the art of physics"**

Pisa

The **"Ludoteca Scientifica, experimenting under the Tower in and around physics"** (April-May 2005), a collection of more than 40 games and scientific experiments presented by students and young researchers that introduce the visitors to the world of science and technology with a simple and enjoyable approach.

Umbria

"Meteorology in Italy: the first pluviometer"
"The future of Meteorology"

Ferrara

Exhibition **"Radioactivity is a face of Nature"** (in collaboration with INFN and ENEA) in the frame of the Radioactivity National Project.

