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Focus

The WYP2005 for physics on the road to extinction

Marzia Mazzonetto
in collaboration with Maria Chiara Montani

From exhibitions to theatrical performances, from fireworks to video games, countless events and ventures have been held all over the world in 2005 to mark the occasion of the World Year of Physics (WYP2005).[1] The year that is drawing to a close has brought physics out into the streets and University campuses, where there have never been so many public lectures or micro-events of every kind (from open days/open labs to science weeks with lessons in the street and small, specially created exhibitions), but in a few cases physics has even invaded theatre stages and art museums, it has involved musicians and even architects, who have planned exhibitions and great shows with quotations from the one real hero of the event, the scientist Albert Einstein. The worldwide objective was to highlight a science that has more and more need to communicate its close connections with society, its involvement in themes that are vital for the present day but above all for the future, like the frontiers of medicine, the reduction of global pollution and the search for new energy sources. 2005 is nearly over, but the celebrations will continue even during the first months of the new year. This focus tries to discover, country by country, the events that have accompanied the World Year of Physics, told with the words of the people who proposed and in some cases organised them, and of those who announced and reported them on radio, television and in the press. But this will also be an attempt to reply to a question on the very nature of this type of event: "do we really need it"? Is a World Year of Physics really necessary and, above all, is it effective?

UNESCO and EPS for the World Year of Physics

The World Year of Physics was proclaimed for 2005 by the General Assembly of the United Nations, on the occasion of the centenary of the "Miraculous Year" of physics, in which Albert Einstein published a series of articles that were destined to revolutionise the history of physics: they included the formulation of the theory of relativity, quantum theory and the theory of Brownian motion.

"Only a representative of one of the member countries can ask the General Assembly of the UN to declare a world year of something", says Minella Alarcon, Programme Specialist for physics and mathematics at UNESCO.[2] "The proposal was officially made in 2002 by Brazil, France, Great Britain, Singapore and Lesotho, the countries that had decided to support the venture, but in fact it had been presented for the first time in 2000 by Martial Ducloy, former president of the European Physical Society, during an important congress in Berlin". With resolution 58/293 of 16 June 2004, the General Assembly of the UN declared 2005 the International Year of Physics.

"The idea was conceived as a reaction to the disconcerting drop in the number of enrolments in science faculties, particularly in physics", explains Martial Ducloy, who now leads the International Steering Committee that deals with the World Year of Physics. "Comparing notes with my colleagues, I realised that the problem is felt all over the world, so I thought it necessary to try to provide a response at worldwide level". 2005 proved to be the best year to celebrate physics but above all to commemorate Einstein.

As Minella Alarcon tells us, the World Year of Physics did not have a central organisation. "We left complete freedom to the individual countries, and in particular to the Physical Societies, to decide whether and how to take part, what events to organise and how to involve the public and the local situations", she explains. "Our idea was not to impose activities, but to give a guide, and above all to

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draw attention to the importance of making the public more aware of how fundamental physics is in many aspects of everyday life. We tried to set up a strong network of connections, a kind of grapevine, so that each Society involved could pass the word to other societies and institutions in its own area. We financed few activities, because physics is a small programme at UNESCO, but above all we organised preparatory conferences, which gave guidance on how to collect funds, especially for developing countries". According to Martial Ducloy, the scientific community's reaction was positive: "I must admit that it took some time, but in the end many scientists and researchers became involved in this new challenge, deciding to try appealing to the general public. If I could have chosen just one event, I would have organised something very involving, in the streets or on the beaches, with interactive experiments and lots of discussion with the public. It is important for people to understand that physics plays a fundamental role in solving the great problems of the twenty-first century".

WYP events in the world

One of the most important events in the World Year of Physics for developing countries was the World Conference on Physics and Sustainable Development,[3] which was held in Durban, South Africa, from 31 October to 2 November 2005. UNESCO took an active part in its organisation. "Incredibly, one of the associations that managed to collect most funds was the South African Institute of Physics", explains Minella Alarcon, "I think this shows how the progress of science in developing countries is possible, it only depends on getting people involved and interested". The International Centre for Theoretical Physics Abdus Salam in Trieste (ICTP), also played a fundamental role in organising the meeting. "It was a very important moment from the strategic point of view because many themes were discussed, but also real projects were formed, and new international networks created *ad hoc* to follow them up", explains Claudio Tuniz, Special Advisor to the Director at the ICTP. "Most of the participants came from developing countries, there was also great participation from the United States and from Great Britain, but I must admit there were few Europeans. It was a congress among scientists, specialists in the field, where there was a lot of talk about knowledge pooling, communication and above all fund raising. To mention only one example, there was the proposal of the formation of an international network for the development of nanotechnologies, in which Africa wants to take an active part. In the developing countries, in particular in this case in the most advanced African areas, there is a great desire to master basic science, but also the new technologies which can contribute to sustainable development. I think meetings of this kind are very important, and now every effort will be made to ensure the continuity of these projects, to support them in raising funds, and to guarantee their multidisciplinary nature. The ICTP itself supplied 50,000 Euro in sponsorships for numerous scientists from the developing countries that took part in the congress. But we also took action at local level, organising various public lectures and congresses in Trieste during the year, which however did not always attract a large audience".

Positive signals are arriving from South Africa, as confirmed also from Edmund Zingu, in charge of the Implementation of Future of Physics at the South African Institute of Physics.[4] "For the first time we succeeded in coordinating our fund-raising efforts at national level", he says, "and it worked, we received financing for more than 250,000 Euro, an incredible sum for our country. I think something is moving at last, in the awareness that in the long run, what has begun today, the opening to other countries, the creation of research networks, but also the involvement of the population, and above all of children, will certainly have positive effects for South Africa". "For the first time we succeeded in involving the interest of the Ministry of Education, which unexpectedly invested over 5,000 dollars, an enormous amount for our country, in the activities of the WYP", says Francis Allotey, representing Ghana at the Society of African Physicists and Mathematicians, "we organised many events to make our audience aware of physics, including a talent contest, some science festivals and various radio programmes". Some Asiatic countries also paid particular attention to the World Year of Physics. "For the first time we held a very particular physics talent contest", explains Ching-Ray Chang, president of the Taiwan Physical Society,[5] "we thought of ten categories, including for example writing an essay, a poem, a piece of music, or a letter, and we opened the competition to students and their families too. We received lots of very creative proposals. To celebrate the World Year of Physics we also organised a musical show and an evening firework display. Lastly we launched a project for discovering the history

of physics before 1970 in our country, Taiwan, restoring and publishing old popular science books. All this was possible thanks to large state funds, about 2 million dollars".

Nationwide activities were also organised in the United States.[6] "The APS received funds of about 200,000 dollars for the WYP, while another half million dollars was provided by various funding agencies", explains Alan Chodos, Associate Executive Officer of the American Physical Society. "At nationwide level we held two types of events:[7] some, like 'Physics Quest' and 'Measure the Earth with Shadows', were aimed at schools, while others, like 'Physics on the Road'[8] and 'Einstein@home' were intended for the general public. In all, 7145 events were recorded on our site, but I believe there were many more, between 10 and 15 thousand all over the country, almost 200 of which were public lectures. At the same time some ventures enjoyed greater visibility thanks to the World Year of Physics, for example the opera 'Doctor Atomic', by John Adams and Peter Sellars, performed in San Francisco, or a television show called Nova, broadcast by the public channel PBS, which devoted several episodes to Einstein: the one with the biggest following, 'Einstein's Big Idea',[9] had millions of spectators".

Europe, Einstein all the way

For most European countries the World Year of Physics meant a multitude of activities, often coordinated at national, or at least regional level: exhibitions, public lectures and meetings with Nobel prize-winners, conferences, open-air performances, theatrical works and experiments in the street. The commitment of some countries, especially of an economic nature, was fundamental. Part of the events was financed by the European Commission: "37 European countries took part in various ways", explains Martial Ducloy. "The European Physical Society obtained special financing for the WYP from the European Commission, amounting to more than 2 million euro, which were distributed among 18 countries on the basis of the projects they presented. These did not include some of the largest countries in Europe, such as Great Britain, Germany, France and Spain, which made exclusive use of their own public funds".

In some cases the World Year of Physics was especially Einstein's year, for example in Germany, where they celebrated the Einstein-Jahr. For Great Britain too the World Year of Physics was transformed into the Einstein Year, represented by three words: "exploring, discovering, inventing".[10] "We decided to focus on the historic figure of the scientist because we knew that in any case the attention would be concentrated on him", says Franka Ostertag, of the Büro Einstein-Jahr 2005 in Berlin.[11] "It was important to celebrate his discoveries and his fundamental role in the development of theoretical physics, but we did it in such a way that it was also a tool, an image that shifted the attention to what it means to know about physics today".

"Germany began celebrating the scientific years in 2000", says Franka Ostertag. "We felt the need to fill a gap, with respect to countries such as Great Britain or France, in science communication and in public involvement in science". Einstein's year was therefore part of a series of events that had already been partly experimented.

"Right from the start the figure of Einstein seemed perfect for celebrating a year of pure science, but at the same time a great effort was needed to develop all its complex aspects in the best way. Einstein is the most famous German scientist, even though he did not like to define himself as such after having left Germany at the beginning of the Second World War. His strong personality led him to take an interest in politics, ethics, art and peace. We worked a long time on developing all these themes". The preparation of the activities involved numerous partners: from the scientific world to the Jewish community, but also actors, writers, musicians and of course science centres. "Only in this way were we able to organise so many events in such a short time", continues Franka Ostertag, "for example the general public was invited to a meeting with famous Nobel prize-winners in Berlin: a lot of people came, but probably more for the names than to really understand something. Einstein too had failed, in Berlin, in his attempt to explain his discoveries to the general public. But in this event, as in others, the focus was not on the content, but on involvement". One of the most successful ventures in Germany was the creation of huge posters, which were hung on the *façades* of more than 90 buildings, mostly in Berlin, but also on buses, trams and sailing boats. "That was our most effective venture", explains Franka Ostertag. "As we did not have funds for a full-scale advertising campaign, we tried to develop something that would still have a

big impact on the public. The posters contained some of the most famous quotations of Albert Einstein, not concerning physics but his view of society and of man". Another very effective venture in Berlin was the E's: 36 big vowels, red E's more than two metres tall, were set up in the places in the city where Einstein lived and worked, but also in the points where events and exhibitions were organised. For the occasion a tourist map of the sites of the World Year of Physics was distributed, and people would go on real "E" safaris, as can be seen by the photos sent to the event website.

"Up till now we have held more than 700 events", explains Franka Ostertag. "At the beginning it was difficult, because every institute wanted to do its own thing, but we immediately insisted that all the Einstein-Jahr events should have the same brand, that they all be presented wearing the same 'hat'. For the first time we had a press agency completely dedicated to these events, with 8 people working full time, and the results were seen especially in the wide press coverage: according to statistics, 75% of the German population was aware of the World Year of Physics and 65% was informed of at least some of the events on the programme. It was a great effort, but I believe the scientific community understood the necessity of relying on experts in communication, especially when working on large scale, as in the case of the Einstein-Jahr. The success also owes a lot to the commitment of the state, which invested 13.5 million euro, a figure more than double the public funds that are usually invested in scientific years. If we also consider the investment of the individual institutions and universities, because that figure only half covered many projects, the money spent for the Einstein-Jahr is quickly doubled". As well as the events already listed there were great exhibitions (such as the one organised by the Max Plank Institute for the History of Science in Berlin, on the life of Einstein and the cultural context in which he lived),[12] theatrical works and performances, and the science festivals organised by Wissenschaft im Dialog. "But the real challenge was the great opening to art", concludes Franka Ostertag. "The scientists had to confront new forms of exhibition, open their minds to architectural and artistic experimentation. For example, in an archive we found some articles dating back to the early twentieth century, with many plans, sketches and drawings. We entrusted them to an artist, who created a blend of scientific material and his own work, and this project resulted in a very fine exhibition that was shown in Berlin".

Germany is not the only country to have a long tradition of scientific years. "In Barcelona too there is a long tradition of 'something years', indeed every year there is always some kind of celebration in progress; for example this is the year of the book but also of astronomy", says Ignasi Labastida i Juan, of the Catalan Physical Society.[13] "We organised a lot of events, even gastronomic ones, proposing an Einstein dinner for the general public. Not by chance, the slogan of our campaign was *Einstein Comestibile*. But we also held a big exhibition at the CosmoCaixa science centre, and produced small posters that were hung in the Barcelona underground, referring to the paradoxes of physics. Researchers and scientists were involved in a great number of lectures". Expressing an overall assessment, "I think the public was enthusiastic about most of the events", explains Labastida, "I personally prefer all the activities that take science out into the streets, among the people".

In France too, considerable investments were made in the World Year of Physics. "For the first time we succeeded in obtaining good support from the CNRS, from the Ministry for Research and Education, and from the local administrations, which altogether made available funds amounting to 5 million euro", says Rémy Mosseri, head of organisation for the Paris area in France.[14] "The communicative aspect was fundamental. In my region, the Ile de France, the local administration consented to provide funds on condition that we apply to a press agency expert in communicative aspects. We also employed one person full-time to deal with various informative activities. It was difficult at the beginning, the agency was not used to dealing with science, we had to work a lot together on the press releases, and established direct contacts between journalists and scientists. The results were important, up till now we have had more than 200 items in the newspapers and various services on radio and television". There were a great many events in France, "more than 300 in the Ile de France alone, nearly one a day", explains Rémy Mosseri. "Nothing like that had ever happened before in France. To involve the public we made an agreement with the publishers of the Routard tourist guides and created the Routard for the World Year of Physics, obviously with Einstein wearing a rucksack on the cover. We distributed 50,000 free copies. This was another very important factor, 95% of all the events were free of charge". In most cases the idea of the activities was entrusted to the scientific community. To get researchers directly involved we held a competition, in which each one could present his own idea. We received lots of proposals of all kinds, the best ones were assigned funds, and the winners were actively involved in organising the

activities they had proposed. According to our estimate, about 2,000 researchers all over France took an active part in some event, often shifting their focus from physics to medicine, or even to art. It was a great challenge. I myself had had no experience in this field, but I think the public appreciated it, and many people participated in exhibitions, shows and events of all kinds".

In Italy, the World Year of Physics did not receive a lot of attention, due to the lack of a serious investment by the state and also a lack of coordination at national level. "The commitment of the community of physicists for 2005 should have been coordinated by the Italian Society of Physics (SIF), by the Italian Association for teaching Physics and by the Italian Astronomical Society. Unfortunately, in the end there were lots of small ventures at local level, but there was no activity of communicating the events, so a real coordination was lacking", explains Roberto Habel, joint president of the national coordination committee organised by the Italian Society of Physics.[15] "The SIF organised two types of activities at nationwide level, both aimed at schools, thanks to the funds from the MIUR (Ministero dell'Istruzione, dell'Università e della Ricerca) and from the European Physical Society, both of which supplied 200,000 Euro. We bought 60 kits for measuring earth radioactivity, which were distributed to schools, and we created a virtual classroom on the Italian Internet site of the WYP, to allow students who have a laboratory in their own school to share the physics experiments by video-conference with other classes". Even in the press, the World Year of Physics passed almost unnoticed, apart from sporadic events dedicated mainly to Einstein's life and discoveries. "Nobody took care of coordinating communication and PR activities at a national level. It is quite a pity, as this reinforced the idea that little has been going on for the WYP in Italy. That is not the case, especially at a local level there were a lot of activities organized, but they were not disseminated adequately", says Roberto Habel. "The impression is that there were various ventures at local level: the Universities all over Italy organised micro-activities. However none of these was proposed through the media, there was not a national idea or dimension", says Romeo Bassoli, a journalist with the Zadig scientific agency in Rome. The INFN (Istituto Nazionale di Fisica Nucleare)[16] also organised some activities, "such as 'Physics on Wheels' or 'Physics in a Boat', but also exhibitions, such as 'Physics Microscopes', as well as local ventures, opening the laboratories to students", explains Barbara Gallavotti, head of Institute's Communications Office. "We also financed a theatrical performance and worked with the SISSA in Trieste on the production of large posters about physics designed by students following the Master in Science Communication. Lastly we launched the '*Crescere* project', which aims to create a network of experiments on web between students in different classes. We also dedicated to the future of physics the four-day meeting '*Comunicare Fisica 2005*', held in Frascati from 24 to 27 October, for specialists in the field, that is for scientists and journalists who have projects and ideas to share, linked with the world of communication. Unfortunately we did not receive any specific public funds for the World Year of Physics, and to organise the activities the INFN drew several hundred thousand euro directly from the budget assigned each year to dissemination activities". Besides local events organised by the individual Universities, at a national level the Festival of Science held in Genoa was a great success:[17] "the Festival is a well-tested event which has now reached its third edition". explains Manuela Arata, president of the Organisation of the Genoa Science Festival. "When we were drawing up the programme, everyone was very aware of the World Year of Physics. For example, Peter Greenaway proposed the idea of realising the show entitled 'The Children of Uranium', and found that the Festival was the right location. For this year's edition we did not invite lecturers, but specialists, and asked them to speak to the audience in the simplest possible way. There was a precise reason for this decision: even though it may not be his own subject, a communicator can be very good at talking about a set topic, but he is not always able to answer any probing questions from the audience". The Genoa Festival did not receive any public funds either: "There were no specific funds for the ventures linked with the World Year of Physics. The Festival is an event that has already earned a reputation and receives funds from various sponsors".

The future, between new forms of communication and cultural challenges

From all that emerges from this brief tour of the events and ventures that the different countries dedicated to the WYP, we can say that the World Year of Physics took place at various levels. There was a wide-reaching educational intent, often translated into slogans suggesting that "physics is easy and

within everyone's reach", or "being a scientist is great fun", and into activities for schools but also for grown-ups, involved in a mass attempt to understand the foundations of theoretical physics (Einstein's relativity) from the words of Nobel prize-winners and great scientists. In the developing countries this intent was achieved in talent contests between students, real Physics Olympics which took the best students to visit great research centres in the most advanced countries. But there was also, for the first time on a worldwide scale, a great effort in communication. As we heard from Rémy Mosseri in France and from Franka Ostertag in Germany, the worlds of science and of information were obliged to communicate, to collaborate at nationwide level in a common intent: involving the public, and for science too this became one of the priorities of the governments that were willing to invest considerable funds in the physics of today. "Einstein's intellectual adventure was certainly an important experience, a message to be transmitted to the general public", comments Silvie Coyaud, an italian scientific and radio journalist, "but there is no sense thinking that you can communicate the basics of relativity in one year; anyone who organised events of this kind made a fundamental mistake, because it is not honest to say that physics is easy. However I was glad to see people queuing up to attend public lectures by Nobel prize-winners, as at the Festival of Science in Genoa, or at the science shows in theatres. What counts is the subjective, cultural experience. The desire to be there and the joy of discovering, as researchers do, that science is made of people, that there is still such a lot to be discovered, and that everything that will be discovered in the future will certainly influence our lives, because physics has now permeated many sectors of our society".

Another opinion is held by Martial Ducloy, head of the International Steering Committee of the WYP. "I believe that the reference to the most famous twentieth-century scientist worked, because it helped us transmit an important message, that is that physics is not difficult, and that even a complicated concept like relativity can be understood. But the WYP2005 also aims to stress the importance of physics in everyday experiences, in culture and in society. For this reason I am strongly opposed to those countries that transformed the World Year of Physics into the Einstein Year. This was also a problem as regards the media. Since the scientist's figure often guarantees large audiences, newspapers, television and radio often focussed their attention on the past, on history and discoveries, rather than on the future, where the many sectors involved in physical research are leading us. To mention only one item, during the year more than half of the broadcasts and articles in France were dedicated to the figure of Einstein". Criticism of the great celebrations of the figure of the scientist also comes from the United States. "The idea of the World Year of Physics is very good, the idea of projecting and transmitting an image of physics in the twenty-first century is important", comments Alan Chodos, of the American Physical Society. "But I think that creating such a strong association between an event like the WYP and the figure of Einstein had a dual effect: a positive one, because the figure attracts people's curiosity, but also a negative one, because their attention is often shifted towards historic aspects, losing sight of the main message, that is that physics is exciting today too. It is difficult to assess the outreach of this type of venture, because it is not teaching but stimulating, with the aim of drawing attention to physics. In a large context such as the United States, it is very difficult to organise nationwide activities, if not with great efforts in organisation and economic means, which we do no have. That is why I think it is better to act at a local level, as we have done in the past, even though it is difficult to judge what might be better in the long term".

It is early to say whether the great official aim of the WYP has been achieved, that is the aim to increase the number of enrolments in the science faculties. "The only risk is that too many 'something years' will make this type of event less spectacular, and therefore less effective", comments Ignasi Labastida i Juan. In the meantime, at least some of the successes and failures of the World Year of Physics have left their mark, showing that collaboration between science and communication on a large scale is possible. "I hope we can continue the adventure we began this year", says Franka Ostertag, "it has been difficult to manage to centralise all the communicative activities, but in the end most of the institutes and universities declared they were very satisfied, and we established a strong network, of contacts with the media. On both sides there is a great desire to continue the experience begun. I believe that science has realised that it cannot do everything alone, and that it is much more effective to collaborate with people who are skilled in communication. I believe the real cultural challenge for the future of physics will be to dare more, to open up to new formats and new experimentations, and to establish more and more connections with the world".

Notes and references

[1] The official web site of the World Year of Physics is available at: <http://www.wyp2005.org/>
[2] Unesco's website on World Year of Physics initiatives is available at: <http://portal.unesco.org/sc_nat/ev.php?URL_ID=1492&URL_DO=DO_TOPIC&URL_SECTION=201&PHPSESSID=88784b16d61529d6800a67741221a801>
[3] A wide description of the fields of discussion covered during the conference days, divided by topic, is available at: <http://www.wcpsd.org/>
[4] The official WYP web site for South Africa is available at: <http://www.saip.org.za/physics2005/>
[5] An original event organized in Taiwan was a special concert dedicated to superstrings, available at: <http://spy.pccu.edu.tw/WYPconcert/>, that took place also in several other locations, as shown in the website available at: <http://www.jackliebeck.com/superstrings.htm>
[6] The official WYP web site for United States is available at: <http://www.physics2005.org/ >
[7] A list of the activities organized in the United States is also available at: <http://www.physics2005.org/aboutwyp.html >
[8] A map of the Universities that were actively involved in the organization of events is available at: <http://www.physics2005.org/events/physicsontheroad/index.html>
[9] Available at: <http://www.pbs.org/wgbh/nova/einstein/>
[10] Available at: <http://www.einsteinyear.org/>
[11] A list of all activities organized by the Büro Einstein-Jahr 2005 of Berlin is available at: <http://www.einsteinjahr.de>
[12] The exhibition, titled *Einstein, ingegnere dell'Universo*, will be on show in Italy until January 31, 2006. Further information are available at: <http://www.universoeinstein.it/index1.html>
[13] The official WYP web site for Spain is available at: <http://www.fisica2005.org/view/default.asp>, while the website of the Catalan Physical Society is available at: <http://www.amf2005.org/index.htm>
[14] Available at: <http://129.199.115.254/05d_lien.htm>. On the web site it is also possible to download a copy of the Routard Guide for the World Year of Physics.
[15] The official WYP web site for Italy is available at: <http://www.wyp2005.it/>
[16] Available at: <http://www.infn.it/indexit.php>
[17] Available at: <http://www.festivalscienza.it/>