

WORLD YEAR OF PHYSICS in the Netherlands



Queen Beatrix visits the Martinikerk in Groningen where a Foucault pendulum proves that the Earth is turning. Prof. Herbert Löhner (from Groningen University) explains the physics behind this classic experiment to Her Majesty and her party, among whom Prime Minister Jan Peter Balkenende. (photographs Theo Jurriëns)

Structure

The Netherlands' Physical Society (NNV) appointed a *National Steering Committee* mainly consisting of university research physicists, both active and retired. In order to have a financially independent legal body, a *Foundation* for WYP2005 was founded (Stichting WYP2005/NL). The Board of the Foundation consists of members of the National Steering Committee, the NNV chairman, and a former treasurer of the NNV acting as treasurer of the foundation. The board appointed a director to take care of the full-time coordination of all WYP activities in the Netherlands.

Funding

The WYP activities in the Netherlands were financially made possible by a generous grant of the European Commission, contributions from 'Platform BètaTechniek' (an agency of the Ministry of Education) and 'Stichting Physica' (Physics Foundation), and by donations from several industrial partners: Philips Nederland, Shell Nederland, Corus, ASM International, ASM Lithography, PANalytical. The total funding amounted to 1.1 million Euro.

Activities

Our activities were partly inspired by the successes of ‘Das Jahr der Physik’ in Germany in the year 2000. The main activities were (for details see below):

- National School Teams Contest (‘Eureka Cup’), May 20, 2005
- National Primary School Teams Contest (‘Techniek Toernooi’), June 10, 2005
- Physics in the Department Store (‘Natuurkunde op de Markt’), May 29–June 11
- Discovery festival *Science Unlimited*, June 14–19
- Booklet ‘Equations’, written by Sander Bais and published by AUP (Amsterdam University Press) in German, English and Dutch
- Energy Beach Tour; August 5-7, 12-14 and September 3.
- Einstein and Picasso, a dream of an encounter (theatre play written and directed by TU Delft staff member); 10 performances in The Netherlands and Belgium
- Science Posters covering six different subjects aiming at arousing young people’s curiosity.

In addition to the above activities there were many *local* activities aimed at the general public, such as lecture series, exhibitions, science circuses, and science cafés. These events were organised mainly by staff members and students from universities, and have reached large numbers of people increasing their appreciation of science in general and physics in particular.

Press and Media coverage

WYP2005 received significant attention in the written press. At the end of the year the pile of newspaper cuttings was many centimetres high. However, it proved difficult to interest radio and TV. Both national and regional radio channels did not give more than a few hours coverage of WYP2005 events. Fortunately, however, two children’s TV programmes paid ample attention by showing several exciting physics experiments and highlights of *Physics Unlimited*.

One overall lesson learned is that, in order to raise a sufficient amount of publicity by radio and TV for this type of activity, it is vital to start an early campaign.

Unfortunately, this was not possible, because of the financial uncertainty which persisted well into the year 2005.

Contact with policy makers

Cooperation with Captains of Industry was excellent, especially with Philips, the largest employer of Physicists in The Netherlands, as well as with Shell and Corus. On the other hand, the interest shown by Dutch politicians and other policy-makers to the World Year of Physics was disappointing. The main proof of interest came from the minister of Economic Affairs who held the opening speech for *Physics Unlimited* - the main WYP event - in the national science centre NEMO in Amsterdam. The city governors and some fifty members of parliament with relevant portfolios (education, science and technology) were invited, but none of them turned up. Their attention for WYP2005 is in sharp contrast with their attention for the Mozart Year and the Rembrandt Year, which have recently started.

Committee of Recommendation

A Committee of Recommendation was formed consisting of

- two captains of industry: the CEO’s of Philips and Shell
- two physicists who served as ministers in the Dutch Government
- two Nobel Laureates.

Eureka Cup - National School Teams Contest (for 12-16 year old students)

Following the example of the successful Freestyle Physics programme in Germany, high schools were invited to build devices (water rocket, chain reaction), develop certain techniques (composition photography, person recognition) or prepare an act ('physics on stage'). The main objective was to promote young people's interest in science, and to encourage critical and creative ways of thinking.

The event was given the name Eureka Cup, referring – of course – to the soccer Europe Cup, which is so popular among youngsters. It took place on May 20 and was a joint effort of UvA and VU (the two Amsterdam Universities), AMOLF and NIKHEF (two institutes of FOM, the Physics branch of the National Science Foundation NWO). As location the Amsterdam 'Science Park' was chosen, where the two FOM institutes are located.

In view of the enthusiastic reactions of the participants, and in order to increase the return on investment – both in time, in money and in experience - it is our objective to make this project a yearly happening. We expect that the publicity and the positive reactions of the participating schools will generate a snowball effect, so that the Eureka Cup will become a first rank national event, analogous to what happened to Freestyle Physics in Germany. We will therefore seek government support in order to raise the necessary funds for future events.



Launching of a water rocket. These students, 12–15 years old, will soon have to choose between an alpha (humanities) and beta (science) course package.



A 'chain reaction'



Waiting for the prize-giving ceremony



Winners of 'Physics on Stage'

Techniek Toernooi - National Primary School Teams Contest

This event was baptized '*Techniek Toernooi*', to be translated by Technology Tournament. Its objectives were to enthuse and surprise even the youngest groups of school kids and to give their teachers a tool to talk in their classes about constructions and inventions, sometimes even about some basic physics. Along with this tournament, for which the preparations took place at the participating schools, the possibility was offered to individual children to make a painting or poem in relation with technology and physics.

The actual contest took place in '*Het Land van Ooit*' (Ever Country) in the province of North-Brabant on June 10th. This 'country', situated on the property of a former mansion built by King William II in the nineteenth century with a 'real' Governor and knights and the like, has proven to be a perfect *ambiance* for the tournament. The morning was for the battle between the lower four groups (ages between 4 and 8 years). They were given the following topics (the first two to the youngest two years of age):

- Tower of sand
- Blowing bubbles
- Paper bridge
- Water xylophone

The afternoon was devoted to more elaborate constructions for the advanced groups with ages ranging from 9 to 12 years. They worked on the following subjects, the last two being reserved for the eldest children:

- Tower of straws
- Ballista, an ancient military engine for hurling great stones etc.
- Crystals
- Water rocket.

There were 108 teams of typically four children each, representing more than 70 schools from all over the country. In addition 70 pieces of art were submitted, of which 17 were selected by a special jury beforehand. These 17 pieces were exhibited during the tournament in a spacious room of the mansion. The price-winning artists were offered a VIP lunch with a group of distinguished guests, among whom many university professors, and received a diploma after they were individually honoured by hearing the jury's opinion on their work.

The winning teams of the eight assignments were selected on site by eight jury's composed of professionals with each of them chaired by a university professor in gown. These selections were based on a number of objective criteria that were agreed upon beforehand, generally the most important ones being 'largest', 'longest' and the like; sometimes however also 'nicest' or most 'ingenious, clever'. The deliberations by the jury's were done in a very serious way. Nevertheless, there were a couple of disputes afterwards on some of the jury's decisions. All of these could however be handled to the satisfaction of both parties. It illustrates that both the organisers and the participants were acting seriously and professionally.

The price a school team could win was consistent with the motivation for the event: *Techniek Torens*, or Technology Towers, composed of a series of cabinets (looking like

castle towers) full of challenging experiments. With these towers that include instructions for the teachers how to use them in the classroom, the schools are encouraged to carry on with technology/science at school. The children of the winning teams each received their own prize as well; ingenious building blocks (Lego) or a (simple) digital camera. The prizes were handed out during a 'hubhub' in the arena with a realistic knight's fight as an introduction to the jury's reports.

The reactions of the teachers who accompanied their teams and the curious parents, who came along, were *uni sono* in their high appreciation of the event. Many expressed the wish to participate again next year, either to take revenge or to win again; and all because they had a fantastic day!

The total participation was about 700. This figure includes teachers, parents and supporters. Clearly more teams could have participated. The projected number for this first-ever-event of this kind was 200 teams from 200 schools. We only reached half of the number in teams, or a third in number of schools. One of the chief reasons for this is that we found it very hard to reach the schools by mail. Much of the material sent never reached the teachers or was discarded by lack of affinity with the subject. We believe that with the foundation laid this year we may significantly increase the participation in the coming years.

The winning pieces of art were on display at various locations (universities, schools, institutes, Shell). A booklet containing pictures of the 17 pieces of art, interviews with the winners, and a photographic impression of the whole *Technology Tournament* served as exhibition catalogue.



*In 'Het Land van Ooit'(Ever Country)
The organizers check the rocket launching platforms.*



One of the university professors at work



Selecting the winning pieces of art



Prize-giving ceremony

This team has won the tower of sand contest for 4-5 year old children.

Physics in the Department Store

Physics shows with spectacular demonstrations were organised on markets or in large department stores in every university city. The public was exposed to this ‘infotainment’ during the first two weekends in June.

The main objectives of this project were to increase the dialogue between the public and the scientific community, and to advertise the discovery festival *Science Unlimited* to be held later that month.

‘Physics in the Department Store’ took place in various forms and in some ten cities in the Netherlands, around the weekend of June 4. Students and staff members alike took science to the people where they least expected it: in the shopping mall and on the market.



Magdeburger Hemispheres in Groningen (Grote Markt), June 2-4



Enschede (Oude Markt), June 4



Nijmegen (Plein 1944), June 4



Alkmaar, at the famous historic Cheese Market, June 11



Delft, at the Market Square, June 3

Discovery Festival

The main physics event Discovery Festival took place in and around the National Science Center NEMO in Amsterdam from 15 till 19 June. Each of the nine Dutch universities with a physics department had developed four (or more) super 'exhibits'. Also Philips Research, Estec and FOM institutes participated. The physics content was accompanied by pieces of music, theatre, sculpture and other elements that have a connection with creativity.

The objective of the event was to create a better understanding by the general public of the role played by science research in medical and technical applications, and also a better appreciation of the fascination of the physical sciences.

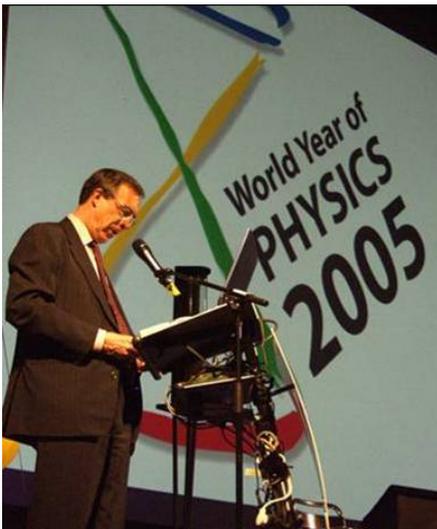
The name 'Science Unlimited' was chosen for this event. At least half of the exhibits refer to cutting-edge science and technology, whilst other exhibits demonstrate interesting and thought-provoking physical phenomena.

Science Unlimited started off on June 14 with a sparkling evening show, presenting a mix of flashes from cutting-edge science, entertaining experimental demonstrations, and performing arts. Former astronaut Wubbo Ockels, physicist and currently university professor at Delft University of Technology, acted as the showmaster.

The show was officially opened with an address by the Minister of Economic Affairs mr. L.J. Brinkhorst. As a representative of industry, Philips Chief Technology Officer dr. Ad Huijser gave a convincing impression of technological breakthroughs that are based on physics research.

Despite a one-day rail road strike and despite a tropical Saturday and Sunday drawing large crowds to the beach, Science Unlimited attracted some 15,000 visitors, considerably more than the 10,000 that were anticipated.

A fullcolor 60-page catalogue of the exhibits of Science Unlimited, containing a preface of the minister of Economic Affairs was produced and widely distributed.



Mr. Laurens Jan Brinkhorst, minister of Economic Affairs (left), Professor Jo Hermans, WYP organizer, and Dr. Ad Huijser, Philips Chief Technology Officer (right), at the opening ceremony.



The 'Human Levitator' is a magnetic disk floating in the field of a high temperature superconductor. The Levitator can easily carry two adults.



The public took delight in all seventy exhibits.

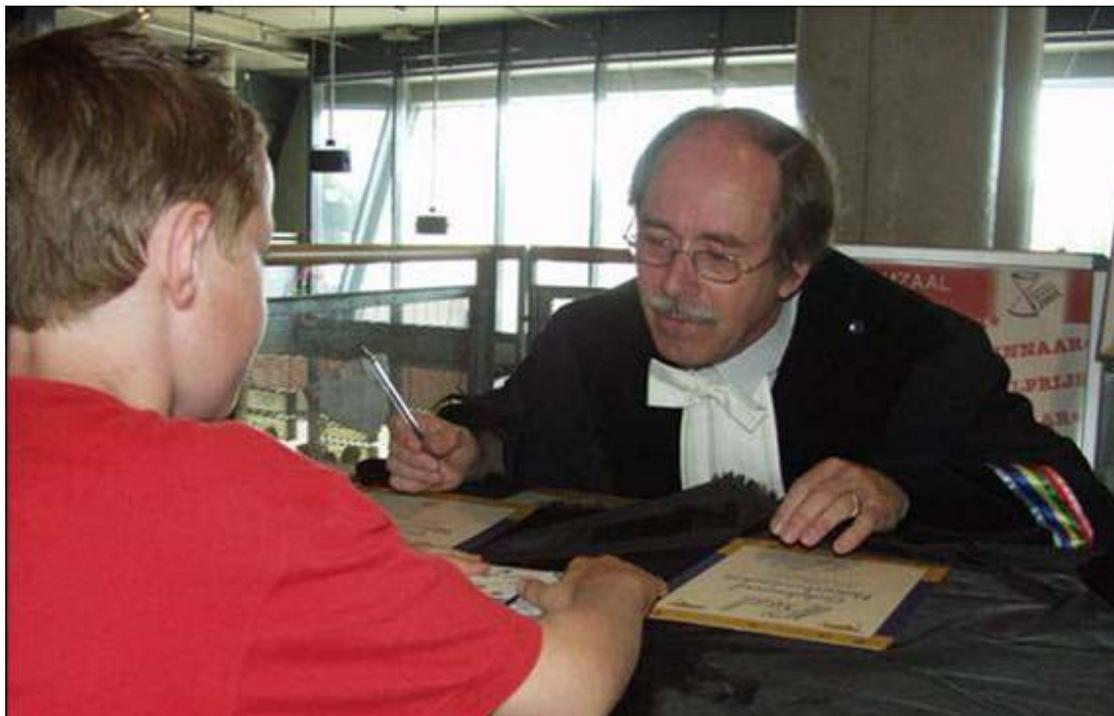




Young children were fascinated by large soap bubbles.



Colourful balloons created a festive character.



Nobel Prize Laureat Professor Gerard 't Hooft signing a 'Physics Talent' diploma.

Energy Beach Tour

A caravan of various environmentally friendly vehicles, manned with physics staff and students, called in at several seaside resorts along the coast, featuring a hydrogen racing car and the NUNA 2, winner of the 2004 World Solar Challenge across Australia. For children there were sand castle building, kite flying, sailing car and wind buggy driving contests. The central topic was renewable energy, as consumable good in daily life, and the necessity to develop and use it.

The objective was to increase public awareness of the need for renewable energy and of the essential role of physicists and other scientists in sustainable development.

Unusually bad weather (even by Dutch standards) caused this project to reach far less people than would have been the case otherwise. Only the very brave turned up in their raincoats. A camera team from national television that had come to cover the beach tour unfortunately had to leave without being able to take a single shot. The weather conditions are illustrated in a six-column wide color picture in the second largest national newspaper (De Volkskrant). Even so, there was a reasonable turnout of about 10,000 people (in 7 days). Reactions from the visitors were very positive. More importantly, the event enjoyed a broad coverage in the media, ranging from radio interviews by RTV Noord Holland to articles in both national and local newspapers.



From 'De Volkskrant', August, 13, 2005



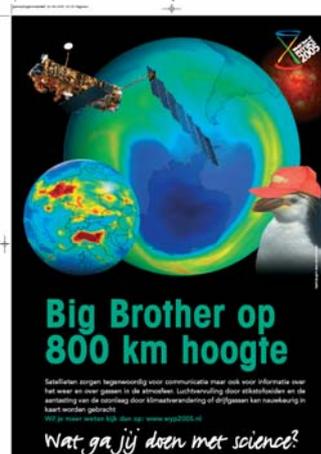
A watery sun after hours of rain. The wind buggies are able to move in every direction, even head-on into the wind.



A hydrogen racing car demonstrating the feasibility of compact hydrogen storage in combination with fuel cells for mobile applications.

Conclusions

- The WYP2005 activities in the Netherlands have been highly successful.
- The activities have served as a catalyst for future activities. For example: In view of the enthusiastic response, plans are being developed to make the two National School Teams Contests (one for primary schools, the other for secondary schools) into yearly activities. Also, it is considered to repeat the discovery festival Science Unlimited at three- or five-year intervals.
- As further spin-off, WYP2005 has led to professionalizing many outreach activities of universities. This includes the development of new items (e.g., the superconducting levitator) and a higher standard in both PR material and presentation by staff members and students. A clear increase in skill and enthusiasm for addressing the general public was observed, as time went by.
- Cooperation between universities has been fostered in the field of outreach, which traditionally used to be a local activity to attract new students to each university separately. Rather than leading to a mere shift in enrollment numbers, such concerted efforts are aimed at increasing the *total* number of science students.
- Finally, also on the international level, we have witnessed an exchange of expertise in the field of promoting science. For example, Dutch students were brought into contact with the EurophysicsFun team, and got actively involved in its activities!
- For 2006, the two most successful activities aimed at schools are being continued. For the 'Techniek Tournooi', most of the finances necessary have already been secured, mainly from industrial sources. Similarly, a continuation of the 'Eureka Cup' is being realized by Delft University of Technology.



Science posters covering six different subjects were distributed among the highschools to arouse young people's curiosity.