

## World Year of Physics 2005 – activities in Croatia

Croatian Physical Society has started its preparation for WYP 2005 already in April 2004, when, as a result of the initiative of EPS, a local committee was formed. The committee members were representatives of Faculty of Science (Physics and Geophysics departments), Institute of Physics, Institute Rudjer Boskovic as well as the representatives of physics students. During 2004 this committee has defined a project *Towards the Croatian week of Physics 2005*, which was submitted as a part of the EPS FP 6 project. In December 2005 CPS has proposed some additional projects, and the total list of activities for 2005 was:

1. *Towards the Croatian week of Physics 2005*
  - 1.1 *Week of physics*
  - 1.2 *Public performances*
  - 1.3 *Interactive experiments*
  - 1.4 *The beauty of physics and Physics Express*
  - 1.5 *Coordination and public relations*
  - 1.6 *Chain experiment*
  - 1.7 *Historical experiments*
2. *Talent Search*
3. *WYP2005 promotion*
4. *Nobel prize posters*
5. *Planetarium; coordinators*
6. *Posters of Croatian physicists*

All the activities coordinated by the Croatian Physical Society have been carried out under the high auspices of the President of the Republic of Croatia and co-auspices of the Ministry of science, education and sport.

The official beginning of the WYP activities in Croatia was on 14th March 2005, where the centenary of the triumph of physics was marked with the lecture given by professor Marijan Sunjic, a former rector of the University of Zagreb. We have also celebrated the Einstein's birthday with Mozart's music and champagne. The final marking of the WYP 2005 was the session of the Education, Science and Culture Committee of the Croatian Parliament in December 2005, where the CPS representatives spoke about the WYP activities and the role and the importance of physics in our society.

### 1. *Towards the Croatian week of Physics 2005*

The main objective was to provide collection of events for the World Year of Physics in Croatia. The project was organized through seven work packages (see above). The central event the „Week of Physics” was held in Zagreb November 7-12, 2005. The other work packages provided collection of events and actions with aim to increase public awareness gradually from the beginning of the year.

#### 1.1 *Week of physics* ([http://www.wyp2005.hr/tjedan\\_fizike](http://www.wyp2005.hr/tjedan_fizike))

Promotion of scientific education of young people as a long-term interest of Croatia, popularisation of physics and stimulation of interest for science in general, strengthening of the common consciousness about technological progress and its impact to the society were achieved by some specific objectives of this work package.

Targeted groups were students, scholars, politicians and citizens of various orientations who should have acquired better understanding of physics and its interplay with other sciences. These objectives were achieved by organizing a series of lectures at different faculties of the University of Zagreb. The lectures were held by eminent scientists from our most distinguished scientific institutions dealing with physics: Faculty of Science (Departments of Physics and Geophysics), Institute of Physics and Rudjer Boskovic Institute. The audience was not necessary chosen among the students who are familiar with natural sciences, but who could find a certain connection of their narrower specialty with physics from the specific subjects, which were expounded. Therefore the level of explanation of each lecture was adjusted to specific targeted group. In order to enable the dissemination of the topics involved on a most wide scale all the lectures were recorded on a video tape and put on web pages ([http://www.wyp2005.hr/tjedan\\_fizike/predavanja/predavanja.htm](http://www.wyp2005.hr/tjedan_fizike/predavanja/predavanja.htm)).

In the Week of Physics (November 7-12, 2005) the inauguration of the memorial room of Professor Andrija Mohorovicic, who was an eminent Croatian scientist in the field of meteorology and seismology took place ([http://www.wyp2005.hr/album\\_otvaranje\\_sobe\\_AM](http://www.wyp2005.hr/album_otvaranje_sobe_AM), <http://metodika.phy.hr/gf/index3.php?kat=10>). The room was located at the Department of Geophysics of the Faculty of Science in Zagreb. Also a series of lectures was given during this week, which ended with the manifestation Open Days during which the laboratories at scientific institutions (Departments of Physics and Geophysics at the Faculty of Science, Institute of Physics and Rudjer Boskovic Institute) were open to public. Guided tours for students, teachers and interested citizens were organized (details, photo albums, etc. can be found on the following addresses <http://www.wyp2005.hr/en/obavijesti.html> [http://www.wyp2005.hr/tjedan\\_fizike/labosi.html](http://www.wyp2005.hr/tjedan_fizike/labosi.html)).

### 1.2. Public performances ([http://www.wyp2005.hr/javne\\_izvedbe/](http://www.wyp2005.hr/javne_izvedbe/))

The main objective of this work package was to attract public attention on larger scale by performing big scale experiments through public shows on streets, squares or parks in major towns. Three experiments (Bernoulli levitation, Monkey and hunter, Magdebourg semispheres) were conducted and presented to the audience (<http://metodika.phy.hr/gf/index3.php?kat=10>)

### 1.3. Interactive experiments ([http://www.wyp2005.hr/interaktivni\\_pokusi/](http://www.wyp2005.hr/interaktivni_pokusi/))

The main objective of this work package was to design and present several interactive experiments covering different fields of physics. The experimental set-ups located at scientific institutions on the Science Hill Horvatovac should attract visitors (students, pupils and general public) to the physics departments of the University and the institutes.

Four interactive experiments have been very successfully realized: the relativity experiment on the time dilatation in the detection of cosmic muons, tsunami waves, model of wind "bura" and acoustical resonators).

### 1.4. The beauty of Physics and Physics Express ([http://www.wyp2005.hr/ljepota\\_fizike/](http://www.wyp2005.hr/ljepota_fizike/))

To increase interest and acceptance of physics for pupils we travelled and visited their schools. We presented them interesting physical topics in easy and challenging way, and show that physics is beautiful. We wanted to encourage pupil's creativity and their acceptance of physics as a part of our culture.

We have developed four kinds of activities: the Competition for the best pupil's presentations of physics, the Festival of physics, the Travelling popular physics lectures and the Physics Express - travelling experiments.

We have announced the competition for the best pupil's presentation of physics. This includes the best essay, SF story, picture, sculpture, performance, photograph, etc. The web pages ([http://www.wyp2005.hr/ljepota\\_fizike/NatjecajLjepotaFizike/pristigli\\_radovi.htm](http://www.wyp2005.hr/ljepota_fizike/NatjecajLjepotaFizike/pristigli_radovi.htm)) were created and the received works were exposed in a web-gallery. The response was very good. The awards were announced in the Week of Physics (November 7-12, 2005).

The Festival of Physics took place in Zagreb on March 17th and 18th, 2005. Twenty-six physicists have presented a popular 30 min. lectures from different topics. The response of pupils, teachers, and the colleagues, was very good. The 150-seat lecture hall was completely filled all the time. The event was also broadcasted via live streaming video server, which was very well visited too. The details of the Festival containing announcements, program, abstracts, photo album and comments can be found at the following site: [http://www.wyp2005.hr/ljepota\\_fizike/populpredav/festljepfiz.htm](http://www.wyp2005.hr/ljepota_fizike/populpredav/festljepfiz.htm).

The whole action is also presented to physics teachers, on *The Seventh Croatian Symposium on Teaching Physics* in Sibenik, Croatia, 30.03. – 02.04. 2005. The workshop: *Playing With Magnets* has been developed and demonstrated. Student's section presented their action named Physics Express. They prepared several attractive demonstrations from various fields of physics. The initiative to invite the lecturers and the students was left to the teachers and schools themselves. We have visited only the schools, which we were invited to.

From April to June 2005 we visited many schools in Zagreb, Split, Rijeka, Pula, Varazdin, Omis, Krapina, Virovitica, Sesvete, Fazana, Mali Losinj, Konscina, Orahovica, Nasice, Pozega, Daruvar, Cakovec and Otocac. Besides giving the lectures the lecturers brought the promoting material, presented the events of WYP and encouraged pupils to participate in the competition with their own works. Students and Physics Express were also included. The web pages for school visits with photo albums and comments are available at [http://www.wyp2005.hr/ljepota\\_fizike/Skole/popisskola.htm](http://www.wyp2005.hr/ljepota_fizike/Skole/popisskola.htm) and [http://www.wyp2005.hr/ljepota\\_fizike/Fizika\\_ekspres.htm](http://www.wyp2005.hr/ljepota_fizike/Fizika_ekspres.htm).

### 1.5. Coordination and public relations

The main objective was to help coordination of all events planed within the activities of the project and to establish connection with media and inform targeted groups about particular event.

The Croatian Physical Society has provided help to promote wyp2005, search for additional support and sponsors of the activities. For example it has been achieved that the activities on highlighting the International Year of Physics in Croatia are conducted under the high patronage of the president of the Republic of Croatia, Stjepan Mesic, and co-patronage of the Ministry of Science, Education and Sport.

Coordination has been performed through regular meetings and over an extensive e-mail communication. The main events and actions were: Setting up web page at [www.wyp2005.hr](http://www.wyp2005.hr) which presents project events and achievements and also other activities by the Croatian Physical Society related to wyp2005. Sending public announcement about WYP2005 to media (HINA – Croatian information agency), TV announcement (Dobro jutro Hrvatska – Good morning Croatia), an interviews to daily newspapers, radio broadcastings and weakly journals were given. Separate web page covers media presentations related to wyp2005 (<http://www.wyp2005.hr/en/mediji.html>). Databases of addresses were prepared for schools and other targeted groups. Posters and other printed materials related to project were disseminated to over 1300 primary and secondary schools in Croatia by regular mail. All traditional events organized by the Croatian Physical Society were used to promote WYP2005 among scientists, primary and secondary school teachers and pupils.

### 1.6. Chain experiment ([http://www.wyp2005.hr/lancani\\_pokus/](http://www.wyp2005.hr/lancani_pokus/))

The idea was to set up a long chain of simple homemade dynamical mechanical devices that all have one common point. The operation of each contraption must start and end in a prescribed way, so that one contraption starts the next one by its last action. School children aged up to 19 years were expected to be the participants in the Chain Experiment, but the help of adults in building up the contraption was encouraged. The objective was to promote the physics through an entertaining event.

The information about project together with the call for participation is sent to all primary and secondary schools (1360). The project was presented at *The Seventh Croatian Symposium on Teaching Physics* (Sibenik, 30.03.- 2.4. 2005) and Croatian Physics Olympiad (Gospic, 12.-15. 5. 2005).

### 1.7. Historical experiments (<http://metodika.phy.hr/gf/index.php>)

Main goal of *Historical Physics Experiments* activity was to renew old experimental devices, which have been used in practical physics education throughout early XX century (modular organs, Tesla's coil, Hertz's wave generator and Koenig's machine). Our plan was also to make this experiments and ideas available to wider range of community, by presenting them in suitable manner on Internet.

Activities were realized in two main directions: renewing equipment and setting experiments back to work (<http://metodika.phy.hr/gf/index.php?kat=7>), and presenting material on the Internet together with additional explanations of physical phenomena connected to the experiments.

Web site of the project is available on <http://metodika.phy.hr/gf>. All presented resources are related to the target experiments, together with biographies of famous physicists who created experimental devices. Early pictures are also available. Video presentations and live streaming from historical collection can be found on the following site: (<http://metodika.phy.hr/gf/index3.php?kat=10>).

## 2. Talent Search

The aim of this international project was to find young students gifted for physics (which was judged by their ability to propose/realize a physical experiment, teach physics, study literature, record physical phenomena, etc...). The information about the contest was sent to over 1300 elementary and secondary schools in Croatia in the beginning of 2005. This call was further repeated during the several occasions, during the events on the national level (Croatian Congress of Physics Teachers, National Physics Competition). The response was not very large, but we have nevertheless nominated two pupils from 5<sup>th</sup> Gymnasium in Zagreb. Damjan Pelc and Marko Popovic were awarded as International WYP2005 Physics Young Ambassador in Taiwan.

## 3. WYP2005 promotion

In order to promote WYP2005, we have proposed that the WYP logo would be printed on the different consumer goods (milk, chocolate, oil ...) as well as that it should appear as a flower arrangement in public parks. We have contacted more than 20 Croatian companies, which

produce and distribute different consumer goods, but none of them showed positive interest. Also, municipal administrations had no interest for the park arrangements. Having no financial sources on our own, we had to resign from this project.

#### *4. Nobel prize posters*

The aim of this project was to present in a simpler manner the Nobel prize winners and to distribute the poster in schools. We have benefited from the offer of the Swedish academy, which printed Croatian translation of their Nobel prize poster. More than 2000 posters were distributed in schools.

#### *5. Planetarium*

In collaboration with Institute Français (in particular, M. Didier Moniott) and French embassy in Croatia we have organized a tour of the Planétarium Cosmodysée de Nantes. The main intention was to introduce the astronomy to the pupils and others through the visit to the planetarium and exhibitions, and in that way to enlarge the knowledge (as the astronomy is not present very much in the school curriculum). The visit to Croatia was the first visit of the Planétarium Cosmodysée de Nantes to one non-francophone country. M. Gilles Roussel (the director of the Planetarium) and Mme. Solange Beauchèsne, (professor of the University of Nantes) have visited Koprivnica, Bjelovar and Osijek between 14<sup>th</sup> October and 15<sup>th</sup> November. Their tour was a big success: more than 8000 persons have visited the planetarium and the exhibitions. Our French colleagues were very satisfied with the first visit and we shall organize the second tour in 2006.

#### *6. Posters of Croatian physicists*

The project was not fully realized. Nevertheless we have published a poster on Nikola Tesla and distributed it in schools all around Croatia. In this way we have started to mark the 150th anniversary of the Tesla's birth, which will be a national event in Croatia in 2006. In the meantime, we have also prepared two other posters on professor Andrija Mohorovicic (a world-known geophysicist) and Rudjer Boskovic, a middle age scientist from Dubrovnik. The project will be continued as it has become a permanent activity of CPS.

### **Financing**

CPS is a non-profit organization that relies entirely on the budget financing, and on the additional financing for its specific activities and projects. The Ministry of Science, Education and Sports covers basically our fees to EPS and IUPAP and our membership fees cover our current expenses.

Knowing that we could not finance any bigger WYP activities from our proper funds, CRS has applied for an additional financial support to the Ministry of Science, Education and Sports, Town of Zagreb, other (local) administrative institutions as well as possible sponsors. We have also expected the EU FP6 funding. In the beginning of 2005 the activity was therefore rather limited, and oriented towards the actions that did not require bigger investments (seminars, low-budget activities based on direct contact...).

Unfortunately, we have not received any significant financial (and other) support from officials, official and public institutions; industry and sponsors. The positive exceptions were one bank, Institute Français de Zagreb and our own institutions (faculties and Institutes). The Ministry and the Town of Zagreb have supported our activities with symbolic amounts. The

industry fully ignored our requirements. Our expectations were much higher, because we believed that the importance of such international manifestations would be recognized. However, our disappointment is not too big, because we became aware once again that we are not attractive to the policy-makers.

The basic financial support for our activity thus became FP6 contract No.516938. However, this was signed only in April, and the funding for the first 6 months of the project were received only 8 days before the expiration of that period!

As the finances became well defined only after the summer, most of the activities have been done in the second part of 2005. (some of them re-defined to the reduced calendar, but also some of them cancelled).

## **Conclusion**

In spite of the fact that all our activities were not fully realized as it was planned, it can be definitely stated that WYP 2005 was successfully marked in Croatia. The full list of events, deliverables, media clippings, recordings, etc. can be found on <http://www.wyp2005.hr/en/index.html>. In all our activities we have emphasized the role, importance and beauty of physics, and we have tried to change the image of physicists ("upset-minded" scientists who don't wear socks...). However, we have not succeeded to make others recognize the importance of physics in other domains (which reflected in their financial support). The role of Croatia as one of the co-sponsors of the UN declaration was neither fully exploited.

Our main result is the big interest and response from young generations. Evidently, the young pupils and students want to learn physics, they participated actively in our activities and experiments, they showed their curiosity and this aspect must be preserved and encouraged. We can be equally satisfied with the participation and involvement of the schoolteachers. The participation of the scientists was less good; the reason for that could be that the popularisation of science is not yet an important part of the scientific curriculum.

We have not any direct information on the impact of our WYP activities. The lack of financing prevented us from making a starting poll in January 2005, which result could be then compared with another poll at the end of 2005. The indirect information are based on direct contacts, as well on the fact that physics was much more present in the media; however has this changed the public opinion is not known.

## **Future:**

Although it was not our intention, a lot of our WYP 2005 activities were concentrated towards the end of 2005; the organizers as well as the participants are at present relatively tired and saturated with their work. Therefore, keeping "warm" their motivation and enthusiasm for longer period seems a rather difficult task. It could be argued whether the number of our WYP activities was too big or that we aimed too high or too wide? We have had good ideas and good will; however we have neither professional education nor knowledge in public relations. We have had difficulties in achieving financial support; we have had to incite bigger interest of scientists for our actions. Evidently, any future activity of such importance would require a more professional approach and help.

Our intention is to continue with the activities that are relatively specific and do not require particular engagement, but are oriented towards younger population. In particular

these are the Physics Express tour, the tour of the Planetarium de Nantes, printing and distributing the posters of Croatian Physicists. We shall also try to make others recognize the importance of physics in all other domains.

President of the Croatian Physical Society



Prof. dr. Amir Hamzic

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