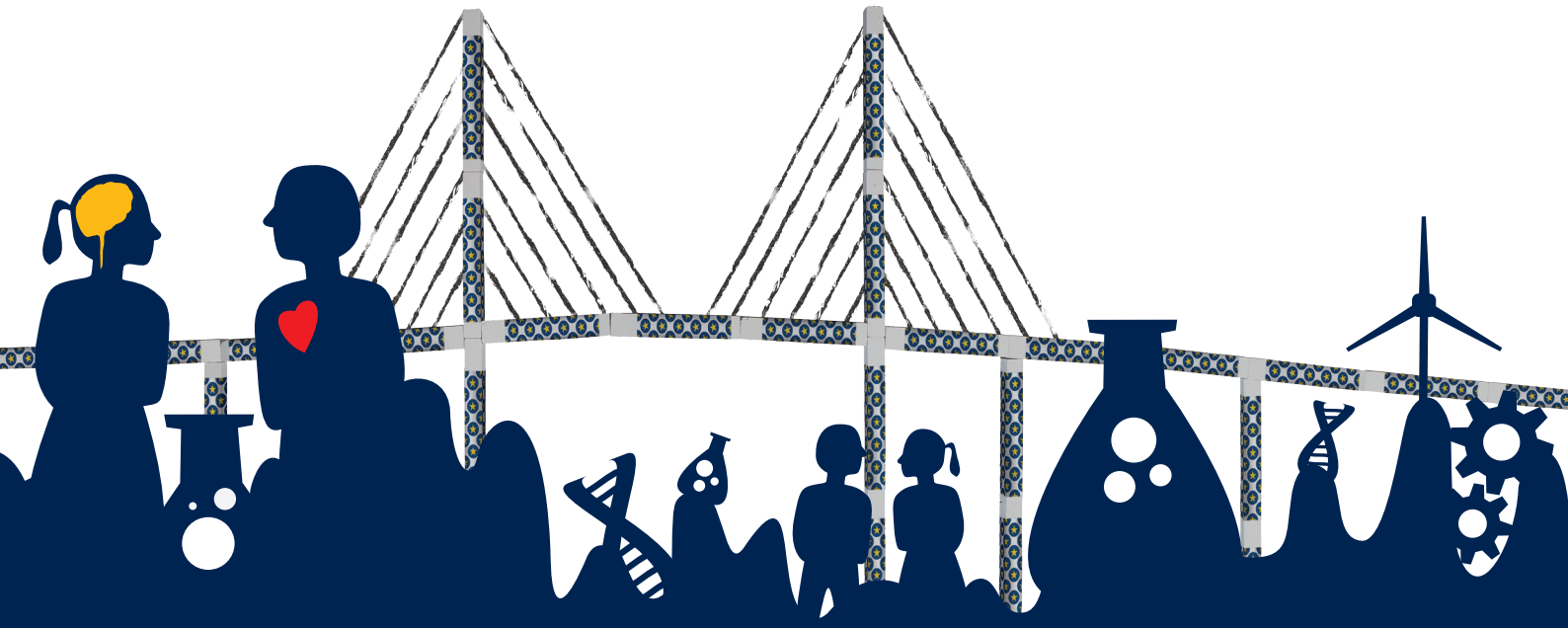
SCIENCE ON STAGE 2011
COPENHAGEN

WINNING HEARTS AND MINDS



PROJECT CATALOGUE

SCIENCE ON STAGE FESTIVAL

COPENHAGEN 16–19 APRIL 2011

Published by:
Danish Science Communication
Slotsgade 2, 4.tv.
2200 Copenhagen N
Denmark
www.formidling.dk

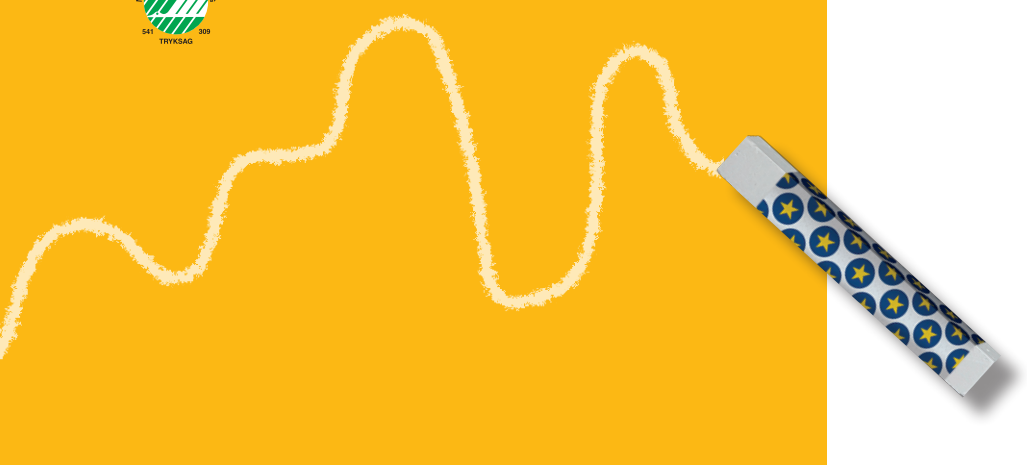
Overall coordination:
Danish Science Communication

Editing and proofreading:
Borella projects, www.borellaprojects.dk

Graphic design/layout:
artegrafix
Magnus Maduro Nørbo
Photography: Monique Wüstenhagen

Sponsors and supporters:
Danish Ministry of Education
EIROforum
Experimentarium
Fondation H. Dudley Wright
THINK ING.
An initiative of the Federation of German Employers' Associations in the Metal and Electrical Engineering Industries (GESAMTMETALL)
Novozymes
Shell
Danfoss Universe
Maersk Oil
Novo Nordisk
L'Oréal Foundation
Intel

Printed by:
PE Offset, www.peoffset.dk



FOREWORD

Copenhagen, April 2011

Dear participant,

We are very pleased to welcome you to the great city of Copenhagen and in particular to the Science on Stage Festival, 2011.

The next few days you will be in the inspiring company of more than 300 colleagues and partners from more than 23 different countries – all of whom share your burning interest in compelling science teaching. You all bring experiences, new ideas, inspiration, and creativity for us all to share at this venue.

In the Danish Organizing Committee we are honoured to be the first country to host the festival on its tour through Europe to member countries. With the kind and generous support of the Danish Ministry of Education and a number of sponsors it has been possible to set up a framework for the festival, which we hope will foster a fruitful and enjoyable time together here at Ørestad Gymnasium.

The Science on Stage Festival is an event with a loyal group of supporters from all over Europe – and beyond – who keep it alive and thriving. The festival is the result of many joint efforts. The work of: the National Steering Committees in each country, the Science on Stage Europe Interim Office in Berlin, and the boards and committees of Science on Stage Europe. At the very core of the festival are the efforts of the participating teachers and the activities that they have been carrying out in classrooms all over Europe. The significance of their work and their preparations for the presentation of their projects here in Copenhagen must not be underestimated. Without them there would be no festival!

We are thankful to you all for the work you have put into making this event happen.

In organizing this festival, it has been our goal to respectfully observe the tradition and history of the Science on Stage Festival and at the same time break new grounds in the set-up and methodology of the festival. We hope you will receive it well.

On behalf of the National Organizing Committee I warmly welcome all of you to the Science on Stage Festival 2011 in Copenhagen.

Sincerely yours,

Karen Gemal, Project Manager, SonS Festival 2011

GREETINGS

SCIENCE TEACHING: WINNING HEARTS AND MINDS FOR GOOD PERFORMANCE IN SCIENCE

Commissioner Vassiliou

The European Science on Stage celebrates Europe's and Canada's best practices of teaching science. It is an excellent forum for science teachers to exchange ideas and access teaching resources, and a unique initiative giving real practitioners the chance to showcase and discuss effective methods of teaching in a European context.

We are living at a time when scientific literacy is fast becoming a fundamental skill for people to be able to make sense of our complex, technology-driven world. At the same time we need bright people to push the boundaries of knowledge forward, to make new discoveries and to find new solutions, so we need more young people to take up scientific careers.

And yet we know that many young people do not have adequate skills in science, and that later on too few choose science- or maths-based careers. The 2009 PISA results tell us that the share of low achievers in science in the EU is still relatively high, around 18% – with some countries showing much worse rates.

This is why it is so important to make science more appealing to students during their school years; and good teachers and teaching methods can make a real difference!

Learning science through experimenting, asking questions, taking risks and testing ideas not only helps develop science skills. It helps students acquire transversal skills, such as problem solving and critical thinking, which open our minds to creativity and innovation, and which are indispensable in the world of today and the future.

As the festival title indicates, helping children develop the right attitudes and motivation is half the battle. Evidence shows that higher levels of motivation lead to higher attainment levels. But the festival motto tells us something more: that we can learn science not only by using our minds, but also through our emotions, for a much deeper learning experience. Involving other disciplines, such as the arts and new technologies, can also help to motivate students and bring the world of science closer to everyday life. As the great Leonardo da Vinci once said, "To develop a complete mind: study the science of art; study the art of science. Learn how to see. Realize that everything connects to everything else".

In order to help improve European performance, ten years ago we agreed on a benchmark to increase the number of graduates by at least 15% between 2002 and 2010. This target was reached, and even surpassed. However, most new graduates were in computer science; growth in mathematics and statistics was much lower and the number of physical science graduates even declined in this period.

This made us aware that questions of motivation and attainment have to be addressed in our schools. This is where we must act, to ensure that all students acquire basic skills in science, and that those who are excellent have the motivation and the information that can help them choose science as a career path. This festival is particularly welcome as it addresses exactly these issues.

Our new European strategy on education and training up to 2020 places a strong emphasis on raising attainment levels in maths, science and technology for all. The new benchmark aims to decrease the share of low achievers in basic skills (reading literacy, maths and science) to below 15% by 2020. Your initiative can contribute a great deal because it touches directly upon practice within the classroom.

We at the Commission have also launched an expert group to examine ways to raise general attainment levels and attitudes towards maths and science in schools, particularly for low achievers. Our Lifelong Learning Programme also co-finances a wide range of activities, projects and initiatives supporting teaching and learning in technical and science subjects.

I am convinced that we are heading in the right direction. With these efforts and with excellent initiatives such as Science on Stage, I am confident that we are at the start of a new and better age for science education for all.

SCIENCE ON STAGE FESTIVAL COPENHAGEN 2011

In recognition of the need to strengthen the teaching of science in European schools, Science on Stage aims at stimulating innovative and creative approaches in science teaching. By strengthening the quality and attractiveness of science teaching the ultimate goal is to enable students to achieve success in their scientific and technological endeavours.

This is important because we need to ensure a steady supply of highly educated science and technology experts in the future. In a world in which so much depends on new technology, and where development occurs so quickly, science and technology skills are fundamental. Besides it is important for the young people themselves, as many have a talent for science and technology but need to be encouraged to develop or explore it.

The purpose of the festival is to increase interest, sharing of knowledge and best practice about primary and lower secondary education in natural sciences throughout the European countries. 350 teachers from 27 participating countries are expected to take part in the event. During four days, they will demonstrate the best science education projects, methods and materials and will exchange ideas and experiences. One of the important aspects of these efforts is to improve the image of science and technology educational programmes. Through teacher commitment, students can be motivated and challenged.

The Danish Ministry of Education warmly supports the idea and content of this festival.

Yours sincerely,

Troels Lund Poulsen
Danish Minister of Education

SCIENCE ON STAGE: FOCUS ON TEACHERS

From the beginning to the Science on Stage festival 2011

Science on Stage Europe (SonSEu) brings together science teachers from across Europe to share good practice in science teaching. The initiative was launched in 2000 by EIROforum, a partnership of European intergovernmental research organisations, and was co-funded by the European Commission until 2008. It was the largest science education initiative ever undertaken in Europe and, in fact, quite unique in the world. The objective of exchanging teaching ideas is to motivate educators for a more attractive teaching and thus encourage schoolchildren to consider a career in science or engineering.

Responding to the fact that the initial funding by the European Commission through the 6th Framework Programme ended in 2008, the representatives of the Science on Stage (SonS) National Steering Committees considered possible scenarios for the continuation of the SonS programme. They unanimously declared their wish to see a continuation of SonS and stressed the importance of maintaining a recurring Pan-European science teaching festival as the flagship activity of SonS, through alternative funding. They also expressed their intention to continue with events at national and regional level, several of which are already under way.

In March 2009, a new operational structure for SonS, including a future board and a Science on Stage office, which is operated by Science on Stage Germany (SonSD) for a period of two years, was approved by the community. At this meeting the idea was born that the national organisers should pass the Science on Stage flame from one to the other, competing to host the international science teaching festival every two years.

We are very delighted that with financial support of the Danish Ministry of Education the fourth Science on Stage international festival takes place on 16–19 April 2011 in Copenhagen.

Science on Stage Europe would like to thank all participants very much for their high level of commitment and wishes all teachers a lot of joy, fulfilment and success in their work. Also thanks to the Danish Festival Committee, the Danish Science Communication, for all their work to make this festival a fruitful teaching event.

The continuation of Science on Stage and this festival would not have been possible without the generous support of the Danish Ministry of Education, THINK ING., an initiative of the employers' associations of the German metal and electrical industry, the Fondation H. Dudley Wright, L'Oréal, Intel, Novozymes, Shell, Danfoss Universe, Maersk Oil and Novo Nordisk. All participants and the organisers are extremely grateful for this support!

Europe is merging – also in terms of youth education, which has largely been an issue of national sovereignty so far. Looking beyond national boundaries, examples of 'good practice', unusual viewpoints and surprising solutions can counteract problematic situations within national education systems.

Thus I would like to encourage all participants to spread the results of the Copenhagen festival to their schools and to take part in our follow-up activities.

We are looking forward to seeing you again at the next Science on Stage festival 2013!

Dr Wolfgang Welz
Chair Science on Stage Deutschland e.V.
Chair Executive Board Science on Stage Europe

[1]See Berlin Declaration www.science-on-stage.eu and Eleanor Hayes (2009) Science on Stage: heading for a country near you. Science in School 13: 2-3.

LIST OF CONTENT

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GUIDING THEMES

GUIDING THEMES

Interdisciplinary teaching

Examples: science and society; science in a social context; innovation; cooperation with public and/or private enterprise; science through drama, art, poetry, photography and film; etc.

Inquiry-based learning

Examples: participative models of learning; self-perception and the teacher's role; how science works; etc.

Experiments

Examples: hands-on learning; exciting experiments; relevant experiments; etc.

Experiencing science in pre-school and kindergarten

Examples: practical and experimental science for pre-school children.

New technologies in science teaching

Examples: applying online resources in a classroom context; applying networks for teachers and students in a learning context; discovering ways of sharing experiences and teaching materials; etc.

PRESENTATION CATEGORIES

Fair and Forum

Exhibition where all participants present their projects together with public and private enterprises, organisations and foundations.

On-stage presentations

Plenary sessions on the big stage. Performances, keynote speakers and other spectacular presentations.

Workshops

The participants develop teaching materials, draw up recommendations and discuss pedagogical issues. Topics will be organised in relation to project themes.

Masterclasses

Masterclasses are all about sharing good practice. Teaching methods and concepts are shared in small, informal presentations. Masterclasses run as parallel sessions.

SOCIAL EVENTS

Festival opening reception
Festival dinner at Experimentarium
Excursions (see descriptions in programme)
Recap Lounge

KEYNOTE

KEYNOTE

CLAUS MADSEN – EIROFORUM

TITLE: REJUVENATING SCIENCE TEACHING IN EUROPE – SCIENCE ON STAGE AS A BUILDING BLOCK

Name: Claus Madsen
Institution: EIROforum

ON STAGE PRESENTATIONS

ON STAGE

1 – ON STAGE – CZECH REPUBLIC

TITLE: SEE THE SOUND, HEAR THE LIGHT

Name: Jan Pavelka, Ondrej Pribyla
Institution: ÚDiF – Physics Theatre, Masaryk University, Brno
File:

The performance focuses on creating an alternative and simple understanding of sound, tones and human hearing. The fundamental tools for the performance are simple light and sound elements: a photodiode, a loudspeaker and a laser pointer. During the performance we start with experiments that explain the function of these elements and link them step by step with what the spectators are seeing and hearing. In this way we gradually build up intuitive understanding of basic acoustic concepts. We clearly show the relationship between the pitch of a tone and its frequency, and we play several simple optical-musical instruments based on previous experiments.

2 – ON STAGE – GERMANY

TITLE: HIGH SPEED/SLOW MOTION

Name: Michael Vollmer, Klaus-Peter Möllmann
Institution: University of Applied Sciences, Brandenburg
File:

Many hands-on experiments are performed at high speed, with the result that the details of the underlying physics are often unseen. Selected examples will be shown using high-speed recordings. They are not only beautiful to watch but also make it possible to understand the physics of these fascinating phenomena. We present experiments from different fields, e.g. a karate demonstration, breaking of spaghetti, falling water droplets, explosions of various balloons, and spectrally resolved sparks from a Wimshurst machine. Due to the rapid developments in camera technology, relatively inexpensive cameras with moderate frame rates are already available, which means that high-speed imaging can enrich physics teaching not only in universities but also in schools.

3 – ON STAGE – HUNGARY

TITLE: SURVIVOR – HOW CHEMISTRY AND PHYSICS HELP SURVIVAL

Name: Dr Zoltán Murányi, Dr József Vida
Institution: Károly Eszterházy College, Eger
File:

Our experiment show could best be considered as a dual attraction performed by us as a pair. Our aim is to illustrate how sciences – chemistry and physics – could be applied to assist in staying alive on a deserted island after a shipwreck. By making the best use of articles fortuitously carried ashore by the waves as well as items found on the island we attempt to make our situation a bit more tolerable.

The experiments conducted include:

- How to make fire using different methods of chemistry and physics
- How to generate electricity using the fauna of the island
- How to make life on the island more comfortable
- Ideas on how to cry for help
- How to obtain food, hunt and protect ourselves against the native islanders
- The escape from the island. We survived and we are saved!

4 – ON STAGE – UNITED KINGDOM

TITLE:

Name: Dr Alison Rivett
Institution: Bristol ChemLabS
File:

Our presentation will share the practical chemistry experiments and other activities (e.g. ChemArt Project, Demonstration Lectures, Lab-in-a-Box) developed by Bristol ChemLabS to enthuse primary-aged pupils about science through enquiry-based learning. The activities link to the school curriculum but also engage and excite pupils by allowing them to experience fun and authentic, hands-on science in their classroom and meet real scientists.

Bristol ChemLabS is the only Centre of Excellence for Teaching & Learning (CETL) for chemistry in England & Wales and has an active and extensive award-winning outreach programme for schools in the UK and abroad. Based in the School of Chemistry at the University of Bristol, our aim is to provide excellent teaching and learning opportunities to teachers, schools and students of all ages. Our activities bring contemporary chemistry into the classroom to enthuse pupils and support teachers.

MASTERCLASS

MASTERCLASS

1 – MASTERCLASS SWEDEN

TITLE: MATERIALS IN CHEMISTRY, TECHNOLOGY AND ECONOMICS

Name: Professor Helena Lennholm
Institution: Åva Gymnasium
File:

Students are often interested in aspects of different materials. Linking materials chemistry and technology with economics and marketing can give an interesting combination. Add a visit to the local university, and you have the makings of a project.

For six years I have been developing a concept where students aged 16-17 work in groups on topics involving different materials. Together with the Department of Fibre and Polymer Technology at the Royal Institute of Technology in Stockholm, the students perform laboratory experiments with the aim of producing their material. They also attend seminars and meet research scientists at the Institute.

In addition to this work they also produce marketing plans for a product they wish to develop and sell, making commercials about their product and calculating production budgets.

About 200 students have taken part in this project since 2005.

2 – MASTERCLASS CANADA

TITLE: USE OF FOLDABLES TO ENHANCE SCIENCE LEARNING

Name: Dr Johanne Patry, PhD
Institution: Collège Bourget
File:

More and more kinaesthetic students are showing up in our classrooms worldwide. Traditional ways of teaching are inefficient, especially with students with learning difficulties. We are forced to steer away from filling the blackboard, a notebook, filling the blanks, and rote learning. Foldables are a schematic tool which involves the learner in representing his/her knowledge through a 3D paper-folding process. Performance has significantly improved when this approach was applied. During the presentation participants will be introduced to the principles behind foldables. They will get to know the materials needed to construct foldables. And they will develop a skill to identify the different types of foldable and construct their own foldable from the concepts they are presently using with their students.

3 – MASTERCLASS GERMANY

TITLE: CHOCO-SCIENCE

Name: Angela Köhler-Krützfeldt
Institution: Romain Rolland Oberschule
File:

This project will give explanations of the chemistry behind different types of chocolate. The pleasurable feelings that chocolate induces can be explained by its physical and chemical properties: the melting range of the cocoa butter, crystallisation and polymorphism. To produce good-looking chocolate you have to temper chocolate to avoid bloom. How you can do this with students and how they can analyse the properties of chocolate and develop new, innovative technologies to produce chocolate coatings or sweets – this will be the content of the presentation, which incorporates live experiments.

4 – MASTERCLASS UNITED KINGDOM/SLOVAKIA

TITLE: WHAT HAPPENS NEXT?

Name David Featonby – UK, Zuzana Jeskova – Slovakia
Institution: Institute of Physics
File:

Following the successful workshop in Berlin, colleagues have worked together to further develop this exciting approach to developing practical thinking skills and communication at all school levels.

Teachers have commented that this approach has engaged students who usually do not find physics stimulating, and has encouraged and challenged those who enjoy the subject.

Students are presented with an experimental scenario and asked to predict what might happen next. After discussion and coming to a consensus, the experiment is either performed or demonstrated, and the reasons for the outcome elaborated.

The masterclass will demonstrate several short experiments, often with discrepant or unusual outcomes that can challenge. Misunderstandings can be identified, and arguments based on scientific principles developed. It will also be shown how further investigation of certain "what happens next?" ideas has been possible, and participants will have the opportunity to perform some measurements.

Participants will then have access to a wide range of ideas which can be used to develop this approach with all levels of student from kindergarten to high school and university.

The masterclass will be jointly presented by members from the UK and Slovakia using the strategy in the two countries.

5 – MASTERCLASS HUNGARY

TITLE: EXPERIMENTS AND DEMONSTRATIONS ILLUSTRATING THE EFFECTS OF RAPID COMBUSTION AS INFLUENCED BY COMBUSTION TEMPERATURE

Name: Endre Szórád
Institution: Bolyai Secondary Grammar School and Dormitory, Zenta
File:

Combustion is one of the most important chemical interactions. It involves oxidation and, due to a change in temperature, it is an exothermic process. My project specifically concerns rapid combustion. As the term suggests, rapid combustion is a quick reaction in which light and heat are released. It has three preconditions: flammable material, the presence of oxygen, and combustion temperature. This last precondition is often forgotten and goes unmentioned in chemistry classes in schools. In a few simple and quick demonstration experiments it can be shown that without the presence of combustion temperature, rapid combustion cannot occur.

6 – MASTERCLASS SPAIN

TITLE: LISTENING TO GRAVITY

Name: M.J. Santos, J.A. White, A. González, S. Velasco
Institution: Salamanca University
File:

We present four experiments (spring, pendulum, free fall and parabolic throw) for measuring the acceleration due to gravity *g* using the sound card of a computer. In each case, a device is connected to the computer audio input, and audio editing software is used to record the electric signal generated by the device. This method allows time measurements with an accuracy of about 10^{-4} s. In the mass-spring system, the signal comes from the electric current generated in a coil by a small magnet attached to the mass hanger. In the pendulum case, the signal comes from an optocoupler (recycled from a computer mouse) that detects the motion of the thread. In the free fall case, the signal comes from the electric current generated by the passage of a small magnet through three coils located at different heights in a vertical methacrylate tube. In the parabolic throw case, the signal comes from the sound (captured with a microphone) generated by a steel ball stroked by another ball from a known height. The proposed experiments provide fast and accurate measurements, enriching them with other physical phenomena that contribute to learning with the support of new technologies.

7 – MASTERCLASS GERMANY

TITLE: EXPLORING SOAP SKIN

Name: Wilfried Meyer
Institution: Primary School Am Halmerweg
File:

This masterclass deals with inquiry-based learning relating to the properties and behaviour of soap skins in planar and three-dimensional environments. It deals with process-related skills such as observation, communication, documentation, presentation, modelling, etc., and technical skills from making a suitable soap bubble solution to the use of a soldering iron and soldering wire. From the simple problem of making soap bubbles to the construction of several Steiner computers, this topic offers an approach to physical questions that is both playful and instructive.

8 – MASTERCLASS SPAIN

TITLE: WHEEL TO WHEEL PROJECT

Name: L. Bignoli, M. Sancho
Institution: Montealto Nursery school, A Coruña
File:

This specific project, designed for children from 0 to three years old, will be presented in a very practical and visual manner.

All the different activities performed by the children in our science workshop will be presented.

Children from different ages and groups experimented with a large number of wheels and simple machines (spinning discs, pulleys, spinning wheels) and watched how they moved and rolled.

Our main objective was that these activities should be enjoyable and fun for them as well as educational.

The specific items used in the activities and images of all kinds will be presented in order to explain and get the audience to understand and come into contact with our project.

9 – MASTERCLASS AUSTRIA

TITLE: NIKOLAB

Name: Klaus P. Schroeker, Wolfgang Mann
Institution: NikoLAB
File:

The NikoLAB project is a best practice collaboration between different European schools bringing together several science and engineering disciplines. It consists of the development of the NikoLAB (Smoke Free Kit) and of NikoLAB applications in science lectures and smoking prevention activities in schools. The NikoLAB makes it possible to demonstrate (or illustrate without smoking) the rapid effects of smoking on the human body and the toxicity of cigarette smoke.

The NikoLAB project was started by an Austrian and a Swiss teacher during Science on Stage Grenoble and expanded considerably at Science on Stage Berlin, when three German teachers joined and introduced the Biology module of the NikoLAB. The project would thus not have been possible without Science on Stage.

Going forward, the aim of the project is to improve the NikoLAB and to develop country-specific adaptations of a concept involving smoking prevention activities by student-peers using the NikoLAB.

An additional goal is to develop and document potential uses of the modules which make up the NikoLAB (the Nikomat, Physics, Biology and Chemistry modules) within a science-based curriculum, going beyond smoking prevention.

The European Union will be supporting the project

during the next two years within the framework of the Comenius programme. The project proposal was rated excellent by the responsible agency.

The NikoLAB masterclass will focus on introducing the contents and development of the project and detail the secrets behind the successful collaboration between several European schools with very different strengths.

During the practical part of the masterclass the participants will have the chance to discuss and examine possible applications of the different NikoLAB modules in student-led smoking prevention activities in their own schools or within their own science lectures.

10 – MASTERCLASS UNITED KINGDOM

TITLE: CLIMATE CHANGE WORKSHOP

Name: Tim Harrison, Prof. Dudley Shallcross
Institution: Research Councils UK (RCUK)
File:

Tim Harrison and Prof. Dudley Shallcross are the Research Councils UK (RCUK) team for delivering climate change chemistry to teachers through half- and full-day workshops. The presentation will be a shortened version of this training course which will encompass 'everything you always wanted to know about climate change but were afraid to ask' as well as looking at experiments (demonstration and hands-on science investigations) that can be used to deliver climate change in secondary schools.

Harrison and Shallcross have written several articles for the pan-European science journal *Science in Schools* and part of the talk will be based on the articles before being taken further.

11 – MASTERCLASS UNITED KINGDOM

TITLE: RICKY GOES TO ANTARCTICA

Name: Stuart Naylor
Institution: Millgate House Education
File:

Ricky is very special. He is the first puppet to go to Antarctica on a Fuchs Foundation expedition. Ricky loves to help children to learn science. He wants all the children to experience the problems of survival in the extreme environment of Antarctica. But they can't all go! So he communicates with them through a blog. The blog is interactive, and through it children leave comments, tell Ricky what they have found out in their investigations and ask him questions. Ricky tries to answer the questions, as well as testing some of the solutions that they suggest. Now Ricky the famous explorer is home, but children still want to talk with him and show him their ideas. Ricky and the blog provide a unique set of starting points for scientific inquiry and a long-term resource for teachers. Where will Ricky go next? Watch this space!

12 – MASTERCLASS GERMANY

TITLE: MEDICAL TECHNOLOGY IN SCHOOL EDUCATION

Name: Dr Olaf Gutschker
Institution: Unex School Laboratories
File:

Complicated physical processes or devices are descriptively explained in a presentation including experiments. All effects that are not part of our everyday knowledge are demonstrated with the help of experiments. The audience is motivated to reproduce the steps during the development of a complex device in their minds. Many examples from everyday life result in the audience not perceiving physics as a dry, formula-heavy science, but as something living, important and useful. The usual separation between 'design' and 'function' is not used when explaining a complicated device. Instead, it is explained 'from the inside out'. This method can be used to explain even very complex matters in a descriptive and entertaining way.

13 – MASTERCLASS DENMARK

TITLE: DIGITAL ENLARGER USED FOR ANALYTICAL WORK IN BIOLOGY TEACHING – BRAND-NEW POSSIBILITIES FOR OBSERVING ANIMAL BEHAVIOUR IN LIVING MARINE ANIMALS

Name: Peter Majland
Institution: Rødkilde Gymnasium (Vejle)
File:

The aim of the presentation is to show how the use of a digital enlarger in biology teaching can increase the benefits of the teaching for both teacher and students. The digital enlarger consists of a camera which can enlarge objects up to 100 times. It can be connected to a PC monitor or a projector, allowing you to blow up the object under analysis to large format. This gives the opportunity for a shared experience in the classroom where the students can consider the same phenomenon at the same time.

14 – MASTERCLASS ITALY

TITLE: FROM SOIL TO PHOTOSYNTHESIS

Name: Angela Cane, Marianna Liunis
Institution: Primary School I.Calvino – Moncalieri (Torino)
File:

Primary-school pupils aged 5 to 7 learn by observing natural phenomena that can occur in an everyday context or in a simulated situation (laboratory). They themselves are the protagonists in the learning, while the teacher acts as a 'trainer'.

The aim of the course is to enable the pupils to test and understand how plants get nourishment through their roots, branches and leaves. This is achieved by observing phenomena in the classroom and through activities in high-school laboratories using peer education.

Observation, description and comparison will help the pupils to develop sensory, logical and linguistic abilities. Furthermore, the manipulation helps the pupils to discover the operating properties, which can provide more complex information. Indeed, it is no longer sufficient to simply describe what is observed, but rather it is important to try to find reports, links and spatial and temporal sequences, explanations of events and processes.

15 – MASTERCLASS IRELAND

TITLE: ESTABLISH – INQUIRY-BASED SCIENCE EDUCATION

Name: Eilish McLoughlin
Institution: Dublin City University
File:

This masterclass is based on the work of the FP7 ESTABLISH project, which is aimed at promoting the use of an inquiry-based science education (IBSE) with second-level students (age 12-18 years) on a large scale in Europe. The ESTABLISH partners come from 11 European countries and collaborate to support teachers' professional development in IBSE and to develop and implement appropriate inquiry-based teaching and learning materials for use in teacher education. Through these actions, ESTABLISH aims to drive change in classroom practice by involving the key stakeholders in creating authentic learning experiences for science education. Website: http://establish-fp7.eu/. Inquiry-based teaching is an organised and intentional effort by a teacher to engage students in inquiry-based learning. The goal is not only to transfer scientific knowledge, facts, definitions and concepts, but to enhance students' ability to reason and become independent learners capable of identifying main questions and finding relevant answers by a gradual acquisition and expansion of scientific knowledge and abilities. It is a student-centred approach to science learning, and a range of types of inquiry activities exist which correspond to the degree of teacher's guidance and student independence involved. The process used for developing inquiry-based teaching and learning materials and examples of inquiry activities for use in teacher education will be presented.

16 – MASTERCLASS DENMARK

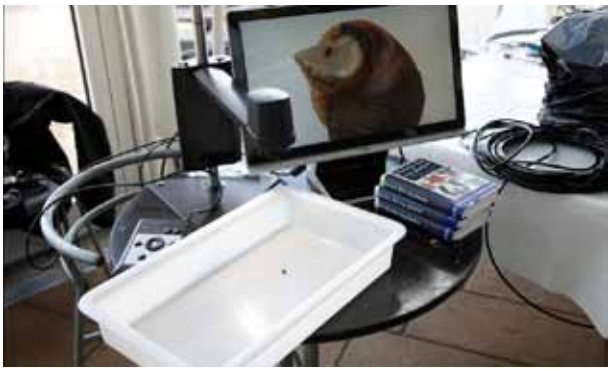
TITLE: THE EARTH FROM SPACE, ESA/EDUSPACE

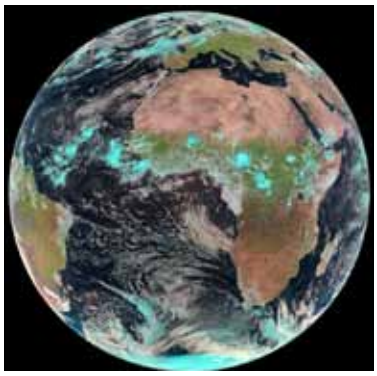
Name: Peter Brøgger Sørensen
Institution: EduGIS, Aabenraa
File:

The Eduspace website aims to provide students and educators in Europe and worldwide with an e-learning tool giving access and exposure to satellite image data of the Earth, and in particular to Earth Observation applications for education and training. Eduspace is primarily aimed at secondary-school students, but some material is more advanced and better suited to university undergraduates. The website encourages teachers to use Earth Observation in their curriculum by providing ready-made project case studies. Eduspace is rich in didactical material, supported by resources in the form of Earth Observation satellite images – in catalogues and available to download in the various case studies – and in the form of the didactical image processing and GIS software Leoworks, which is made available for teaching data analysis and image interpretation.

The structure of Eduspace allows for easy navigation and insertion of new content. Some recently produced material includes case studies in Latin America, such as investigating the El Niño effect and analysing the vegetation characteristics of the continent. There are also new case studies focusing on Earth Observation related to volcano monitoring and the monitoring of glaciers from space. A further recent upgrade to Eduspace includes the addition of a new language version, Greek, which brings the total of available languages to nine.

The open source software Leoworks 4 is now available in its new interface. It allows the overlaying of multiple image and vector layers in the same viewer and contains all the functionality of the previous Leoworks version 3 but on a more robust Java platform. It is still in the process of a three-year development project, which is expected to deliver a much more enhanced, didactical image processing and GIS software. The final version will have more advanced functionality, including capabilities for radar image processing, whilst retaining the existing basic image processing functions in a user-friendly and didactically suitable interface.





The website address is: www.esa.int/eduspace

17 – MASTERCLASS SPAIN

TITLE: EXPERIMENTS WITH GRAVITATIONAL LENSES IN THE CLASSROOM USING EAAE'S MATERIALS

Name: Rosa M. Ros, Fernand Wagner
Institution: European Association for Astronomy Education (Spain/Luxemburg)
File:

Normally schools present a lot of experiments related to ancient Greek and renaissance astronomy. It is also possible to present some astronomical activities related to the 19th Century, but it is not common to introduce current astronomy in schools. This presentation aims to offer a set of experiences related to gravitational lenses by means of computer simulations and by the use of a simple drinking glass that should be cheap and easy for school teachers to obtain.

These activities with gravitational lenses will be introduced as a sample of EAAE materials. The European Association for Astronomy Education, EAAE, and its activities will be introduced at the end of the presentation. On its website, teachers can find materials for their classes, competitions to involve their students such as Catch a Star – well known to European teachers – summer schools, and much more.

More details at: www.eaae-astronomy.org

18 – MASTERCLASS DENMARK

TITLE: THE CLIMATE CARAVAN – AN EDUCATIONAL PROJECT IN THE FIELD OF SCIENCE AND POLITICS

Name: Janus Henriksen
Institution: Energy Service Denmark
File:

Background

The Climate Caravan was developed to serve the need for spreading up-to-date information on the impacts of climate change and remedies to reduce the changes. A basic assumption of the project is to demand involvement from the participants.

The project core team consists of partners who work in the field of education in energy and environment:

1. The Danish Society for Nature Conservation
2. The Danish Outdoor Council
3. Schools Energy Forum Denmark
4. Teacher Resource Centres Denmark

Basic idea behind the project

The core partners had the idea of developing a project that would change the way the subject of climate change is taught in Danish schools. The climate theme was seen as a science subject, and the idea was to give the different teachers a new entry to the subject – a debate and political angle – and let the science be the background and part of the solution.

The role of the Climate Caravan was to take the message out to every region of the country by visiting one school per community and then anchor the debate in society. The effect of the physical visits was to create local debate, but the effect of creating the website and teaching materials is that the subject is taught in a large number of schools nationwide.

Most of the exercises that have been developed have been designed to be carried out by the teachers. All the materials are on the website and free to use – including AV-based content.

The target group of the Climate Caravan is 14-16-year-old students and their teachers.

19 – MASTERCLASS NETHERLANDS

TITLE: DNA LABS BRING MODERN GENOMICS RESEARCH TO DUTCH HIGH SCHOOLS

Name: Hienke Simia, Carin Cruijsen, Gerrianne van der Velde
Institution: Dutch mobile DNA labs
File:

Dutch genomics research centres and universities have developed ‘DNA labs on the Road’ to bridge the gap between modern genomics research practice and the secondary-school curriculum in the Netherlands. These mobile DNA labs offer upper-secondary students (age 15-18) the opportunity to experience current topics in genomics research through experiments with advanced laboratory equipment that is not available in schools. The mobile DNA labs also place genomics research in a relevant societal context.

The four-hour educational modules include an introductory lesson, a two-hour practical lab and a final lesson. The introductory lesson prepares the students by introducing a relevant context and gives the students more biological background information about the content and techniques that are used in the practical. The practical is taught at school by university students. These students bring up-to-date genomics knowledge and also all the necessary advanced equipment and techniques that are used in genomics research. The final lesson can serve different goals, namely deepen knowledge, broaden knowledge, and/or discuss societal and legal aspects of genomics research.

During the masterclass the workshop participants will be introduced to three different ‘DNA labs on the Road’. They will get the opportunity to experience genomics and carry out hands-on activities in the areas of cancer research, forensics and bioinformatics.

‘DNA labs on the Road’ is a collaborative project between the Netherlands Genomics Initiative, The Centre for Society and Genomics, six Dutch universities and six national Genomics Centers of the Netherlands Genomics Initiative.

20 – MASTERCLASS DENMARK

TITLE: THE ULTIMATE TIME-SPACE CROSS

Name: Bo H. Jacobsen
Institution: Geologisk Institut, AU
File:

How can we illuminate the proportions of time and space in history, climate, geology and cosmology and the implications for public debate and policy making for the future?

This project links traditional 'geo-time walks' and 'planet walks' using two scalings: 1 mm per 100 years and 1 mm per diameter of our Earth.

The space-time cross defines the square millimetre, embracing an individual's life projects viewable with a microscope. Along the space arm, the Solar System is within walking distance and the nearest stars are about 3,000 km away. Along the time arm, history fits within a credit card; modern man starts 1 metre back and the Big Bang is no more than 137 km away.

This space-time cross, if anchored near or in the classroom, tangibly opens up a number of learning activities integrating the past and future history of family, civilization, climate and cosmological/geological events.

21 – MASTERCLASS UNITED KINGDOM

TITLE: BROADCASTING YOUR LEARNERS' WORK!

Name: Alessio Bernardelli
Institution: The Institute of Physics
File:

In this on-stage presentation I will show how to effectively apply ICT tools and approaches to the learning and teaching of science. Each tool and approach will be introduced as a question and will have a pedagogical issue attached to it, e.g. "Why can't my students mind map?" I will, whenever appropriate, take the audience through the learning journey that led me to adopt certain strategies and tools to improve my pupils' enjoyment and understanding of science, and to develop thinking skills. I will start these learning journeys from the mistakes I made and the steps taken to correct and tweak my approach and teaching techniques, and I will stress throughout the presentation the important truth that a teacher is the first learner in his/her class!

Each question in the presentation will be backed up by theories of learning and current educational research and will aim at shaping a pedagogy that is fit to meet the demands of the 21st century. It will be evident from the examples presented (pupils' work, learning resources, etc.) that the focus must always be on the learning and not on the technology if we are to achieve valuable learning outcomes.

This presentation will be spectacular because it will outline how sound learning and teaching principles can really bring science to life in your classes when used in conjunction with the latest technologies.

22 - MASTERCLASS EIROFORUM

TITLE: FUSION RESEARCH - AND HOW IT CAN HELP THE RESEARCHERS OF THE FUTURE

Name: Chris D Warrick
Institution: EIROforum
File:

Fusion research - striving to harness the powers of the Stars to generate electricity here on earth - has made huge strides in the past few years. Building on results from many experiments worldwide - notably the joint European EFDA-JET device at Culham in the UK - has bought the world together to build an international experiment - ITER - which will demonstrate fusion power on a commercial scale.

The challenges faced in realising fusion power are enormous - heating plasmas to 200 million degrees C; the applications of enormously powerful magnetic fields to control the plasma and the use of remote handling techniques to maintain and upgrade our devices. These challenges require a stream of highly qualified scientists and engineers in the future. Organisations such as JET therefore take the area of education outreach very seriously. Visits to JET, talks/roadshows in schools and special activities for primary students are all offered to schools - as well as close collaborations with university physics and engineering departments in universities across Europe - offering PhD opportunities and post doc placements.

It is hoped attendees of this masterclass will learn about fusion research and contribute to an overall discussion on education outreach from large scale research infrastructures such as JET.

23 – MASTERCLASS – SCIENTIX

TITLE: THE NEW INTERNET-BASED COMMUNITY FOR SCIENCE EDUCATION IN EUROPE

Name: E. Gerard, À. Gras-Velázquez
Institution: EUN Partnership AISBL
File:

In accordance with the objectives of the Lisbon declaration and with the affirmation of the European Commission that there is a need to promote more widely inquiry based science education methodologies in primary and secondary schools and to support teachers' networks, Scientix, a new web-based information platform for science education in Europe whose aim is to ensure the regular dissemination and sharing of progress, know-how, and best practices in the field of science education and providing a feedback mechanism has been launched. Scientix is a three year project run by European Schoolnet (EUN) on behalf of DG Research, and funded under the 7th Framework Programme. The portal (http://scientix.eu), available in six European languages and whose main target are teachers, offers a resource repository containing hundreds of teaching materials from European projects, but also research reports and policy-making documents; a translation on demand service for the teaching materials towards any of the 23 languages of the European Union; a community including a forum and chat rooms; an online news service featuring international science education topics and a calendar of forthcoming events and training opportunities; and also a newsletter sent once a month to registered users. Part of the added value of this new platform consists in its philosophy which entails a shift between a central portal where information is disseminated to end users towards a more dynamic and user-centered platform. Besides the website, several events and workshops are being organized during the three years of the project, the main event will be the Scientix conference (Brussels, 6-8 May 2011) which will promote networking among the science and education community and provide feedback on the services offered online. Workshops to inform science teachers, give them tools to use the Scientix platform in class effectively and meet other science teachers in Europe will take place in several European countries.

WORKSHOP

WORKSHOP

1 – WORKSHOP DENMARK

TITLE: COME AND TAKE A SCIENCE DRIVING TEST!

Name: Erland Andersen
Institution: The Danish Physics and Chemistry Teachers Association
File:

Workshop with practical work relating to energy, electrical engineering and design. The workshop starts with a short introduction after which the participants perform practical work relating to simple circuits, energy and energy conservation, and design and build simple structures.

Subsequently we will discuss the practical work and incorporate it into relevant courses.

The practical work can be directly used in teaching the next day.

2 – WORKSHOP BELGIUM

TITLE: PHOTONICS EXPLORER: IMPLEMENTING IBL AT EU SCALE

Name: Robert Fischer
Institution: Photonics Explorer
File:

The EU-funded project Photonics Explorer aims at the development, testing and scientific evaluation of an educational kit on light, optics and photonics. This kit will be available in seven languages and will be handed out free-of-charge to teachers in many European countries.

It is important for teachers that such material helps them to achieve the educational targets set in their national curricula. In particular, when using the material teachers do not want to have to spend much more time than with their current teaching material. This is a tough challenge, especially for an international programme. So how do we ensure that the material we develop can easily be integrated into the national curricula and diverse educational systems and cultures across Europe? In this workshop we will present our experiences with an interactive review system involving teachers and teacher trainers from 11 countries and discuss the possibilities for improving it.

3 – WORKSHOP POLAND

TITLE: VISIBLE-INVISIBLE; NEW TECHNOLOGIES IN SCIENCE TEACHING

Name: Maria Dobkowska & Mirek Los
Institution: The Raoul Wallenberg's Group of Integrated Schools no 62, Complex of Public Schools in Czastkow Mazowiecki
File:

Effective science teaching with ICT. We will present several examples of lessons using filmed experiments, animations, interactive simulations, interactive exercises and movies shot with an infrared camera.

As an element of classroom practice, we propose an educational use of technology-enhanced learning, particularly if traditional methods, approaches and tools for teaching science subjects are ineffective and are not helping students to overcome educational barriers.

Participants in our workshop will find answers to why, when and how ICT tools should be used in science education.

The most important conclusion of the workshop is that students can use ICT tools to understand science ideas more effectively compared to non-ICT teaching activities.

4 – WORKSHOP SPAIN

TITLE: THERMOELECTRIC SOLAR ENERGY

Name: I. Abad, P. Compte
Institution: Cor de Maria Secondary and Primary School, Valls
File:

Society is aware that the current energy model based on hydrocarbons is neither valid nor sustainable. It is therefore necessary to seek alternatives. On the one hand, technological solutions are needed; cleaner energy with higher efficiency obtained from renewable sources. On the other hand, civic outcomes are also needed to help raise awareness of the need to save and rationalise energy consumption.

These two aspects have been examined over the course of this study by upper-secondary students. The students have focused on one of the most promising forms of renewable energy, thermoelectric solar energy. After studying the different technologies for generating solar electricity, the students designed, developed and built – by themselves – several models, prototypes and experiments explaining how solar energy can be used to obtain electricity without using solar cells.

The summary comprises: (i) Why solar energy? (ii) Production: how do we get electricity from the Sun? (iii) Concentrating surfaces. (iv) Solutions to problems: hybridation and storage. (v) Models: the parabolic cylinder system, the parabolic dish, the Fresnel system and the solar tower. (vi) Conclusions.

5 – WORKSHOP AUSTRIA

TITLE: BACK TO BASICS IN SCIENCE TEACHING

Name: Friderlinde Krotscheck
Institution: "Science on Stage Austria" e.V.
Stand No.:

The historic context of scientific research at its earliest recorded stage takes us back to philosophers like Aristotle and Archimedes, later Galilee, Newton and many others. Their tools of investigation were mainly their five senses and analytic reasoning. The results are still mind boggling for us today.

Modern scientific research is in command of complex techniques and equipments, which make new and difficult discoveries possible at a much faster rate. Growing up in such a highly sophisticated environment, children are more challenged than ever. Their natural curiosity starts at a very early age. Their imagination is driving their exploration. Today, science teaching starts with students aged 10 or 11 and continues up to graduation. The school environment is strictly regulated and there is little time left for imagination. This leads to a vicious cycle of rejection of anything that has to do with science or mathematics. As a consequence the students are not being properly prepared to comprehend the most basic principles of scientific thinking. The workshop will guide the adult teachers through the wondering stages of children with hands-on experiments. Putting ourselves into the minds of students we will reflect in this workshop on the schools' mission to cater towards the most basic needs for all children to become scientifically literate.

6 – WORKSHOP UNITED KINGDOM

TITLE: CELLULAR DANCES

Name: Richard Spencer (UK)
Institution: SRC Bede 6th Form
Stand No.:

The aim of this masterclass is to inspire science teachers to invent their own dances to enhance student understanding of complicated biological, chemical or physical processes.

Simple dances can be used to bring complicated topics to life and help students learn about cellular processes which they might otherwise find difficult, dry or hard to remember. You will participate in a selection of cellular dances chosen from the Mitosis Mamba, Meiosis-in-A-Minute, DNA Boogie and Aerobics Respiration.

This masterclass provides a multisensory approach to teaching about complex biological processes. It shows how simple actions, set to music, can stimulate students visually, auditorally and kinaesthetically. The dances are a fusion of art and science blending fun and serious biology. Everyone who attends will participate in the action. You don't need to be able to dance, but a sense of humour will help!

8 – WORKSHOP GERMANY

TITLE: WHAT'S NEEDED TO TEACH INQUIRY-BASED BIOLOGY LESSONS IN SCHOOL?

Name: The European Learning Laboratory for the Life Sciences (ELLS)
Institution: EMBL
Stand No.:

In this workshop, the European Learning Laboratory for the Life Sciences (ELLS) will promote an open discussion with secondary-school science teachers to reflect on the barriers that prevent teachers from introducing inquiry-based biology lessons in school.

ELLS provides continuing professional development (CPD) for European secondary-school teachers based on state-of-the-art molecular biology research at EMBL, updating teachers' knowledge on contemporary science and techniques which are appearing on curricula, and providing a special intellectual challenge to teachers and students alike: www.embl.org/ells.

Since 2008, the unit has been working with teachers to develop inquiry-based science teaching (IBST) resources which bring cutting-edge science into schools, illustrating 'how science works'. Combining wet-lab activities with online learning elements, these resources are helping teachers and students to develop and apply the inquiry skills needed in science: analysis, argumentation, presentation and review. The resource themes link into school science curricula and are especially designed to illustrate real-life applications of science and technology, adding important contextual links that can capture students' interest in modern science.

Together with teachers, we want to identify the existing barriers that prevent teachers from employing IBST in school and jointly find ways to overcome them.

9 – WORKSHOP NETHERLANDS

TITLE: TAKE YOUR CLASSROOM INTO SPACE: HOW TO GET INVOLVED WITH EXPERIMENTS ON THE INTERNATIONAL SPACE STATION

Name: Shamim Hartevelt
Institution: European Space Agency – Directorate of Human spaceflight ESTEC the Netherlands
File:

At the European Space Agency, the Directorate of Human Spaceflight (HSF) has taken on board the value of working together with various key players to reach children at an early age to get them hooked on science. The HSF Education team has developed and distributed a wide range of educational materials for use in European schools.

The International Space station has provided the exciting backdrop to how humankind will need to survive in harsh conditions in order to continue the quest for further exploring space. The astronauts who live and work in the unique microgravity environment are also seen as ambassadors of their respective countries. These missions serve as an incredible opportunity to demonstrate many physical and biological phenomena that can take students out of their classroom laboratory into the space environment. This thematic approach where human spaceflight and the International Space Station are used in the pedagogical cycle is, by its very nature, exciting and inspiring for students in the classroom. Combine this with questions based around the curricula and you have a complete cycle where learning also becomes fun.

In the development of these resources, the education team strives to work with practicing teachers in European schools. By involving teachers from the beginning it is clear that materials can be developed that teachers will use and students will benefit from.

In this workshop, we would like to continue doing just that: in this case to get together a group of teachers who can bring forward ideas that can take their classroom into space. Small simple items that can be found in any school lab can be used to demonstrate various phenomena in the unique environment of weightlessness on the International Space Station. The team would like to give teachers the opportunity to come up with new ideas which we could develop together, test on the ISS and make available to all teachers online.

The workshop will introduce teachers to the criteria that the experiments or demonstrations need to fulfil in order to become a viable project in space.

The teachers will also be introduced to what resources are already available from the HSF education team and shown examples of materials that can be ordered and downloaded for free.

This will be an interactive workshop and teachers from all subject areas are welcome.

10 – WORKSHOP ITALY

TITLE: INVISIBLE FORMS: PROTEINS IN 3D

Name: Cus-Mi-Bio
Institution: Università degli Studi di Milano
File:

Biological macromolecules measure only a few nanometres and cannot be observed even with the strongest light microscope. One of the major technologies available to make protein structures ‘visible’ is X-ray crystallography. Getting regular crystals is the first step of 3D protein structure determination. X-ray irradiation of crystals allows magnification at atomic resolution and determination of the 3D structure of the molecule. The spatial structure of a protein is very important for its function. These structures are collected in specialised databases and can be viewed using dedicated software to ompare the structures of normal and mutated proteins, and to design new vaccines and therapeutic molecules.

This workshop provides an interdisciplinary exercise for biology, chemistry and bioinformatics.

FAIR

FAIR

1.1 – AUSTRIA

TITLE: BARRIER-FREE HEARING – USING MAGNETIC FIELDS TO IMPROVE HEARING

Name: Engelbert Stütz
Institution: Bundesrealgymnasium
Stand no.: 276

Problem: Hearing-impaired people often face problems using a hearing aid because of peripheral noise. The reason for this is the amplification of the hearing aid, which cannot distinguish between important and unimportant sound.

Idea: While teaching electromagnetism and induction in physics we reconstructed a method to eliminate most peripheral noise. In addition, the students were confronted with the disability of hearing impairment and its daily challenges.

The most common method to eliminate peripheral noise in hearing aids is the induction loop method. We designed experiments with the aim of highlighting the physical background of the induction loop as an aid to improving hearing by magnetic fields. The students designed and ran a one-week exhibition called Exploratorium, which was attended by about 400 people. The project was awarded the distinguished Erwin Wenzl Prize.

1.2 – AUSTRIA

TITLE: BINOMI – THE GAME

Name: Hans Hofbauer
Institution: Gymnasium Horn
Stand No.: 274

Some of the binomial theorems appear in our maths textbooks, but it takes a lot of work getting this topic into the long-term memory of the students. I had the idea of creating a game called Binomi which would help enhance the understanding of how to multiply binomials, how to factorise polynomials, how to solve quadratic equations, and how to more profoundly understand the theorems of Vieta.

We have built an LED light box since we use coloured film in overlay technique to visualise positive and negative numbers in this context. The game therefore works without a computer. Our goal is to offer the game to as many teachers as possible. We look forward to presenting Binomi at Science on Stage.

1.3 – AUSTRIA

TITLE: COSMI WANTS TO KNOW – CHILDREN'S PLANETARY WALK LICHTENBERG

Name: Ida Regl
Institution: Volksschule Lichtenberg
Stand No.: 277-278

'Cosmi wants to know' is the continuation of a long-term project, 'Sunny side up', which has grown out of the school into a community-wide effort, even reaching to the city boundaries of Linz/Donau (Upper Austria), inviting visitors to 'walk the planets' and learn more about them. The visitors can check out a backpack stuffed with small experiments which apply to each planetary station. They can even prepare themselves before they go by visiting the website www.cosmi.at.

The extraordinary development of this project has its origin in the questions which children at this primary school were asking when discussing space and Earth. To answer those questions people of all walks of life contributed to provide the children with satisfying answers or helped them to find and understand the answers. The children's planetary walk has become a destination for family outings.

1.4 – AUSTRIA

TITLE: HANDS-ON NATURAL SCIENCES AND ENGINEERING

Name: Alice Pietsch, Peter Nöhrer, Elisabeth Stücklberger, Angelika Fussi, Berthold Kaps, Renate Schachner
Institution: Pädagogische Hochschule Graz
Stand No.: 269-271

Visiting the Museum of Science in Boston in 2004 gave birth to the idea for an interactive Science Museum in Styria (Austria). With the help of the Pedagogical Institute and its partners, plus several teachers and students, we launched the Hands-on Science Museum 2009, which first exhibited in the House of Sciences in Graz.

36 experiments and 14 projects were documented in the first volume of *Science Museum – Hands-on Science and Engineering – Experiments and Projects*. The second edition is now in print.

Asking each school that visits to contribute more to the museum will keep the idea of interactivity alive. By being open to the general public as well as travelling to schools, the museum provides new ideas and motivation for even the most remote schools. Every visit can start a snowballing of science and engineering interest.

For more information: www.phst.at

1.5 – AUSTRIA

TITLE: NO MUSIC WITHOUT PHYSICS – A WORKSHOP FOR PRIMARY-SCHOOL STUDENTS PLANNED AND ORGANISED BY SECONDARY-SCHOOL STUDENTS

Name: Klara Steinbach (music), Agnes Wiesinger (physics)
Institution: Hauptschule Munderfing
Stand No.: 272

Students of the HS Munderfing secondary school worked out common topics of physics and music. In various workshops and experiments they gained expert knowledge, created their own musical instruments, and heard tips from an otorhinolaryngologist on how to protect and take care of the ear.

Armed with all this information, the students of the secondary school planned a workshop with 11 stations. Our visitors from the primary school learned about various methods of sound generation, characteristics of sound, the anatomy of the ear, sound propagation and amplification of sound by holes. They also got tips on soundproofing. Finally, the students all performed music together.

1.6 – AUSTRIA

TITLE: STUDENTS AS SCIENCE AND RESEARCH EXPERTS

Name: Elisabeth Inschlag
Institution: HLW Wiener Neustadt
Stand No.: 275

Learning and studying at secondary level two should be more student-centred and self-driven. The teacher should be a tutor providing materials and time.

As part of the Sparkling Science Project students of a graduating high-school class were able to visit the University of Vienna (Dept of Zoology) and study the life of the bee *Osmia cornuta* under the guidance of Ass. Prof. J. Spaethe. Using their new knowledge they then had to plan workshops and experiments for younger students. Finally, they ran a workshop for the younger students to teach them about the differences between the honey bee and the solitary bee.

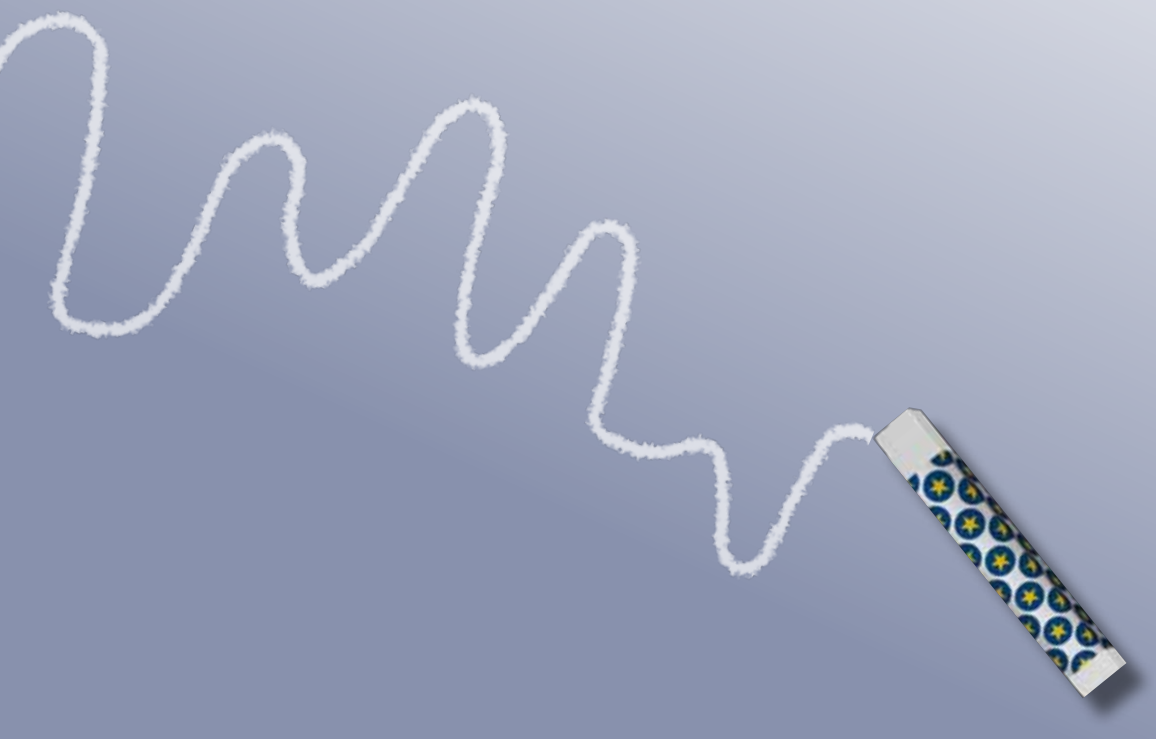
2.2 – BELGIUM

TITLE: EDDY CURRENTS

Name: Bernadette Anbergen
Institution: Athénée Royal Ernest Solvay
Stand No.: 417

When a magnet falls through a metallic pipe, an eddy current is induced. The duration of the fall depends on the nature of the metal. We study the motion of a magnet falling through various metallic pipes and measure the magnetic forces.

We simulate a braking system, as found in trucks, HSTs and funfair rides, using computer parts. Come to the festival to see all the experiments and reproduce them in your classroom.



2.3 – BELGIUM

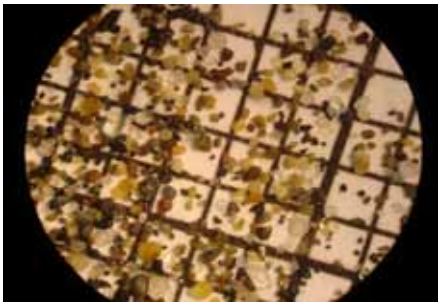
TITLE: SAND OF THE BEACH IN THE CLASSROOM

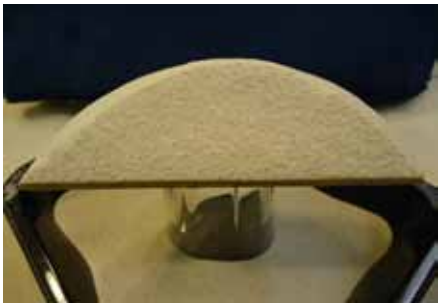
Name: Francis Moreau
Institution: Duferco
Stand No.: 420

We can find sand on the beach on holiday, in a local river, or in a do-it-yourself store. Sand is the result of the weathering of rocks by physical, chemical and/or biological agents. The rocks can be used as the basis for teachers to explain the genesis of the Earth and its evolution over billions of years.

Various samples of sand from different regions of Europe and around the world are observed under a microscope.

Sand (silica) is the raw material for glass, electronic chips, photovoltaic panels, optic fibres and concrete.

2.4 – BELGIUM

TITLE: 1) SOLAR WATER PUMP, 2) TRUCK RACE

Name: Esteban Jiménez
Institution: Centre de formation
Stand No.: 418

1) Solar water pump

The solar water pump is a simplification of the water pump that was used by the inhabitants of northern Africa to collect water from rivers and underground sources of shallow water by exploiting the large temperature differences between day and night in these desert areas. Concepts such as thermal machine, expansion and contraction of gases are encountered in this experiment.

2) Truck Race

Truck Race is a series of experiments that make it possible to compare in different situations the final velocity of two objects thrown from the same height or rolling on an inclined plane (two steel balls of different size and two small toy trucks loaded or unloaded).

3.1 – BULGARIA

TITLE: ELECTROMAGNETIC ENGINE USED FOR STUDIES AND EXPLANATIONS – AND CAN IT BE USED AS A GENERATOR?

Name: Rositsa Konova
Institution: Vasil Levski High School, Sevlievo
Stand No.: 254

The engine is a normal engine with an improvement made to use the swinging action to decrease energy losses. An important aspect of its functioning is the special shape of the pair of rings, which allows the structure to maintain the swinging motion for a longer period of time. The coil is placed on the battery-powered platform.

The principle of the engine's movement is that the direction of the current on the turns of the coil is reversed. Unicellular magnetic poles therefore appear in front of each other, which causes them to repel each other, turning the coil clockwise or anticlockwise.

3.2 – BULGARIA

TITLE: FROM LIVING CELLS TO BIOFUEL CELLS

Name: Yolina Hubenova[1], Mario Mitov[2]
Institution: University of Plovdiv[1], South-West University[2] – Blagoevgrad
Stand No.: 255

As world energy demands are constantly growing, there is an urgent need to find an effective way to meet them, but without causing or worsening other global problems. The main goal of the proposed project is to popularise the innovative technology of biofuel cells, which give an opportunity for simultaneous electricity generation and organic waste purification. For this purpose, several types of biofuel cell have been constructed and examined under different operating conditions using complex microbiological, biochemical and electrochemical analyses. Some of the prototypes constructed by us, for example those of yeast and sediment microbial fuel cells, could be used for demonstrations and research activities in high schools and universities. By using the developed methodology students should be able to conduct interdisciplinary investigations under the supervision of experienced tutors.

3.3 – BULGARIA

TITLE: OPPORTUNITIES TO RAISE STUDENT INTEREST IN STUDYING NATURE

Name: Marianna Vitanova
Institution: Professional High School in Mechanics and Electronics, Pleven
Stand No.: 256

The presentation introduces an innovative educational process – the staging of an exhibition for three consecutive years. The application of basic methods is presented: brainstorming, expert scientist, teamwork, expert studying, and the dynamic organisation of the exhibition. The educational objectives are to learn about plants: structure and chemical composition; biologically active substances; collection and processing of herbs; and the functional place of flora in the biosphere.

The educational objectives achieved include:

- Acquisition of skills for an environmentally friendly way of life
- Communication skills
- Skills for applying knowledge
- Increased creativity and deployment of the students' potential
- Ability to address problems in a new way
- Formation of ecological behaviour

3.4 – BULGARIA

TITLE: PHOTONICS EXPLORER TEACHING KIT

Name: Tsviatko Popov
Institution: St. Kliment Ohrid University of Sofia, Faculty of Physics
Stand No.: 257

The Bulgarian stand will be presenting the EU-funded Photonics Explorer teaching kit on light, optics and photonics. This kit will be available in seven languages and will be provided free-of-charge to teachers in many European countries. It is important for teachers that this teaching material helps them achieve the educational targets of their national curriculums.

Photonics Explorer contains a set of generic components for hands-on experiments. Most of the components are industry-sponsored 'real-world' products like solar cells (used on roof-top photovoltaic installations), polarising foil (used to make liquid crystal displays), or polymer optical fibre (used for high-speed IT networks). Some components, e.g. colour filters and mirrors, will come as a set of 10, while others, e.g. laser pointers, will be provided as single items.

See also: http://www.photonicsexplorer.eu

3.5 – BULGARIA

TITLE: SCIENCE THEATRE – AN UNORTHODOX WAY TO RAISE INTEREST IN NATURAL SCIENCE

Name: Maria Nikolova
Institution: Aprilov National High School, Gabrovo
Stand No.: 253

The Aprilov National High School has an interesting approach to raising interest in science and engaging with our talented students in science and art. This approach uses educational theatrical performance – 'science theatre'. In the last four years we have staged three performances and we are currently working on a fourth dedicated to the International Year of Chemistry 2011 and the 50th anniversary of human space flight. The three previous shows were: Water Wading – Knowledge Craving; Michael Faraday: The More I Work, the More I Learn; and For a Gram of Radium. Several of the experiments included in the performances will be showcased at the festival. Some of the tools used in the demonstrations are from the museum collections of the Aprilov National High School and the National Museum of Education in Gabrovo.

All pictures and videos are available at: http://marianikolovaen.wordpress.com

3.6 – BULGARIA

TITLE: THE WORLD OF MUSHROOMS

Name: Ofeliya Rusinova[1] and Irina Kostadinova[2]
Institution: Nikola Obreshkov High School[1], Sofia, and Thomas Jefferson English Language School[2], Sofia
Stand No.: 252

In our presentation for the Science on Stage Festival 2011 in Copenhagen we aim to demonstrate, examine and discuss a variety of teaching resources on the topic 'The world of mushrooms'.

The use of good visual teaching materials makes learning easier and provokes the curiosity of students, motivating them to learn about mycology. In the teaching on fungi we use materials created by our students in their biology lessons in both our schools in Sofia, Bulgaria: the Nikola Obreshkov High School and the Thomas Jefferson English Language School.

The materials of our students, posters and models, illustrate the three basic levels of organisation of living matter – microsystem, mesosystem and macrosystem.

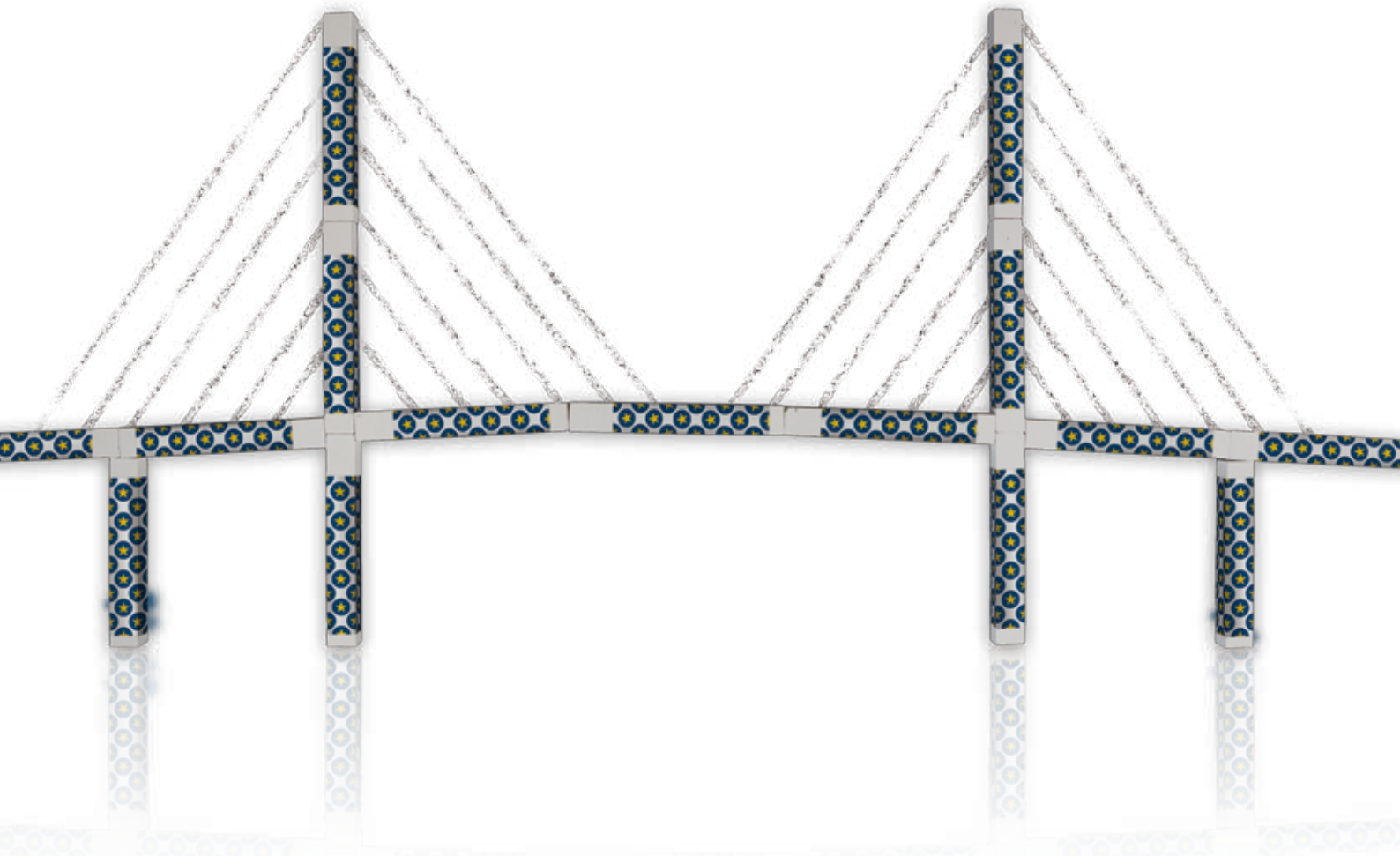
We hope that our presentation will be useful to our colleagues and will contribute to the better integration of theory and practice.

3.7 – BULGARIA

TITLE: LEARNING ABOUT NATURE – WITH LOVE

Name: Magdalena Beluhova
Institution: High School of Economy and Tourism, Velingrad
Stand No.: 258

During the presentation various approaches will be used to demonstrate the students' experience of applying science at school and in nature guided by their interest in sustainable development. Experimental projects, which have been implemented and debated successfully in front of experts from Bulgaria and abroad, are selected to present the way that topics taught at school are transferred to real life. Typically we take a socially important problem such as water pollution, interpret it from a local perspective, and experiment with methods for solutions. These solutions are exciting for the students because they stimulate their minds to seek out the relationship between science and practice, current local issues and long-term challenges. The presentation set covers: applied science at school; short films on ecological projects; and the best moments from the Intellect club's activities.



4.1 – CANADA

TITLE: EVERYTHING IS ABOUT PHYSICS!

Name: Anjuli Ahooja
Institution: Appleby College
Stand No.: 113

This project gives ideas and a strategy to make physics more interesting and relevant to students. Through in-class examples and discussions, and a major inquiry project, the students are made aware that 'everything' is about physics. They are acquainted with connections of the principles of physics with their daily lives, future careers and hobbies. The students choose a topic to make links between sports, health science, medicine, medical equipment, etc. and physics. They do research and/or build a model and/or do an experiment for their major project. In some cases, students have communicated with an expert in the field related to their project, thus learning from the best! Technology is used to present the project as a PowerPoint, website or video. The students present their projects in their class and at the Canada Wide Virtual Science Fair, where they have won various awards.

4.2 – CANADA

TITLE: AMUSEMENT PARK PHYSICS

Name: Julie Bolduc-Duval
Institution: Cégep de Thetfordmines, Québec
Stand No.: 114

In order to study mechanical concepts in physics with my students, I decided to take them to an amusement park and study the different rides and roller coasters. But I think this project was innovative as it pushed the analysis further than I have ever seen for this level. The students had to answer many questions about the rides by taking data on site and then doing the necessary calculations. But the main part of this project was for the students to conceive a ride based on a few physical criteria. This forced them to fully understand the physical concepts before they could create the ride. This project, which turned out to be extremely successful, was aimed at college students aged 17-20 from a technical programme in mechanical engineering in Quebec, Canada.

4.3 – CANADA

TITLE: SYNCHROTRON SOFT X-RAY ANALYSES OF ICE PRECIPITATES AND SOIL FROM CENTRAL NORTHWEST TERRITORIES, CANADA

Name: Glen Guthrie
Institution: Sahtu Renewable Resources Board, Chief Albert Wright School, Mackenzie Mountain School
Stand No.: 116

Previous elemental and synchrotron soft X-ray analyses of discoloured overflow ice demonstrate unique chemistry that is thought to be associated with melting permafrost. The increasing abundance and distribution of discoloured ice may have significant negative impacts on northern aquatic ecosystems and contribute to biomagnification of toxic elements in northern human populations. This investigation with students aged 16-18 includes chemical, geological and chronological analyses that will result in the most comprehensively studied permafrost sample in the world. The results may provide invaluable assistance with tracking changes in groundwater distribution that are increasing because of the warming climate, and may also shed light on the seemingly preferential transport mechanisms involved in this process.

4.4 – CANADA

TITLE: THE PISIM (SUN) PROJECT

Name: Sally Meadows
Institution: Outreach and Transition Programs, College of Engineering, University of Saskatchewan
Stand No.: 117

The Office of Outreach and Transition Programs, College of Engineering, University of Saskatchewan, supports community-driven, science and engineering projects at high-school level in northern Saskatchewan, Canada. From 2008 to 2010 Aboriginal students at Charlebois Community School in Cumberland House, SK, under the tutelage of elders, community members and industry experts, designed and built an energy-efficient house based on the footprint of their ancestors' homes but incorporating 21st century technology.

This multi-disciplinary project provided enrichment in core areas such as science and math as well as credits in practical and applied arts. The youth gained practical and communication skills, increased their self-esteem, and helped secure a greener future for their community. The Pisim Project has been filmed as an educational documentary: www.pisim.ca




4.5 – CANADA

TITLE: HELPING ROBOTS

Name: Mylène Poudrier
Institution: Collège Bourget
Stand No.: 115

This project is intended for grade 5 and 6 students, who built robots using LEGO® MINDSTORMS®. Their robots had to be able to help a fictional person with physical disabilities. To launch the project, we had several group discussions about ethical and human health questions. Following the discussions, we watched a clip from the movie Bicentennial Man and the students shared their reactions regarding the robot's presence in a family.

The students were introduced to the computer program MINDSTORMS. In each class, six students were chosen to become 'experts'. Having those experts on hand enabled the teachers to focus more on the pedagogical aspects of the project and not just the technical problems. Different groups would come into our classrooms and experiment with our helping robots. The students were impressed by the possibilities that a robot can offer in helping a disabled person.

5.1 – CYPRUS

TITLE: CONNECTING INPUT AND OUTPUT MODULES ON A TRANSISTOR/THYRISTOR PROCESSING UNIT

Name: Georgios Georgiou
Institution: Ministry of Education, Department of Secondary Education
Stand No.: 413

The series of experimental modules that have been constructed (3rd grade of secondary school) comprises:

- INPUT (models with sensors)
- 2 PROCESSING UNITS (thyristor and transistor circuits)
- OUTPUT (mechanisms)

The students experiment with the modules and choose the appropriate processing unit, on which they connect the input and output modules to the suitable points to solve specific problems that are given to them.

Example problem: the wipers of a car should start automatically when it rains.

To solve this problem, the students must choose the transistor processing unit, on which they connect the humidity sensor, a resistor and the output module (model windshield wiper module) to the correct points.

Basic advantages of this series:

- Quick to put together
- Not limited to usual output components (motor, buzzer, lamp) but includes output modules (garage door, parking space arm barrier, etc.)

5.2 – CYPRUS

TITLE: SOLID CO_2: THE ICE THAT FASCINATES AND TEACHES

Name: Georgia Costi-Papasavva
Institution: Ministry of Education, Department of Secondary Education
Stand No.: 415

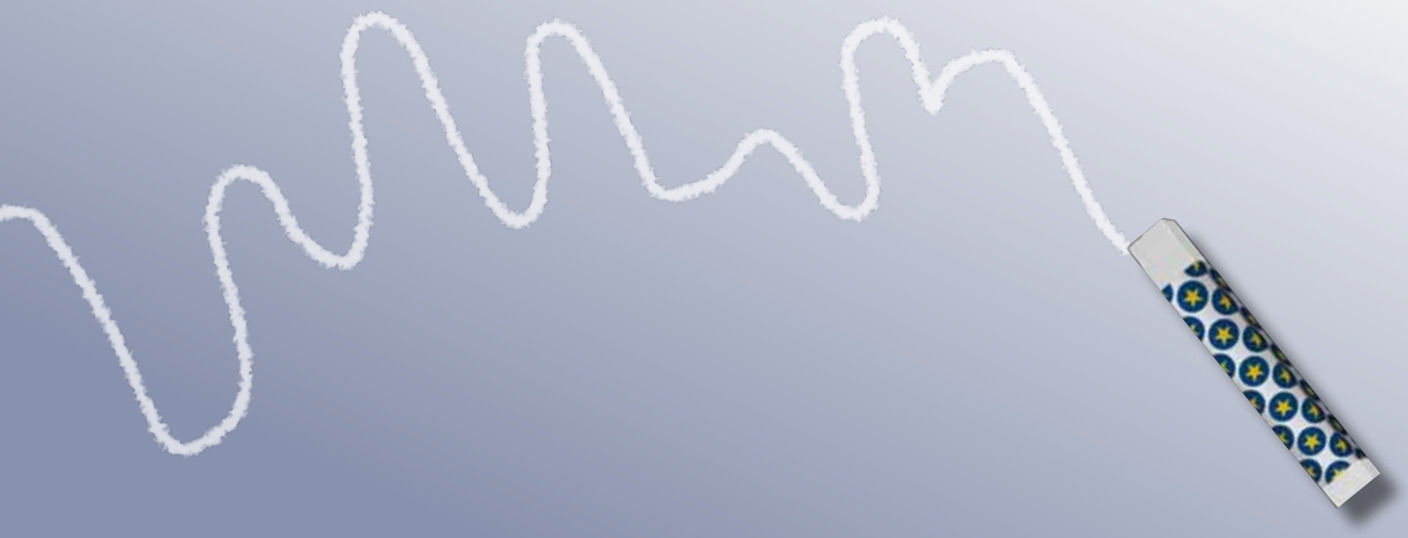
The project teaches the properties of gases, specifically carbon dioxide. Using solid carbon dioxide, students conduct a practical investigation of the density of gases, the test(s) for carbon dioxide, the process of sublimation and the energy transfer involved, the solubility and acidic character of carbon dioxide, the mass of gases and mass conservation, why mass seems not to be conserved (upthrust), and everyday applications. It is advisable to use a worksheet to reflect on what has been learnt. Ideally, the lesson should take place in the school laboratory and a proper risk assessment should be conducted by the teacher beforehand. The lesson can be implemented in a 45-minute period, although a double period would be ideal. The lesson can be used at upper-secondary or lower-secondary levels. The project is presented using PowerPoint and demonstration/experiment simultaneously.

5.3 – CYPRUS

TITLE: THE POWER OF SIMPLE MATERIALS: THE DIVER SUSPENDED IN WATER

Name: Georgios Papasavvas
Institution: Ministry of Education, Department of Secondary Education
Stand No.: 414

'The diver suspended in water' is a teaching approach created to improve year 9 students' attitude to physics and to increase their understanding of the behaviour of objects (made of more than one material). After an introduction, the students engage in a hands-on/minds-on activity where they create a model diver using simple materials and tools, then compete by altering their models to make them remain suspended in the water. This goal is a great challenge for the students and makes them extremely excited and motivated. The continuous feedback they receive from the system and the teacher, the constructive and differentiated environment, which is accompanied by appropriate cooperative learning methods, and the opportunity they are given to reflect on the activity all help the students achieve a good understanding of floating, sinking and, especially, suspension of objects in water.



6.1 – CZECH REPUBLIC

TITLE: GPS FOR SCIENCE TEACHING DURING FIELD EXERCISES

Name: Ladislav Dvorak
Institution: Elementary school and Pedagogical Faculty, Masaryk University, Brno
Stand No.: 301

GPS has become a regular feature of automotive equipment and tourism. This project introduces GPS as a teaching tool which increases the motivation of students in the classroom. The project was trialled using GPS receivers during implementation of the project 'Environmental research in selected localities of the city of Brno' at the elementary school Laštuvková in Brno and during field exercises for students and teachers of physics at Masaryk University in Brno. The project presents the Wherigo game as another motivator in the teaching of science.

6.2 – CZECH REPUBLIC

TITLE: STRONG CZECH EGGS

Name: Vladimíra Erhartová
Institution: Stredni odborna skola a Gymnazium
Stand No.: 302

The project 'Strong Czech eggs' focuses on various simple but surprising experiments with eggs. As everybody is familiar with eggs, nobody is worried about not understanding them. These experiments easily capture the pupils' attention and motivate them to try the experiments for themselves and, more importantly, to seek out explanations. Because the experiments are surprising, pupils remember them better. The big advantage of these experiments is that they can be used for all ages of pupils, from kindergarten to high school, simply by tailoring the precision of the explanations.

6.3 – CZECH REPUBLIC

TITLE: PLAYFUL PHYSICS

Name: Katerina Lipertova
Institution: Cirkevni gymnasium, Plzen
Stand No.: 303

Taste delicious juices, play the water pipes, gaze into familiar kaleidoscopes (and even some less well-known ones such as a monster from the deep and other three-dimensional pictures). Reveal the secret of biceps, peep into the world where everything is upside down, test yourself to find out whether you are male or female, build a very stable sculpture from human bodies. And there are other little machines, toys and tricks awaiting you.

6.4 – CZECH REPUBLIC

TITLE: EXPERIMENTS FOR TEACHING METROLOGY

Name: Tomas Necas
Institution: Gymnázium Brno
Stand No.: 304

Physical processes in the atmosphere are amazing and you can encounter them every day as most meteorological processes can be observed in the sky. This project will demonstrate some relatively simple laboratory experiments that can be carried out in school or at home. The experiments are divided into three topics:

- How does solar radiation heat the Earth?
- Atmospheric pressure changes
- Clouds and precipitation

6.5 – CZECH REPUBLIC

TITLE: SEE THE SOUND, HEAR THE LIGHT

Name: Jan Pavelka, Ondrej Pribyla
Institution: ÚDiF – Physics Theatre, Masaryk University, Brno
Stand No.: 306

The performance focuses on creating an alternative and simple understanding of sound, tones and human hearing. The fundamental tools for the performance are simple light and sound elements: a photodiode, a loudspeaker and a laser pointer. During the performance we start with experiments that explain the function of these elements and link them step by step with what the spectators are seeing and hearing. In this way we gradually build up intuitive understanding of basic acoustic concepts. We clearly show the relationship between the pitch of a tone and its frequency, and we play several simple optical-musical instruments based on previous experiments.

6.6 – CZECH REPUBLIC

TITLE: INFRARED RADIATION IN SCHOOL EXPERIMENTS

Name: Zdenek Polak
Institution: Jiraskovo gymnazium Nachod
Stand No.: 307

This project, which enables independent study by pupils aged 14-19, uses simple, easy-to-obtain things to explore the characteristics of material that cannot be felt by our senses. Using a manual, pupils can make a light filter on their own which transmits only the short-wave part of the infrared spectrum of electromagnetic radiation. By attaching the filter to a digital camera, you can see the world in the invisible part of the spectrum – infrared radiation. Pupils can find answers to questions like: What is transparent, bright or dark? What are the sources of infrared radiation and their properties? How do different materials react with this radiation? Which materials absorb it and which transmit it? Does infrared radiation behave the same way as light? Can it be refracted, reflected, polarised, etc.? The pupils experience how an audio signal can be transmitted via infrared radiation.

6.7 – CZECH REPUBLIC

TITLE: PHYSICS EXPLORES THE MUSICAL INSTRUMENTS

Name: Zdenek Rakusan
Institution: Zakladni umelecka skola Jablonec nad Nisou
Stand No.: 308

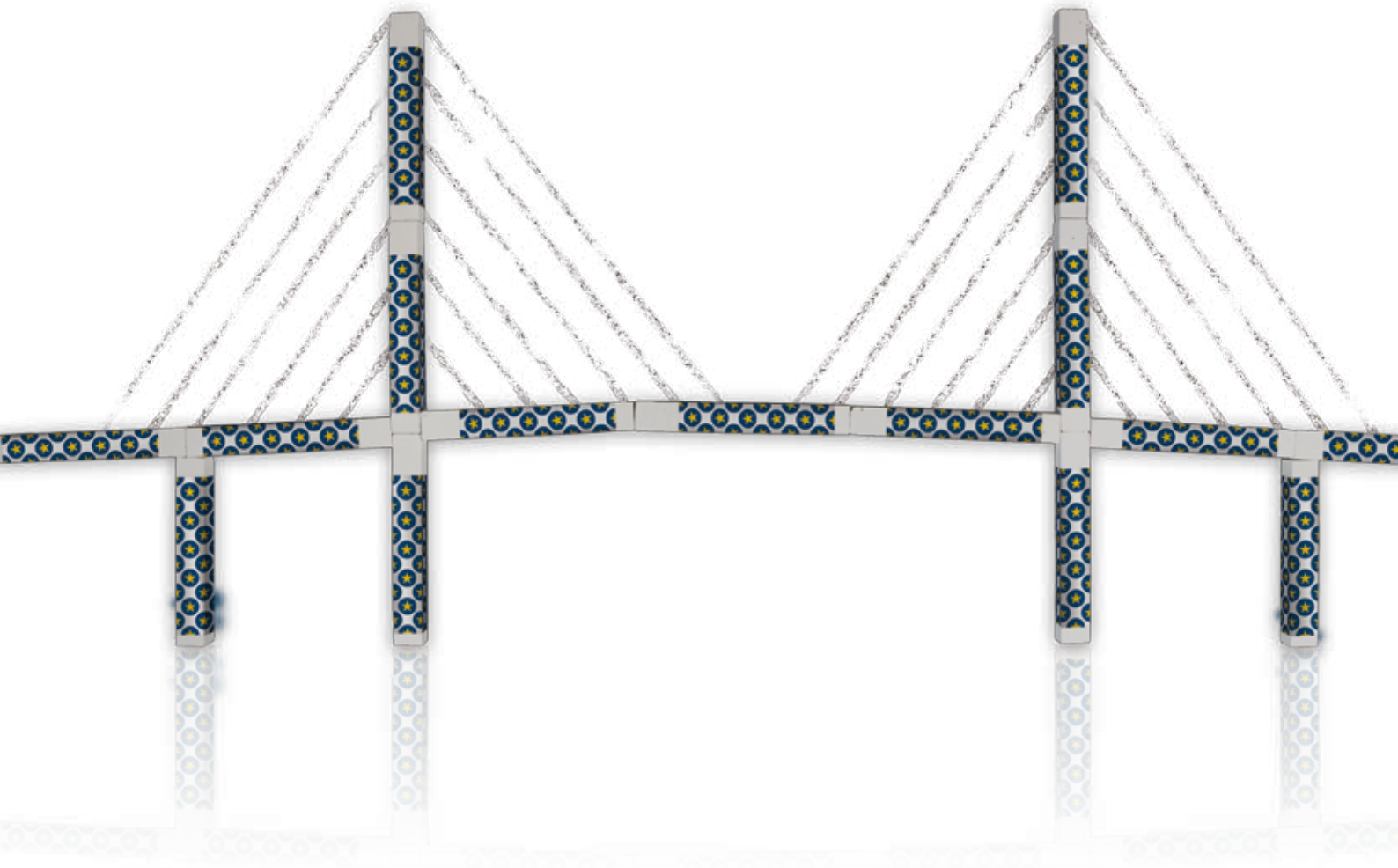
Sound is produced by a vibrating body and transmitted by air as a wave of alternating compression and dilution. If the wave strikes the ear-drum, it makes the ear-drum vibrate. We explore this and the difference between tones and sounds. Musicians know four basic tone qualities (strike tone, duration, volume and timbre) and we look at their characteristics. Exploring the relationship between strike tone and length of vibrating body, we also present infrasound and ultrasound. We explore aliquot tones, the main factor in timbre, using the Tibetan singing bowl, guitar flageolets and the simplest form of aliquot singing. We then explore resonance, the main factor in volume; these experiments are based on various ways of amplifying tuning-fork sound. Finally, we explore the main groups of European musical instrument, including the voice, as well as some ethnic instruments and musical toys.

6.8 – CZECH REPUBLIC

TITLE: ELECTROMAGNETIC INDUCTION AND RELATED PHENOMENA

Name: Peter Zilavy
Institution: Gymnazium Pierra de Coubertina, Tabor
Stand No.: 309

The project focuses on a series of experiments associated predominantly with electromagnetic induction. These spectacular experiments show various forms and applications across a wide range of frequencies. Experiments with a DC electromagnet, transformers, an induction cooker, an RF electromagnetic field and a Ruhmkorff inductor are presented.



7.1 – DENMARK

TITLE: UNGEKLIMAFORSKER DK (THE 'YOUNG CLIMATE RESEARCHER' WEBSITE)

Name: Louise Pilegaard, Aff Hjarnø
Institution: St. Heddinge Skole
Stand No.: 138

This course is born out of wonder at how we as science teachers make science teaching attractive, up to date, relevant and authentic for the oldest pupils.

Pupils today do a lot of their communicating on the Internet. It was therefore natural to bring this teaching material together as a virtual teaching portal with the possibility of podcasts, blogs, hands-on experiments and film clips. This makes the lessons an interaction between pupils and teachers from the primary & lower-secondary school and the upper-secondary school in the informal and formal learning spaces. The learning gives the pupils the opportunity to study locally and compare globally.

7.2 – DENMARK

TITLE: ADAPTING TO A WORLD UNDER THE WATER

Name: Danni Wower Nielsen, Juliana Mitervski
Institution: Odense Katedralskole
Stand No.: 319

The vast majority of the physics terms at B level are to be found in diving theory. Pressure, buoyancy and thermal conduction have a crucial influence on diving conditions, and light refraction and the absorption of light in the water help make diving a visually fascinating pastime. We have studied all this, partly in the school laboratory, but also wearing air tanks and diving masks in the swimming pool. This gave the pupils an insight into the relevance of the physics terms and the opportunity to learn under unusual conditions.

7.3 – DENMARK

TITLE: PROJECT BALTIC SEA

Name: Deia Vejby
Institution: Ingrid Jespersens Gymnasium
Stand No.: 149

The pupils will do field work in autumn and spring. They will take various samples from the Baltic Sea, which they will then present on a portal in English. The Finnish pupils will also go out into the field. The studies will be compared between countries, seasons and the way the testing is carried out. For example, the pH value can be found using three different methods: electric pH meter, universal indicator and sticks. The aim is for the chosen pupils from Denmark and Finland (4-5 in each case) to do an exchange in autumn 2011.

7.4 – DENMARK

TITLE: TRAVEL IN THE 4TH DIMENSION – TIME LAPSE

Name: Heide Munk
Institution: Frørup Skole
Stand No.: 410

The science programmes broadcast on television often use slow motion or time lapse (fast forward) to enable viewers to see something that we are not normally able to see. These programmes are watched by children, young people and adults alike.

It was out of fascination with these slow-motion and time-lapse recordings that we began searching the market for equipment to make similar recordings. It proved to be the right time to buy this sort of equipment out of tight school budgets because the market offers equipment that does not cost very much more than the ordinary apparatus already found in a science room.

The starting point of the project is the opportunities that arise when you are able to make super-slow-motion and time-lapse recordings. So 'Film science – and make it visible' is not just intended to be an isolated teaching project, but a project that will be integrated into general teaching and used where appropriate in both science and PE.

7.5 – DENMARK

TITLE: SCIENCE CULTURE WHERE PUPILS PASS ON LEARNING TO OTHER PUPILS

Name: Kamma Rasmussen
Institution: Katrinebjergskolen
Stand No.: 148

An important part of the science teaching at Katrinebjergskolen is that pupils pass on what they have learnt in science to others, first and foremost other pupils.

The aim of this is to strengthen the sciences and the interest in them. When the pupils pass on what they have learnt to others, they choose relevant examples, immerse themselves in the subject and present their topic using models, demonstrations or experiments.

7.6 – DENMARK

TITLE: SUPERMAGNETS

Name: Martin Søgaard
Institution: Svanninge Skole
Stand No.: 317

The idea of the course is to create a teaching programme which can greatly help to engage and activate the pupils in the lessons. With the 'Supermagnets' course we will try to tackle the subject of magnetism in a different way and thus make the pupils more enthusiastic about lessons. The different approach is called the Wonderwall method and builds on the pupils' natural inquisitiveness and desire to investigate the world around them. This is done by letting the pupils experiment and study what magnets can and cannot do. By letting the pupils experiment with magnets of different shapes, sizes and strengths, they quickly get ideas themselves of what the magnets can be used for. The pupils generate their own understanding of the magnets' properties, which can help them to more easily remember what they have learnt.

7.7 – DENMARK

TITLE: GRASP THE TERMS AND MAKE THEM GRASPABLE

Name: Mette Norup Hansen, Dorte Christensen
Institution: Nr. Asmindrup Skole, Gryldenstenskolen
Stand No.: 137

It is with great interest that I have started up these N/T courses involving the subjects of Danish, maths and visual art because I find it exciting to see how other subjects can support the pupils' familiarity with scientific explanations. I take pride in conducting courses which get the pupils to be amazed, ask questions, and be engaged and active!

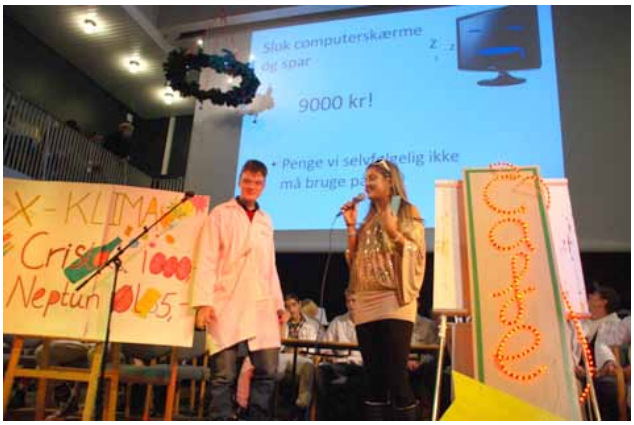
As a reading specialist I consider it a special challenge to help generate reading comprehension in all subjects. Comprehension is about appreciating and constructing contexts, structures and images. The historic and philosophical are often brought into play.

7.8 – DENMARK

TITLE: CLIMATE TEACHING THAT REALLY INSPIRES

Name: Ole Gadsbøll, Leif Poulsen
Institution: Esbjerg Statsskole, Rybners Gymnasium
Stand No.: 145

In physics lessons the pupils were given the task of studying the school's electricity consumption and making suggestions for savings. The pupils carried out measurements on the school's electrical appliances with expert help from the caretaker, the local utility company and the Internet. They then calculated energy consumption and implemented various suggestions for savings with the result that energy consumption fell by around 25%.



The focus was on the technical, but in such a way that they also had to use their creative skills. The pupils:

- Drew up a report for the school management with suggestions for savings
- Drew up a climate contract with the school management
- Produced a poster for display throughout the school
- Turned their suggestions into entertainment for the end-of-term Christmas party
- Got media coverage in a regional newspaper
- Wrote a letter to the Minister for Climate

7.9 – DENMARK

TITLE: ROCKETS AND SUSTAINABLE ROBOTS

Name: Rune Hilling, Inger-Marie Hilling
Institution: Faaborg Gymnasium
Stand No.: 314

In a collaboration with Danish Space Challenge and the Continuation School in Vejle Municipality, pupils from five schools joined together in a competence-demanding, multi-faceted project to build real rockets with sustainable robots, which were then launched at the rocket festival in summer 2010.

7.10 – DENMARK

TITLE: THE FLAVOURS AND COLOURS OF NATURE

Name: Trine Søholm
Institution: Svanninge Skole
Stand No.: 318

In class 3 we have worked on the theme 'The flavours and colours of nature', which is a cross-subject educational course involving nature/technology and art. We have worked with the human senses, focusing in particular on sight, taste and smell as these senses link with the continuing work we have carried out on cave-painting and painting with the colours of nature. Among other things, we have been out in the field painting with natural plants and made our own colours from natural materials. We have also collected materials to make our own tea and floral perfume. As a conclusion to the course the class had to pass on what they had learnt to class 0, which is their 'twin class'.

7.11 – DENMARK

TITLE: CHILDREN OF GALILEO

Name: Carsten Andersen, Martin Götz,
Institution: Bellahøj Skole
Stand No.: 133

Children of Galileo is an educational project that will give 10-20-year-old pupils the opportunity to build their own telescopes and go out in the evening to explore the sky.

Watching the waxing Moon they can observe new craters every night. Observing Jupiter they can measure the orbiting periods for each of the four Galilean moons. Exploring Venus over several months they can observe the changes in phases.

We provide Galileoscope kits and tripods.

On our site www.boernafgalileo.dk you will find assembly instructions, links to planetary programmes, experiments, links to videos, guides to help teachers arrange observing evenings, guides to the night sky, and much more.

We think the pupils will find joy in exploring their new hobby and become interested in science in general.

7.12 – DENMARK

TITLE: ENZYMES – THE SECRET HELPER IN EVERYDAY LIFE

Name: Claus Brandt Jacobsen, Henrik Kruse Larsen
Institution: Nørrebro Park Skole
Stand No.: 136

The project deals with enzymes of different varieties and their influence on diverse processes, both natural and man-made. Goals involve the pupils understanding the effect of enzymes on these diverse processes through experimental work. Different experiments will involve similar processes done with or without enzymes to establish different reactions and reaction times. The project is planned in cooperation with enzyme-producing companies and companies using industrial enzymes in their products. Evaluation of the pupils' learning is planned to be interactive using programmes like Scratch from MIT. The project will be tried out in early 2011 in Nørrebro Park School with pupils aged 12-16, and evaluation of the try-outs will be presented alongside the project.

7.13 – DENMARK

TITLE: MOLECULAR GASTRONOMY IN BIOTECHNOLOGY

Name: Claudia Girnth-Daimba
Institution: Solrød Gymnasium
Stand No.: 412

Pupils often complain that science topics are far removed from the real world. This is certainly the case for chemistry, but in part also for certain topics in biology such as molecular genetics or cell biology. Teaching chemistry and biology using examples from cooking is bridging the gap between science and everyday life, making pupils ask questions about science not only in the classroom but also at home. Molecular gastronomy is not just a motivational factor in teaching; it is building up a sense of science as an important factor in our culture. It provides us with a scientific way of seeing the world around us and eventually becomes a way of thinking about scientific explanations whatever we do – not just in the academic surroundings of the classroom.

7.14 – DENMARK

TITLE: PROJECT ON AIR

Name: Axel Karlshoej, Pia Kannegaard
Institution: Sorø Privatskole
Stand No.: 150

The project is about air and utilisation of atmospheric properties. The work comprises three phases.

1. Collection of students' experiences in the field.
2. Conducting of experiments that exercise observation and development of conclusions while adding new experiences.
3. Production and development of origami airplanes, larger depron planes, simple steam engines and windmills.

Instructional videos can be downloaded as shareware from www.sciencetoymaker.org, a fantastic site that provides everything needed for the production of origami planes and tuk tuk engines (simple steam engines made from three straws, an empty soft drink can and a little epoxy glue).

The project costs almost nothing to implement, is super-instructive and encourages students to seek out more information by themselves. Furthermore, the website also offers a series of instructive short videos talking about aerodynamics.

7.15 – DENMARK

TITLE: RUM & COKE

Name: Christina Frausing Binau, Bjarne Winther
Institution: Brønshøj Skole
Stand No.: 315

This project is an example of interdisciplinary science education. The topic makes an element of the students' reality the object of learning in science. In this way we take advantage of the great interest that students have in topics that are personally and individually meaningful to them.

The topic runs over four weeks in all the science lessons – 20 in all. During that period the science education leads the students through various subtopics like: what rum & coke is made of; what alcohol and carbohydrates are made of; the history of growing sugar; multinational companies and globalisation; how alcohol and carbohydrates are metabolised; and what the consequences of consuming rum & coke can be.

7.16 – DENMARK

TITLE: TRÆERNES STI (TREE TRAIL)

Name: Lone Skafte Jespersen, Line Matthiesen
Institution: Krogårdskolen
Stand No.: 411

Our resource is available right outside our windows as almost all the regular species of Danish tree grow in the school grounds. The pupils have learnt all about trees: how trees and plants are built; photosynthesis; distinguishing features of tree species; the function and significance of trees; and forests and their ecology. The pupils have also planted 2,411 trees themselves. Having acquired the technical knowledge, the pupils have then produced technical texts to form a book.

7.17 – DENMARK

TITLE: SPONSORSKOLEN.DK

Name: Niki Danvad & Matilde Danvad
Institution: Engzlsborgskolen
Stand No.: 409

Sponsorskolen.dk is based upon science videos and podcasts. There is nothing new about videos or podcasts, but they are a resource that is not being used to its full potential in parts of the Danish school system, especially the lower grades. Videos and podcasts with academic content cannot replace a skilled, inspiring teacher, but these media can provide helpful tools in keeping students attentive and more open to learning. Using videos in class assists teachers in passing on new knowledge to students and creates possibilities for the teaching environment in the sense that we are able to have more focus on differentiation and inclusion. This gives us more freedom to control and structure experimental teaching, which is considered the kind of teaching that is most motivating and meaningful for students.

I look forward to seeing you and sharing thoughts at Science on Stage 2011!

7.18 – DENMARK

TITLE: ENERGY BALANCE OF A WATER PUMP

Name: Niels Gustav Pedersen & Brian Lykkegaard Karlsen
Institution: Technical High School of Grenaa, Videndjurs
Stand No.: 320

In a set of experiments we will make practical use of thermodynamics and Joule's law for determining how much energy is added to a running water pump and where this energy goes. A good part of this energy is converted to a temperature rise in the water, but not all of it. What happens to the rest of the energy? Answering this question is the objective of this investigation.

First we investigate how much energy is used to heat the cooling air which is sucked through the pump motor. Next, we ascertain how much energy is used to heat up the housing of the motor pump. Lastly, we determine how much of this heat is dissipated to the surroundings. All of this is done using simple procedures and materials. The outcome is not only the complete energy balance of the water pump, but also a very practical way of teaching high-school physics.

7.19 – DENMARK

TITLE: GREEN ROOFS AND MONITORING THE CLIMATE

Name: Birthe Zimmermann
Institution: Alssundgymnasiet Sønderborg
Stand No.: 146

With global warming and climate change the local precipitation pattern in the Sønderborg area has shown some nasty examples of severe 'monster rain', especially in the month of August. In August 2007, heavy rain destroyed a road and the railway line in just 20 minutes, and the situation has been repeated in recent years.

Will a 'green roof' help solve the problem of too much rain? How can Sedum plants on the roof do the job of retaining and reducing the amount of water that runs off the roof? Will the plants actually reduce the run-off by the estimated 60-70%? How can the climate be monitored in practice?

My focus is on students as problem solvers; on students' motivation, on ownership, on active participation, on designing experiments, on carrying out investigations as part of the core curriculum work in biology, and on informing others about our work.

7.20 – DENMARK

TITLE: JAMES BOND AND PHYSICS

Name: Poul Hedegaard
Institution: Odense Katedralskole
Stand No.: 132

Introduction

We use clips from James Bond films to study what is physically possible and impossible. We try to come up with explanations if something that James Bond encounters seems to be in contravention of the laws of physics, and we assess whether the film clips' inventions are realistic.

Aim of the project

- To give the pupils insight into scientific working methods and ways of thinking, especially how we can use models to explain physical phenomena. In the process the pupils have to formulate and test hypotheses for accepting or rejecting some of the phenomena they have seen in the James Bond film clips
- To inspire the pupils to be investigative when they have to find the data they need when carrying out quantitative or qualitative testing
- To get the pupils to experience the subject as exciting and relevant so that they want to do more physics and other sciences

7.21 – DENMARK

TITLE: SCIENCE TALENTS

Name: Dennis Wowern Nielsen, Jesper Lykkegaard
Institution: Bornholms Gymnasium, Rønneskolen Bornholm
Stand No.: 316

The students produced urea formaldehyde, a low-tech plastic, from urease-inhibited liquid pig manure. The intention was for the students to see themselves as part of a skilled community of chemists which can provide a solution to the age-old problem of pollution from mass production of pigs. Prior to this, the students received both a brief introduction to chemical reaction kinetics and a quick review of classical organic chemistry: alkanes, alkenes and alcohols, and the various syntheses that connect these groups of substances. The teaching presented the students with questions at all taxonomic levels in terms of both chemistry and the area of public debate which has a chemical interface with manure pollution. This encouraged the students to understand themselves as both critical and knowledgeable: individuals who identify chemistry as an essential choice in their further education.

7.22 – DENMARK

TITLE: TRAVEL IN THE 4TH DIMENSION – HIGHSPEED

Name: Bjarne Juul Johansen
Institution: Toftegårdsskolen
Stand No.: 409

Dive into a moment using high-speed recording

We are used to seeing amazing visual effects in science programmes on TV. One of these effects is created by recording the action with a high-speed camera. When you play back these recordings, you get a perfect slow-motion video, where you can suddenly see events which are hidden from the eye even if they take place right in front of you.

High-speed cameras used to be expensive, but now you can buy them for as little as 200 euros. This opens up the possibility of a new tool in science for exploring, measuring and observing everyday 'miracles' like surface tension on water, the explosion of popcorn or the acceleration of a water rocket taking off.

Using a high-speed camera is simple. Just a few minutes of introduction and you will be ready to explore the world through 'a new pair of glasses'.

The high-speed camera – a new tool for the science room.

7.23 – DENMARK

TITLE: LEARN, PLAY & MOVE OUT – USING SMARTPHONES CONNECTING TO THE MOBILE INTERNET AND THE GPS SYSTEM

Name: Kirsten Noe, Lars Hazelton, Jørgen Klæstrup, Ida, Gravgaard Jensen, Anders Lundgren, Louise Petersen Matjeka, Barbara Sobanska and Adam Rybaczyk
Institution: Schools of the city of Kalundborg, Gerlev Sports Academy, and our partner, Playingmondo
Stand No.: 131

Join the workshop run by the schools of the city of Kalundborg, Gerlev Sports Academy, and our partner, Playingmondo.com.

We work in a joint venture concerning learning, play and physical activities.

You are the player – you have to move yourself to get to the required point!

The system is location-based games and learning for smartphones.

The games and learning are for use outdoors, in the schoolyard, at the sports field, in the local park or close to the school in the city.

The system uses the built-in GPS in the smartphone, together with the mobile Internet. The system leads you to move around in the games and show the learning spots in the landscape.

At the workshop we will show you the system on our smartphones.

LEARN, PLAY & MOVE OUT!

Info: www.Playingmondo.com and www.Gerlev.dk

7.24 – DENMARK

TITLE: A SCIENCE DAY AT THE GYMNASIUM/SECONDARY SCHOOL

Name: Signe Allerslav
Institution: Hadsten skole
Stand No.: 135

An exciting, eventful and instructive day for primary-school children where they are taught by students from secondary school.

7.25 – DENMARK

TITLE: THE ULTIMATE TIME-SPACE CROSS – GRASPING SPACE AND TIME FROM PERSONAL LIFE PROJECTS TO GALACTIC LIFE CYCLES

Name: Bo H. Jacobsen
Institution: Aarhus University
Stand No.: 134

How can we illuminate the proportions of time and space in history, climate, geology and cosmology and the implications for public debate and policy making for the future?

This project links traditional 'geo-time walks' and 'planet walks' using two scalings: 1 mm per 100 years and 1 mm per diameter of our Earth.

The space-time cross defines the square millimetre, embracing an individual's life projects viewable with a microscope. Along the space arm, the Solar System is within walking distance and the nearest stars are about 3,000 km away. Along the time arm, history fits within a credit card; modern man starts 1 metre back and the Big Bang is no more than 137 km away.

This space-time cross, if anchored near or in the classroom, tangibly opens up a number of learning activities integrating the past and future history of family, civilization, climate and cosmological/geological events.

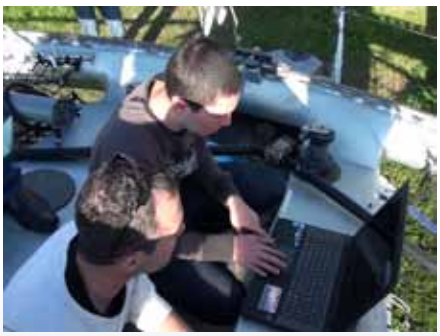
8.1 – FRANCE

TITLE: FROM THE BLUE PLANET TO BLACK HOLES, THE STRANGE GEOMETRIES

Name: F. Loret , L. Beddou
Institution: Collège Albert Camus, Miramas
Stand No.: 154

It all started with a challenge between the pupils and their teachers in the school science working group: who could finish first in the Vendée Globe, the biggest virtual Internet sailing race ever organised? The quest for success became a field of educational exploration in many directions: group strategies, learning to apply new technologies (data management, programming, simulation of physical mechanisms through computer-generated images, etc.), immersion in research centres, working sessions with professionals... finally expanding the project content, which began with the mathematics of the terrestrial globe, to the mathematical exploration of much wider universes: hyperbolic, conical and tropical geometries... from the blue planet to black holes.




8.2 – FRANCE

TITLE: NEWTON'S CRADLE

Name: J. Barthes and P. Langlois
Institution: Lycée Gustave Eiffel, Dijon
Stand No.: 152

In textbook descriptions of Newton's cradle, the conservation of momentum and energy explains the result of the collisions of several balls. As novice researchers, several students looked for the reasons for the movement of Newton's cradle. First, they set forth hypotheses, tested them with experiments, and compared their results with Belgian and Spanish researchers. Then they provided an explanation for this phenomenon without any equations by resorting instead to further experimental studies. This led us to present our work to an audience not requiring any scientific knowledge. Finally, a current simulation of German researchers shows that a realistic description of Newton's cradle is more subtle than it seems. The students used their experiments to bring a simple explanation of the phenomenon which takes place during the first millisecond of the impact.



8.3 – FRANCE

TITLE: THE MUSIC OF THE SUN

Name: J.M. Laclaverie and E. Martre
Institution: Lycée Bernard Palissy, Agen
Stand No.: 155

The sun is a musical instrument whose sound cannot be heard. However, we can study that sound by watching the sun vibrate, as has been done by SOHO (the Solar and Heliospheric Observatory). When we 'listen' to the music of the sun, we more easily understand its structure. The sun is a sphere that produces a sound. The air confined in a Helmholtz's sphere produces a sound too. We have analysed how often a sphere produces a sound wave and all the information it can provide us about this structure. In order to access the sun's sound waves, SOHO's magnetic resonance spectrometer Zeeman GOLF measures the Doppler gap between some sodium lines of the solar spectrum. We studied a simplified pattern of the system probe/sun with a lab model using ultrasound signals. Finally, we compared the spectrum of the sun to various musical instruments before attempting to reconstitute its original music.

8.4 – FRANCE

TITLE: THE SUNNY COOK

Name: G. Lebatard and A. Sultana
Institution: Collège François Mitterrand, Toulouges
Stand No.: 153

Teachers, how can you make optics, thermodynamics and ecology fun? It's simple: get pupils to cook! Very few resources are needed: just an old satellite dish, some aluminium foil, a saucepan, and some wood for the structure. You are now ready to tackle science problems with your pupils while you cook up a chicken curry using solar energy. This challenge was undertaken with 10 pupils aged 11-12 in a school science working group over the course of a year (one hour per week). This fun approach motivates the pupils and gently introduces them to scientific methodology: devising and performing experiments, then formulating and verifying hypotheses.

9.1 – GERMANY

TITLE: BE ASTONEISHED!

Name: Matthias Kusber:
Institution: Helene-Lange-Gymnasium, Fürth
Stand No.: 431

Five pupils present a physics theatre show, which is the result of a project which ran for eight months. The equipment is mostly self-built. The show was planned and the text written by the students themselves. The show demonstrates numerous experiments and explanations on the theme of acoustics in a good-humoured way.

9.2 – GERMANY

TITLE: CHEBIKU – INTERDISCIPLINARY TEACHING OF CHEMISTRY, BIOLOGY AND FINE ART

Name: Thomas Michael Braun
Institution: Gymnasium am Markt, Bünde
Stand No.: 427-428

'Chebiku' interlinks the subjects of chemistry, biology and fine art in a two-year project (grades 8 and 9). Chebiku has been one of our school's obligatory elective subjects for more than 10 years. Fine art is the superordinate subject, but Chebiku consistently interlinks topics from the chemistry, biology and fine art curricula. The project is mostly chosen by female students.

9.3 – GERMANY

TITLE: CHOCO-SCIENCE

Name: Dr. Angela Köhler-Krützfeldt
Institution: Romain-Rolland-Oberschule, Berlin
Stand No.: 430

This project will give explanations of the chemistry behind different types of chocolate.

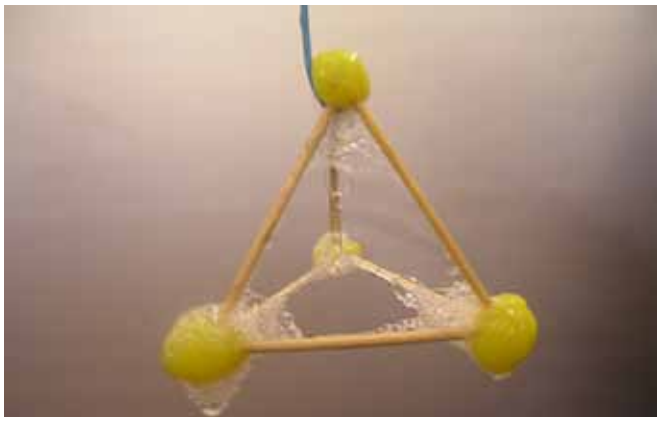
The pleasurable feelings that chocolate induces can be explained by its physical and chemical properties: the melting range of the cocoa butter, crystallisation and polymorphism. To produce good-looking chocolate you have to temper chocolate to avoid bloom. How you can do this with students and how they can analyse the properties of chocolate and develop new, innovative technologies to produce chocolate coatings or sweets – this will be the content of the presentation, which incorporates live experiments.

9.4 – GERMANY

TITLE: EXPLORING SOAP SKIN

Name: Wilfried Meyer
Institution: Grundschule am Halmerweg, Bremen
Stand No.: 433

This project deals with inquiry-based learning relating to the properties and behaviour of soap skin in planar and three-dimensional environments. It deals with process-related skills such as observation, communication, documentation, presentation, modelling, etc., and technical skills from making a suitable soap bubble solution to the use of a soldering iron and soldering wire. From the simple problem of making soap bubbles to the construction of several Steiner computers, this topic offers an approach to physical questions that is both playful and instructive.



9.5 – GERMANY

TITLE: HIGH SPEED/SLOW MOTION

Name: Michael Vollmer, Klaus-Peter Möllmann
Institution: University of Applied Sciences, Brandenburg
Stand No.: 434

Many hands-on experiments are performed at high speed, with the result that the details of the underlying physics are often unseen. Selected examples will be shown using high-speed recordings. They are not only beautiful to watch but also make it possible to understand the physics of these fascinating phenomena. We present experiments from different fields, e.g. a karate demonstration, breaking of spaghetti, falling water droplets, explosions of various balloons, and spectrally resolved sparks from a Wimshurst machine. Due to the rapid developments in camera technology, relatively inexpensive cameras with moderate frame rates are already available, which means that high-speed imaging can enrich physics teaching not only in universities but also in schools.

9.6 – GERMANY

TITLE: RADIOACTIVITY – CURSE OR BLESSING?

Name: Veronika Gallus
Institution: Gymnasium am Tannenberg, Grevesmühlen
Stand No.: 425

The curse and blessing of the atomic era: hardly any other physical discovery has shaped the 20th century as much as radioactivity. The threat of nuclear weapons, the hopes, fears and dangers of the civilian use of nuclear energy, and the application of radioactive substances in technology, research and medicine are discussed from an interdisciplinary view. Beyond that, experts from politics and science contribute to the topic, which is also considered from an artistic-literary viewpoint. Finally, the participants get artistically active themselves, folding 1,000 origami cranes according to a Japanese tradition.

9.7 – GERMANY

TITLE: LEARNING HOW TO EXPERIMENT AUTONOMOUSLY IN CLASS 5/6

Name: Lars Janning
Institution: Gymnasium Allee, Hamburg
Stand No.: 423

The lecture will provide an introduction to the didactics of the course, including the following questions: How is the course organised? What topics are dealt with? How are the experiments performed? What materials are used? What skills do the students learn?

9.8 – GERMANY

TITLE: A WEEK IN THE MEADOW

Name: Petra Breuer-Küppers
Institution: Schule an der Schwalm, Special School, Schwalmtal; currently University of Cologne
Stand No.: 426

Every year we build a yurt in a meadow with our students (classes 1-4/5) from Schule an der Schwalm (a special school for children with learning disabilities). This yurt provides shelter if it rains and a store for all the materials we need. We have a single topic (e.g. the Stone Age) and arrange duties with scientific focal points. One group looks for firewood and makes sure that the fire keeps burning and is cleared up when we leave the meadow. The 'hunters' produce weaponry (spears and bows) and test out the property of flying. The 'gatherers' look for herbs to make tea or salad, grain for baking bread, ingredients for soup, etc.

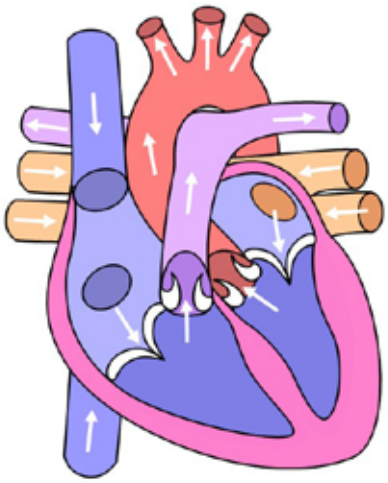
9.9 – GERMANY

TITLE: PHYSICS FROM THE INSIDE OUT

Name: Dr Olaf Gutschker
Institution: Unex School Laboratories, Cottbus
Stand No.: 429

Complicated physical processes or devices are descriptively explained in a presentation including experiments. All effects that are not part of our everyday knowledge are demonstrated with the help of experiments. The audience is motivated to reproduce the steps during the development of a complex device in their minds. Many examples from everyday life result in the audience not perceiving physics as a dry, formula-heavy science, but as something living, important and useful.

The usual separation between 'design' and 'function' is not used when explaining a complicated device. Instead, it is explained 'from the inside out'. This method can be used to explain even very complex matters in a descriptive and entertaining way.



9.10 – GERMANY

TITLE: SCIENCE IN PRIMARY SCHOOLS

Name: Carina Peschek
Institution: Staatliches Studienseminar für das Lehramt an Grund- und Hauptschulen, Kaiserslautern
Stand No.: 424

Looking at science in primary education and its different aspects, you can see a significant focus on the topic of living nature. There is a tendency among teachers to focus on the so-called soft science of biology because teachers have to teach science without having studied it at university. The aim of the project 'Science in primary schools' is to strengthen the topic of inanimate nature, especially in respect of chemistry and physics.

9.11 – GERMANY

TITLE: SMALL, SMALLER, TINY – INTRODUCING NANOTECHNOLOGY

Name: Petra Wlotzka, Patrick Woldt
Institution: Gesamtschule Eilpe
Stand No.: 435

The lecture series will make the pupils familiar with the fundamental terms of nanotechnology.

They will be able to apply the knowledge on nanotechnical products. In a virtual enterprise the pupils will act as trainees for a nanotechnology expert. Seven different training stations will simulate a basic educational programme in nanotechnology. After the basic programme, the pupils will visit different departments of the virtual enterprise. These departments represent different areas of nanotechnology. Here the pupils can theoretically and experimentally examine the effects of nanoproducts. Different degrees of complexity can be chosen by the pupils to match their level of experience.

9.12 – GERMANY

TITLE: THE LIGHT AT THE END OF THE TUNNEL

Name: Dieter Legl
Institution: Paul-Pfinzing-Gymnasium, Hersbruck
Stand No.: 432

"The only conceivable way of unveiling a black box, is to play with it" (René Thom). People who do not know much about what happens inside their body should think of it as a black box. Regarding the human digestion, this means knowing what goes in and what comes out. Luckily, our students do not seem to be content with the final product and – in contrast to Germany's former Chancellor Helmut Kohl – they want to know exactly what happens in between. Our play *The Light at the End of the Tunnel* shows the hidden processes inside the human body in both a funny and comprehensible way.

10.1 – GREECE

TITLE: CELL MEMBRANE: SIMULATION OF THE FLUID MOSAIC MODEL

Name: Antonios Archontoulis
Institution: Laboratory Center of Physical Sciences of Samos
Stand No.: 125

This project is a simulation of the cell membrane (fluid mosaic) using simple materials. The present model is hydrostatic and shows a portion of the cell membrane.

We use empty plastic bottles to represent phospholipids. The bottles contain ballast (e.g. shot). A few bottles float on oil and a few bottles balance on a separating water and oil surface.

The bottles create the image of the phospholipids bilayer. Larger bottles with suitable free ballast represent proteins. The floating bottles can move sideways (this is a property of phospholipids and proteins of the cell membrane). A special construction of phospholipids can indicate flip-flop, another property of phospholipids.

10.2 – GREECE

TITLE: AN 'EXPERIENTIAL FLIGHT' INTO THE WORLD OF GASES: MACROSCOPIC AS WELL AS MICROSCOPIC

Name: Ioannis Gatsios, Andreas Patsis
Institution: Laboratory Center of Physical Sciences of Neas Smyrnis
Stand No.: 120

With this project on gases we intend to present in a solid, brief way the historical evolution of human knowledge and science in the field of thermodynamics.

We start with the Aeolus sphere of Heron of Alexandria in 50 BC. It shows fire turning water into steam and causing the Aeolus sphere to rotate, thus making a thermodynamic machine for the first time in human history.

1,800 years later James Watt and others made more advanced steam engines, launching the industrial era. Since then thermodynamics has advanced rapidly and changed the fate of humanity.

In order to make the learning process attractive, interesting and relevant for students at all three levels of education in the field of thermodynamics, we have chosen the didactic path from phenomena to ideas and then to theories.

We have constructed equipment using simple materials to make the properties of gas much easier to understand.

10.3 – GREECE

TITLE: FROM RAINBOWS TO THE CHEMISTRY OF COLOURS

Name: Elias Kalogirou
Institution: Laboratory Center of Physical Sciences of Ileias
Stand No.: 121

The project consists of two parts. The first part considers the construction of the apparatus and the experiments required to explain the phenomenon of the rainbow. It starts by analysing white light passing through a prismatic and then a cylindrical mass of water. This is followed by a demonstration of the paths followed by green and red laser beams through the same medium. Finally, two models demonstrate the passage of sunlight through a drop of water and a rainbow.

The second part demonstrates an interdisciplinary approach to physics, chemistry and biology. Remaining true to the programme title, 'Science teaching: winning hearts and minds', we chose this work as it serves the concept of beauty (winning hearts) and favours supervision in teaching (winning minds). We also sought to construct the apparatus using simple items found in everyday life or school laboratories.

10.4 – GREECE

TITLE: FUNCTIONAL MODEL OF A 'GREEN' HOME

Name: Serafeim Spanos
Institution: Laboratory Center of Physical Sciences of Magnisias
Stand No.: 129

The model can be copied by anyone to demonstrate the benefits of heat insulation, effective use of electric energy at home, and energy input from renewable sources. The students are instructed to alter specific system parameters, record the response and draw conclusions with the help of a supervisor.

To simulate the sun and wind respectively, the model includes a halogen heater and a fan with variable operating intensities. The students can simulate the effect of cloudiness on solar panel output energy, the effect of solar azimuth variation (hour of day) on output energy, and the effect of solar radiation intensity variation (season of year) on output. They can also simulate the effect of wind intensity on wind generator output energy and the thermal insulation of a building. Finally, a digital thermometer shows that ordinary lamps act more as heat producers than light emitters.

10.5 – GREECE

TITLE: PLANNING A TRIP TO MARS

Name: Theodoros Pierratos
Institution: 2nd General Lyceum of Ehedorou Thessalonikis
Stand No.: 128

The following proposal is in fact an educational scenario which utilises a modern and extremely interesting issue for students, namely space exploration, to present some impressive natural phenomena through hands-on activities that use everyday materials and toys. The students are asked to perform 12 interactive experiments under three conceptual umbrellas: a) the dangers that lie outside the Earth's atmosphere; b) planning a route to Mars; and c) living on the surface of Mars. The aim of this scenario is to actively engage students in a science project, and to teach them that science is involved in any activity, game or everyday object. By first capturing the students' hearts, the ambition is to light the way that leads to scientific discovery and creativity.

10.6 – GREECE

TITLE: PLASTIC BOTTLES – FROM CIRCULAR MOTION TO OSCILLATING AND WAVE MOTION

Name: Karounias Dionysios, Malapanis Antonis, Triadopoulos George, Boufeas Alexander
Institution: 6th General Lyceum of Kalamata
Stand No.: 122

The negative effect of plastics on the environment prompted students aged 13-15 to tackle the subject, focusing on drink bottles. The project, presented as a PowerPoint, uses the following model:

A. A tennis ball attached to a car wheel trim is set in circular motion manually (demonstrates circular motion).

B. A second tennis ball that can glide in a fixed straight rod is connected to the first via a metallic arm. The circular motion is converted to oscillating motion (demonstrates oscillation).

C. 70 bottles are attached in pairs to a 2.5 m line, which is hung from ceiling to floor. Along each side of the model the bottles are interconnected. Via a second metallic arm connected to one of the bottles, the disturbance caused by spinning the wheel trim is transmitted from the connected bottle to the rest of the bottles (demonstrates a mechanical wave transmitted along an elastic medium).

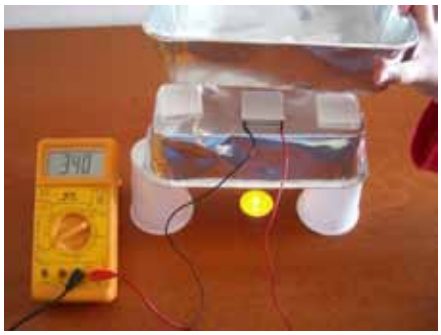
10.7 – GREECE

TITLE: LOOKING AT THE WORLD THROUGH CD SPECTROSCOPY FOR YOUNG AND OLD, EXPERTS AND NOVICES

Name: Panteleimon Bazanos
Institution: General Lyceum of Filiatra
Stand No.: 119

This work firstly proposes a method for introducing young students to spectroscopy and spectroscopic analysis, and secondly presents a simple construction which, in combination with a simple method, allows the students to perform spectroscopic measurements with an accuracy comparable to a traditional laboratory spectrophotometer. Both strands of work are based on the diffraction of light through optical disks (CDs, DVDs), allowing analysis to be carried out and conclusions drawn.

Using simple materials, students from kindergarten to lower high-school classes are able to come into initial contact with the interaction of light with matter and learn about spectroscopy and its usefulness in our lives. Upper high-school students and university students can perform spectroscopic measurements using a spectrophotometer made from materials of zero value.



10.8 – GREECE

TITLE: STRUCTURE OF SIMULTANEOUS LINEAR MOTIONS WITH PULLEYS ON A HORIZONTAL LABORATORY BENCH

Name: Antonios Archontoulis
Institution: Laboratory Center of Physical Sciences of Samos
Stand No.: 123

This paper presents a device which can achieve simultaneous horizontal movement of two or more mobile objects on a laboratory bench. It is useful for observing and studying linear motions in any laboratory. It uses a system of pulleys connected by thin strings and suitable weights attached to the ends of strings.

The structure uses:

- Six stationary pulleys
- A mobile pulley
- Strings for links
- Four equal weights

The operation of the device is based on the properties of mobile and stationary pulleys.

10.9 – GREECE

TITLE: THE CONCEPT OF THE MACHINE

Name: Georgios Pantazis
Institution: Musical Lyceum of Lamia
Stand No.: 127

The theme of our work is 'The concept of the machine: conversion, degradation and conservation of energy using a small heat engine, a generator and a consumer'.

For this work we constructed a machine demonstrating all the energy conversions that take place to produce the electrical energy we use in our daily lives. In particular, it converts the chemical energy of hydrocarbon into thermal, mechanical, electrical and, finally, light energy.

Our main objective is to use our machine and new technologies to create a teaching environment that stimulates the interest of our students in the concepts and phenomena of physics, gives them a thirst for knowledge, and causes them to reflect on contemporary problems in society.

We have also created some presentations on the concept of the machine and devised an experimental procedure to measure its performance.

10.10 – GREECE

TITLE: THE PUZZLE EXPERIMENT

Name: Anastasios Nezis
Institution: 1st General Lyceum of Salamina
Stand No.: 126

The Puzzle Experiment consists of nine different experiments involving electric current (electricity and electromagnetism) that can be presented individually or as a whole. This is possible because of the puzzle-like design of the bases and cables, which connect all the experiments (in parallel). The experiments relate to solenoids, compasses, magnets, motors and generators, resistances, variable resistances, lamps and electrolysis glasses. They show the basic uses of electric current in a presentation lasting 3-5 minutes.

http://www.youtube.com/watch?v=6V0TLcDagsg
http://www.youtube.com/tasosne

10.11 – GREECE

TITLE: UNDERSTANDING THE NECESSITY OF A REFERENCE SYSTEM FOR THE DEFINITION AND STUDY OF BODY MOVEMENT

Name: Antonios Archontoulis
Institution: Laboratory Center of Physical Sciences of Samos
Stand No.: 124

It is important but far from easy for students to understand primary motion concepts like the observer, the reference system, position and displacement. This project proposes laboratory supplies, tools and methods for investigating the root concepts of motion and how to use them.

1. The students can understand what the reference system is (using auto-reset measuring tapes) and measure within the framework of the specific reference system (using the tapes).
2. With the help of a doll with a built-in webcam linked to a computer, the students become observers who can be either on the laboratory bench or on the lab cart monitoring the sight of the doll through the webcam.
3. With the help of live video (in both observed cases), the students can see and measure the positions and displacements of moving objects on the lab bench.
4. Finally, the students can conclude whether a body is moving or not.

11.1 – HUNGARY

TITLE: EXPERIMENTS AND DEMONSTRATIONS ILLUSTRATING THE EFFECTS OF RAPID COMBUSTION AS INFLUENCED BY COMBUSTION TEMPERATURE

Name: Endre Szórád
Institution: Bolyai Secondary Grammar School and Dormitory, Zenta
Stand No.: 263

Combustion is one of the most important chemical interactions. It involves oxidation and, due to a change in temperature, it is an exothermic process.

My project specifically concerns rapid combustion. As the term suggests, rapid combustion is a quick reaction in which light and heat are released. It has three preconditions: flammable material, the presence of oxygen, and combustion temperature. This last precondition is often forgotten and goes unmentioned in chemistry classes in schools. In a few simple and quick demonstration experiments it can be shown that without the presence of combustion temperature, rapid combustion cannot occur.

12.2 – HUNGARY

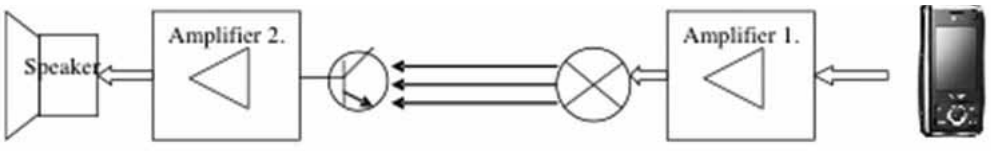
TITLE: VISIBLE SOUND, AUDIBLE LIGHT

Name: Miklós Jendrék
Institution: George Boronkay Technical Secondary School, Vác
Stand No.: 259

The experimental demonstration consists of two parts. In the first part, the light emitted by different light sources is converted into sound. In the second part, sound is transformed into light and then back to sound. All this requires is a sound source (MP3 player or mobile phone), two amplifiers, a light sensor and different light sources. The apparatus set-up is shown in the figure.

The following experiments will be presented:

- Light from different sources converted into sound: light bulbs, remote controls, displays, monitors, etc.
- Information transmission of modulated light (using bulbs, LED, infrared LED)
- Reflection of infrared waves (specular reflection and total internal reflection)
- Focusing infrared rays using a lens
- Information transmission using a low-frequency electromagnetic field



11.3 – HUNGARY

TITLE: ACTING AS GOOD PRACTICE IN TEACHING SCIENCE – PHYSICS AS AN EXAMPLE

Name: Dr Éva Kirsch
Institution: Secondary School of Lajos Kossuth University, Debrecen
Stand No.: 265

Our 11 years of dramatising the history of physics show that drama has an important role even in teaching science subjects. In our projects students act out authentic or fictional scenes from the history of physics, and in doing so they also conduct experiments.

This method has three very important benefits. Firstly, learning lines and carrying out experiments expands the students' scientific knowledge in a direct, experiential way. Secondly, as laws and phenomena are typical of a given era, the scientists who are portrayed and their role in the history of science are better imprinted. Finally, the most important long-term effect is the positive reshaping of the students' attitude towards science. This activity offers participants the chance to get involved as much as possible in creating, rehearsing and performing such a play.

11.4 – HUNGARY

TITLE: ALICE IN CHEMISTRYLAND

Name: Dr Beáta Jarosievitz
Institution: SEK Budapest International School, Budapest
Stand No.: 264

This study explores the relationship between science, performance and audience in a production of *Alice in Chemistryland*, based on the *Alice in Wonderland* movie by Tim Burton. The play was written and the stage designed by the students.

The play, which takes the audience into the charming world of Chemistryland with its strange and sometimes funny characters, is proof that science can be entertaining. One experiment shows an eruption of oxygen-filled foam, which is compared to the classic volcano experiment where carbon dioxide is released. And when the little golden key unlocks the door leading into the garden, we enter the fascinating world of pyrotechnics. The bright flower-beds and cool fountains are simulated with fantastic chemical reactions. Part of the performance can be seen here:

http://videa.hu/videok/tudomany-technika/alice-RwIroyV7cczIo68L

11.5 – HUNGARY

TITLE: AGES AND SCIENTISTS

Name: Dr Zsuzsanna Farkas
Institution: Department of General and Environmental Physics, University of Szeged
Stand No.: 260

Our plan is to present an interactive lecture, in which the scientists are seen in their contemporary costume. They represent each milestone of classical physics in a way that normal physics lessons can't because of time shortage. The 'strict laws' are packed into everyday events, and the historical background is also told. Archimedes, Galilei and Newton can be asked questions about their lives and thoughts about modern days.

For example:

- Archimedes will speak about his law
- Galilei will invite us to look into the now more than 400 years of binoculars
- Newton will demonstrate the impurity of white light with a prism and the connection between an apple and gravity

The greatest strength is that the whole show is mobile. In the spare time the scientists will be 'released' to entertain the crowd.

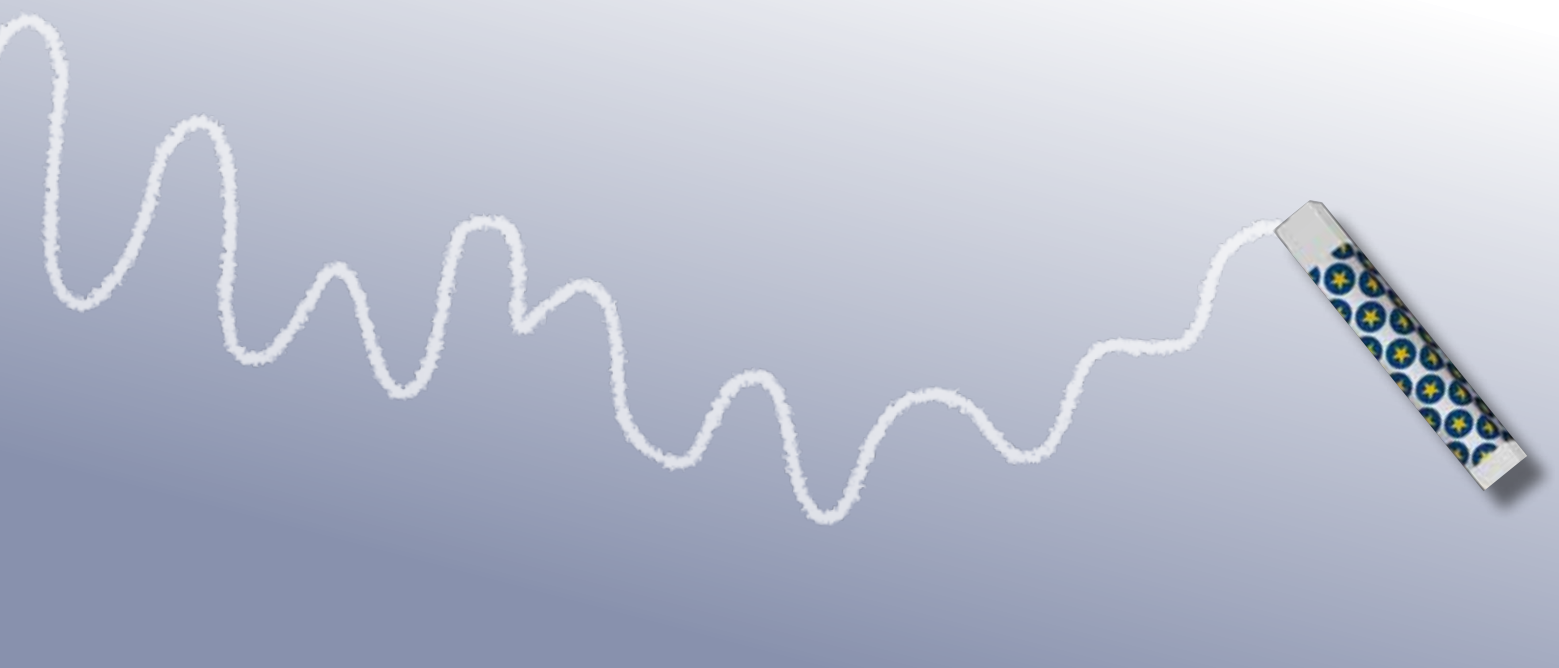
11.6 – HUNGARY

TITLE: PHYSICS LESSON WITH THE NINTENDO WIIMOTE CONTROLLER

Name: Dr Károly Piláth
Institution: Ágoston Trefort Secondary School, Budapest
Stand No.: 261

In addition to my physics teaching degree, I also have an IT teaching degree, and I have come to realise how much today's multimedia computers can be used in teaching physics. Not primarily for simulations, but for real measurements. Today's market has a huge variety of measuring tools, but my measurements are based on already built-in computer accessories with no expensive additional interface needed, only a cheap Wiimote Controller.

I have developed user-friendly programs which can be used without any special IT knowledge to measure a variety of physical quantities. I will be presenting a few of these at Science on Stage. These include position vs time graphs, measuring the acceleration of harmonic vibration with a Nintendo game controller, measuring temperature using a sound card, and even projecting a huge rainbow via a tiny gap drawn in PowerPoint using a CD as a dispersion element.



11.7 – HUNGARY

TITLE: SURVIVOR – HOW CHEMISTRY AND PHYSICS HELP SURVIVAL

Name: Dr Zoltán Murányi, Dr József Vida
Institution: Károly Eszterházy College, Eger
Stand No.: 266

Our experiment show could best be considered as a dual attraction performed by us as a pair. Our aim is to illustrate how sciences – chemistry and physics – could be applied to assist in staying alive on a deserted island after a shipwreck. By making the best use of articles fortuitously carried ashore by the waves as well as items found on the island we attempt to make our situation a bit more tolerable.

The experiments conducted include:

- How to make fire using different methods of chemistry and physics
- How to generate electricity using the fauna of the island
- How to make life on the island more comfortable
- Ideas on how to cry for help
- How to obtain food, hunt and protect ourselves against the native islanders
- The escape from the island. We survived and we are saved!

11.8 – HUNGARY

TITLE: CANNOT LIVE WITHOUT EXPERIMENTS

Name: Zoltán Sebestyén
Institution: Retired secondary-school physics teacher
Stand No.: 262

My major aim has been to devise spectacular experiments which can be easily created and simply reproduced. The aim of my experiments is to demonstrate and make visible the invisible! The experiments are the following:

- Dry-ice experiments:
  - Diffusion cloud-chamber
  - 'Screaming' dry-ice
  - Air-cushion dry-ice
  - Dry-ice detonation
  - Dry-ice Stirling engine
- Demonstration of air pressure with wallboard and newspaper
- Glass as a conductor – with a burnt-out bulb
- A 100 euro experiment – or the broomsticks 'hating' each other
- Magnet repelling iron?
- Energy paradox slope where the balls roll upwards
- Air balloon gun in different versions
- Demonstration of weightlessness and the change in weight of objects using a digital balance
- Water circulation in nature – an aquarium demonstration
- Human-powered LED operation

12.1 – IRELAND

TITLE: AN INQUIRY-BASED APPROACH TO TEACHING SCIENCE

Name: Eilish McLoughlin
Institution: CASTeL, Dublin City University
Stand No.: 111

Inquiry-based teaching is an organised, intentional effort by a teacher to engage students in inquiry-based learning. The goal is not only to transfer scientific knowledge, facts, definitions and concepts, but to enhance students' ability to reason and become independent learners capable of identifying main questions and finding relevant answers by a gradual acquisition and expansion of scientific knowledge and abilities. A range of inquiry activities correspond to the degree of teacher guidance and student independence involved. This project is based on FP7 ESTABLISH, which defines inquiry as "the intentional process of diagnosing problems, critiquing experiments, and distinguishing alternatives, planning investigations, researching conjectures, searching for information, constructing models, debating with peers, and forming coherent arguments".

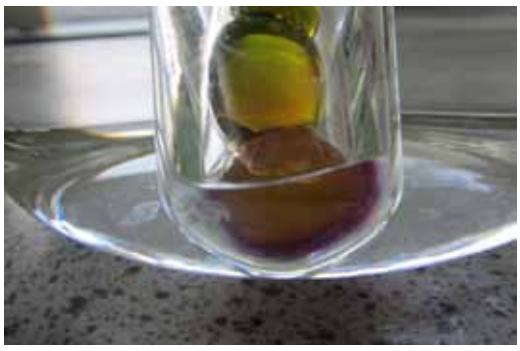
12.2 – IRELAND

TITLE: COLOURFUL SCIENCE – INTRODUCING AQUA BEADS

Name: Catherine Tattersall
Institution: Sutton Park School
Stand No.: 108

Aqua beads are hydroponic gel beads that can absorb up to 150 times their volume in water. Chlorella algae can be grown on their surfaces and then used in photosynthesis experiments using CO_2 or O_2 sensors linked to a PC or a datalogger. Put aqua beads in lengths of visking tubing and they can simulate red blood cells and diffusion in tissues. Aqua beads soaked in universal indicator solution allow pH experiments to be conducted. As the beads are very elastic, they can be used to measure the coefficient of restitution. The beads can also be used to demonstrate via colourful charts how the cones on the retina work and to demonstrate the conditions affecting the rising of bread dough.



12.3 – IRELAND

TITLE: GARDEN PARTY CHEMISTRY

Name: Michelle Dunne
Institution: St. Joseph's College Presentation Convent, Lucan, Co. Dublin
Stand No.: 109

Take chemistry outside for a garden party. Whether it's making 'Lemmoleade' using the molar mass of glucose, citric acid and water, or 'Making Molecules' special-edition keyrings using Fimo, wire and glue to model different shapes, e.g. linear, V-shaped, trigonal planar, etc. Engage students in a 'Molar Mass Treasure Hunt' or in 'Chro 'mole' atogrphy' – chromatography with cartoon moles drawn in permanent ink on clothes coloured in with water-soluble markers.

Other fun garden-based science activities include comparing the density of the wood from different tree types; making a microscope with a drop of water carefully positioned on a piece of sellotape based on the scientific contributions of Anton Van Leueenhoek; comparing reaction rates using vitamin C tablets in canisters or rhubarb plants; and carrying out molecular madness by boiling plastic yoghurt pots and heating elastic bands.

12.4 – IRELAND

TITLE: SCIENCE DIFFERENTIATION IN ACTION

Name: Paul Nugent[1] and David Keenahan[2]
Institution: [1]Santa Sabina, Dominican College, Sutton, Dublin 13, [2]Gonzaga College, Sandford Road, Ranelagh
Stand No.: 107

Early in 2009 the Irish Institute of Physics and the Special Education Support Service collaborated to design workshops for second-level teachers to promote the concept of differentiation in science teaching. This project shares the experiences gained. The idea of accessible experiments was a central concept in designing these workshops. There is also strong evidence to suggest that learning and teaching strategies which include consideration of pupils with special educational needs benefit all pupils. In summary, differentiation is not just about facilitating different curriculum content, learning styles and student work, but, more importantly, about valuing each student by establishing a classroom and school environment where everybody belongs. A selection of teaching ideas and activities suitable for differentiation in science teaching will be shared at the Science on Stage Festival.

12.5 – IRELAND

TITLE: SHARING SCIENCE TEACHING IDEAS

Name: Stephanie Holden
Institution: Intermediate School Killorglin, Co. Kerry
Stand No.: 110

A selection of demonstrations and teaching ideas for teaching science at lower-secondary level will be presented, mainly in the areas of chemistry and biology. These will include models and displays of concepts such as the opening and closing of stomata on a leaf and the working of an antagonistic pair of muscles. Through the collaborative efforts of a group of Irish biology teachers, a CD presenting a variety of teaching strategies for teaching topics within biology, e.g. Mendelian inheritance, capture-recapture technique, etc., taking note of Multiple Intelligences of students has been developed. Innovative teaching ideas from these activities will be shared at this festival.

13.1 – ITALY

TITLE: A COMPACT COSMIC RAY TELESCOPE FOR OUTREACH ACTIVITIES

Name: Adriano De Giovanni
Institution: LNGS (Gran Sasso National Laboratory) – Assergi (L'Aquila)
Stand No.: 339

The Compact Cosmic Ray Telescope is a portable tracking system for penetrating particles (i.e. muons) mainly produced through the interactions between cosmic rays and the atmosphere. The aim of this apparatus, which we will use in schools and scientific outreach events, is to introduce people to the world of subnuclear particles in which we are living in a very direct and simple way.

13.2 – ITALY

TITLE: ACCOMPAGNA – (ACELERATION COMPASS GEO NAVIGATOR)

Name: Marco Nicolini
Institution: Liceo Scientifico Tassoni – Modena
Stand No.: 338

ACCOMPAGNA (ACceleration COMPAss Geo NAvigator) is the hardware/software core of TASSONI (Tiny Atmospheric Solitary Space Observatory with Naïf Instrumentation).

ACCOMPAGNA comprises an ATMEL microcontroller, an integrated radio modem, a three-axis acceleration sensor and a three-axis magnetic field sensor. The acquired data are read and processed by a C++ program firmware resident, modifiable, validated as usable at modifiable frequency, and sent to the radio modem for transmission at a programmable frequency.

An ordinary radio receiver receives the radio signal through a jack-cable carried from the radio analog out to the laptop audio board in. Using well-known amateur radio software the signal is then interpreted as data ready for processing.

The hardware/software core can be used to measure accelerations and magnetic field. The hardware, software and mechanical part can be further developed.

13.3 – ITALY

TITLE: FROM SOIL TO PHOTOSYNTHESIS

Name: Angela Cane
Institution: Primary School I.Calvino – Moncalieri (Torino)
Stand No.: 322

Primary-school pupils learn from observing natural phenomena which can occur in everyday life or in a controlled laboratory situation. They are the protagonists in the learning, with the teacher acting as a 'trainer'.

The aim of the course is to get pupils to test and understand how plants get nourishment through their roots, branches and leaves. This is done by observing phenomena in the classroom and through activities in high-school laboratories using peer education.

Observation, description and comparison help the pupils to develop sensory, logical and linguistic abilities. The manipulation also helps them to discover the operating properties, which can provide more complex information. Indeed, it is no longer sufficient to simply describe what is observed, but rather it is important to try to find reports, links and spatial and temporal sequences, explanations of events and processes.

13.4 – ITALY

TITLE: GENETIC TRANSMISSION OF INHERITABLE CHARACTERS AND BIOTECHNOLOGY

Name: Letizia Vittorelli, Felicia Cutrono
Institution: Associazione Natura Vivente, I.I.S. Don G. Colletto, Corleone (Palermo)
Stand No.: 323

Our project concerns a lab course examining genetic topics and biotech applications in agriculture, medicine and forensic analysis. In the first part of the course the students analysed transmission of genetic characters and the role of chromosomes in the process. They observed cell division and meiosis under the microscope and used models to reproduce chromosome behaviour and learn how chromosomal aberrations are produced. Again with molecular models they analysed DNA structure, DNA replication, mRNA and protein synthesis.

In the second part they learned to extract DNA from bacterial cultures and from their own spittle. They carried out electrophoretic separation of bacterial DNA and observed plasmids in antibiotic-resistant bacterial DNA. They learned about restriction enzyme technology and recombinant DNA. Finally, they conducted an experiment simulating DNA fingerprinting analysis.

13.5 – ITALY

TITLE: ROBOT@MICO

Name: Maria Grazia Gallo
Institution: I.I.S. A. Maserati – Voghera (Pavia)
Stand No.: 328

The project was carried out in the 3rd grade of the A. Maserati Higher Education Institute in Voghera (Pavia, Italy). It was coordinated by Maria Grazia Gallo, teacher of computer and automated systems, in collaboration with Francesco Faccinetti, technical teacher of computer and automated systems, and Franco Cavallaro, owner of the company Elca System.

The robot@mico project has been under development in the school since 2004-2005. It has evolved over time in terms of both the physical devices used and the classes involved.

In 2009-2010 the students built and programmed robots that could play football using the LEGO® MINDSTORMS® teaching kit and the C programming language. Four robots were built, two strikers and two goalkeepers, with different software.

13.6 – ITALY

TITLE: SCIENCE BOX: FORCE–MOVEMENT–ENERGY

Name: Sybille Hasler, Monica Zanella
Institution: Bolzano – South Tyrol
Stand No.: 321

Science box: force–movement–energy connects language and natural science. Targeting children in kindergarten, but also parents and educators, the project aims to describe everyday physical phenomena such as force, movement and energy using stories, non-fiction and picture books.

Two dolls, Marie and Albert, are used in the experiments to help the children think about the meaning of movement and its connection with everyday actions like walking, driving a car or riding a bike. The dolls also help them to develop their conversation skills, think about natural phenomena, ask questions and seek answers. Moreover, the children are encouraged to take home their favourite experiments to show their expertise to their families.

Adults (skilled professionals and parents) can get a quick, precise overview of the topic by reading the booklets included, which give teaching and scientific information.

13.7 – ITALY

TITLE: SCIENCE GAME

Name: Gabriella Salerno
Institution: ITC Cattaneo – San Miniato (Pisa)
Stand No.: 340

Science Game is a cognitive model for the study of complex phenomena. Students are involved by the teacher in stimulating activity, channelling their energies into learning in an ever more complete and exhaustive way to keep their interest high. Everything has a structured context without neglecting scientific discipline.

The educational outcome is a greater ability to apply knowledge acquired in the process of problem-solving. In addition, the game turns out to be an opportunity for peer-to-peer learning, where the content transmission takes place horizontally with the teacher acting as facilitator. The sharing of common rules within the class group also has positive effects on group cohesion, which in turn has a positive effect outside the school, generating teaching and educational value on a broad scale.

13.8 – ITALY

TITLE: SOLAR TOWER

Name: Dario Barca
Institution: IIS Erasmo da Rotterdam – Nichelino (Torino)
Stand No.: 341

The solar tower technology is a modern method of renewable energy production. The physical principle underpinning the solar tower is energy conversion, specifically the conversion of solar radiation into the kinetic energy of air molecules beneath a bell-glass. The air flow produced is subsequently used to drive eolic turbines placed inside the tower. This system of energy production is often called 'induced eolic'. The project involved the design, construction and study of a solar tower in a collaboration between an Italian high school, the Fiat Research Centre (CRF) and the University of Udine.

13.9 – ITALY

TITLE: SPACE...EFFECTS – WEIGHTLESSNESS EXPERIMENTS

Name: Giovanni Pezzi
Institution: Palestra della Scienza del Comune di Faenza
Stand No.: 324

Gravity, force, weight, freefall, etc. are normally studied in physics classes. The state of weightlessness is investigated by observing video clips of astronauts floating freely inside the International Space Station (ESA video clip) or the space shuttle.

The absence of weight is sometimes misunderstood as the absence of gravity, it being assumed that there is no force of gravity in the space where the International Space Station is orbiting.

The equipment presented here has been created in order to give an 'environment' in which to perform experiments under similar conditions to those of the International Space Station, but in a shorter period of time. At the same time, this provides an opportunity to explain difficult concepts in a simple, concrete way.

13.10 – ITALY

TITLE: STUDYING CHEMISTRY WITH PLINY THE ELDER

Name: Gianluca Farusi
Institution: ITIS Galilei, Avenza-Carrara (Massa)
Stand No.: 327

2011 is the International Year of Chemistry. This work aims to celebrate the subject, highlighting its interdisciplinary cultural and educational value. The project works through some doubts and statements of Pliny the Elder, each lesson starting with a passage from the *Naturalis Historia*. Step by step, the interplay between teacher and students produces a tree structure set of demonstrations with the purpose of building a concept map whose target is to achieve the first-year chemistry course goals. The passage is discussed in the classroom, then the same natural event referred to by the author, or something similar, is adapted to the lab.

As they are led by Pliny, the students are in the same pre-scientific state, which produces strong motivation. For example, making Telinum, the perfume of Julius Caesar, is a great way to make even the laziest student curious about separation methods.

13.11 – ITALY

TITLE: THE TESLA TURBINE

Name: Regina Stocco
Institution: IPSIA Galilei – Castelfranco Veneto (Treviso)
Stand No.: 325

The Tesla turbine is technologically unique: it is a bladeless turbine that exploits the properties of the boundary layer of a fluid. Two models tested in 1909 did not give the hoped-for results, but if they had been constructed using the materials and technologies available today, the story might have been different.

For one year our project has involved students and teachers from four schools in the province of Treviso. The turbine was designed by the CAD-CAM system using INVENTOR software. The construction details were divided among several classes from two schools. A small prototype and three turbines were assembled, then tested by applying them to an irrigation system that uses a 'big' reel to recover the hose.

Further studies and insights will serve to incorporate the turbine into a cogeneration system and to measure its performance using the electronic system PAC CompactRIO.

13.12 – ITALY

TITLE: WHY DOES THIS HAPPEN?

Name: Cristina Duranti
Institution: IITGA Santoni – Pisa
Stand No.: 326

Electrochemical phenomena are usually presented to pupils from primary school upwards. But most young people struggle to apply theoretical principles of electrochemistry to specific situations. In particular, understanding of standard reduction potentials is a serious cognitive obstacle even for undergraduates. This work aims to improve observational and deductive reasoning skills.

This proposal comprises a series of experiments with electrolysis in aqueous solution. The pupils internalize the concept of standard potential and use it to predict which particular reaction will occur. Changing one experimental variable at a time, the pupils are led to solve ever more complex problems. The pupils observe, describe, try to formulate explanations, and enter into discussion with classmates to compare different solutions and reach a shared explanation of empirical results.

14.1 – NORWAY

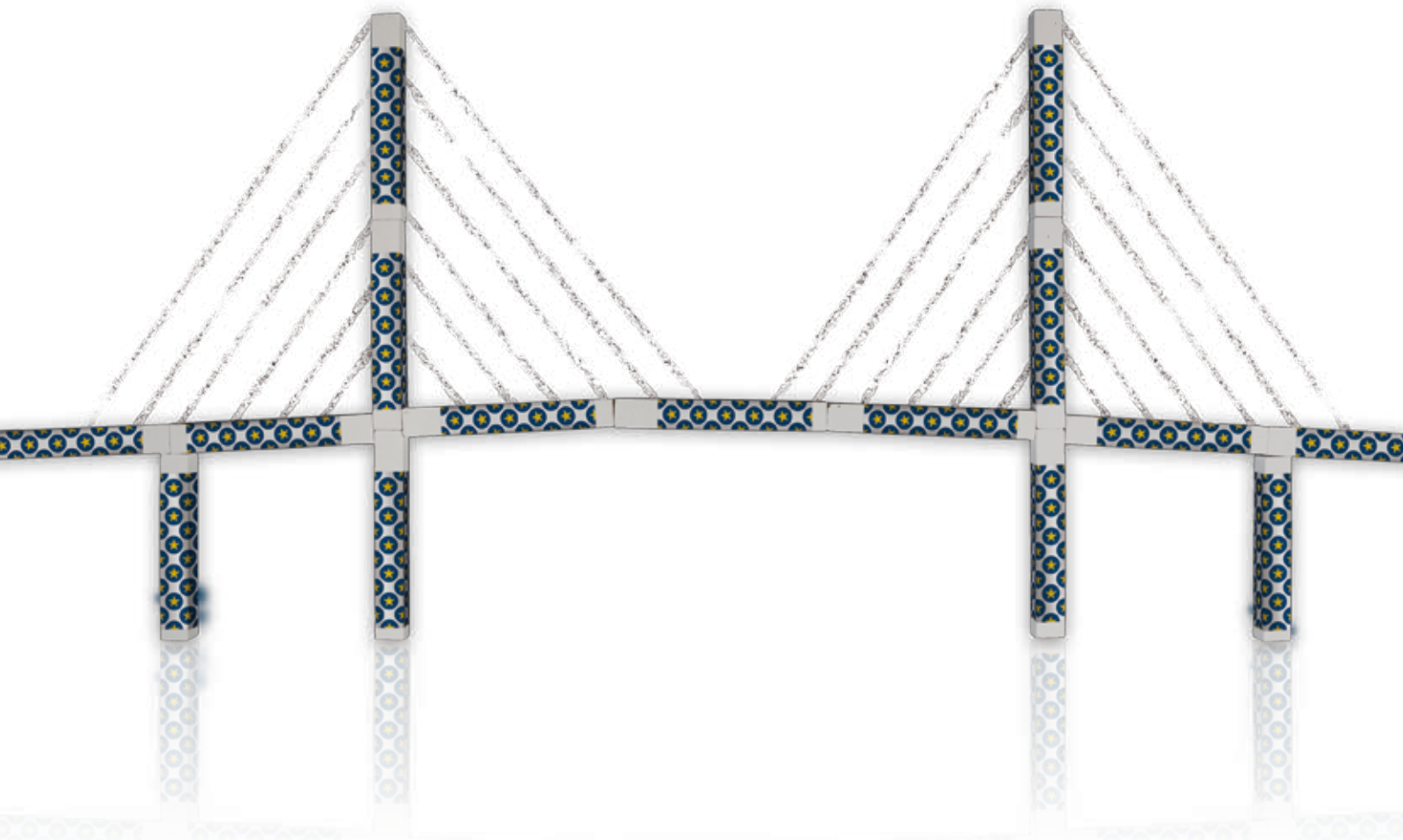
TITLE: ETHE ENERGY-NETWORK PROJECT

Name: Siri Krogh
Institution: Melvold u. skole
Stand No.: 151

The energy network project in Norway seeks to educate students about energy and bring together their ideas on careful use of energy and how we can have a sustainable future. Many schools are participating, and I would like to share our work at SOS.

This not only requires us to look at Norway's and the world's energy needs, but also different aspects of energy, and particularly sustainable energy. The participating schools in Norway work together and share ideas to teach students about this in the best possible way.

We have made models of different ways of using natural resources to provide energy. As an example, we have made and raced solar-powered cars with our students, and I will bring these cars along to the festival. I will also have a display of pictures of our work with the students and the work carried out between teachers.



15.1 – POLAND

TITLE: NEW TECHNOLOGIES IN SCIENCE TEACHING

Name: Maria Dobkowska
Institution: Roul Wallenberg High School No 32 – Warsaw
Stand No.: 244

Main task: effective science teaching with ICT. We will present several examples of lessons using filmed experiments, animations, interactive simulations, interactive exercises and movies shot with an infrared camera.

As an element of classroom practice, we propose an educational use of technology-enhanced learning, particularly if traditional methods and tools for teaching science subjects are ineffective and are not helping students to overcome educational barriers.

Participants in our workshop will find answers to why when and how ICT tools should be used in science education.

15.2 – POLAND

TITLE: HOW TO BREAK A MOBILE PHONE

Name: Dominika Domaciuk
Institution: Unia Lubelska III High School – Lublin
Stand No.: 247

Sometimes pupils do not respect the rule to not use mobile phones in lessons. If we notice this, we can carry out an entertaining and informative experiment. All we need is a mobile phone, some thread, a pencil and a box of matches. We begin by choosing an expensive or stylish model of phone. Having chosen one, we wrap the thread of about 1.3 m long around it. Next, we hold the thread and the mobile horizontally and place the pencil below the thread in the middle between one hand and the mobile. We let the mobile dangle freely about 70 cm above the ground. What would happen if we let go of the thread? The mobile, of course, would hit the floor. But what can we do to prevent it from breaking?

15.3 – POLAND

TITLE: POSTERS OF HEVELIUS

Name: Cezary Filipiuk
Institution: High School – Pszczyna
Stand No.: 241

In 2011 we celebrate the 400th anniversary of the birth of Johannes Hevelius. In order to mark the occasion, we prepared the exhibition ‘Hevelius and the Times He Lived in’, which presents four posters and two replicas of famous experiments:

- Galileo and Spheres in the Leaning Tower of Pisa
- Pascal’s Barrel

15.4 – POLAND

TITLE: FROM JUNIOR HIGH SCHOOL TO UNIVERSITY

Name: Urszula Grabowska
Institution: Stanisław Kielich Gymnasium
Stand No.: 245

We are going to present our project 'From junior high school to university'. We will be using a multimedia presentation, a poster and leaflets.

Within this school project, our students give performances on the subject of science (mainly physics) for the annual School Patron Day. They use texts and images explaining scientific laws, rules and theories. An essential element is presenting the influence of scientific studies on the development of civilization.

Combining science with art – images, music and words – is an integral part of all activities. At the same time, it is a great opportunity for us to improve our skills in using multimedia and other technical devices.

15.5 – POLAND

TITLE: THUNDERSTORM

Name: Jerzy Jarosz
Institution: Institute of Physics, Silesian University – Katowice
Stand No.: 237

The Thunderstorm project introduces some concepts and physical principles related to atmospheric discharges observed in nature. Phenomena associated with lightning strikes are demonstrated and explained using equipment consisting of a two-dimensional model of charged clouds, ground and various objects like trees, buildings, humans and animals.

Basic phenomena that can be demonstrated in the project are:

- Lightning strikes, their random occurrence and complicated paths of electric discharges
- Increased probability of striking high objects like trees, buildings, etc.
- Role of sharp objects like edges and rods in initiating and creating the discharge path
- Lightning conductors and lightning protection systems
- Corona discharges
- Step potentials due to a direct lightning strike

Additionally, this project also presents a model of an electrostatic precipitator using the corona discharge effect.

15.6 – POLAND

TITLE: CHEMICAL EXPERIMENTS PERFORMED IN THE CLASSROOM

Name: Danuta Jesiak
Institution: High School – Oborniki
Stand No.: 239

I would like to present some chemistry experiments which can be performed in the classroom using the Small-Scale Chemistry technique. The main topic will be 'Preparation and properties of gases: oxygen, hydrogen, carbon dioxide'. I will also present the method for creating the solubility chart. This project was developed to help chemistry teachers to safely illustrate simple chemistry concepts in front of the class and with minimal materials.

I am using materials available in day-to-day life which you can buy in any pharmacy or grocery store or find in the kitchen. I will prepare a poster about interesting experiments performed by my students at various science festivals.

15.7 – POLAND

TITLE: DOUBLE RESONANT SOLID STATE TESLA COIL

Name: Robert Malocha
Institution: High School of Electronics and Telecommunication – Olsztyn
Stand No.: 242

The demonstration shows a double resonance solid state Tesla coil (DRSSTC). I present the principles of the DRSSTC and explain the differences between the classic Tesla coil and my model.

During the demonstration I will first describe all the essential elements of the device and then generate sparks half a metre long. The phenomenon is best observed in the dark.

15.8 – POLAND

TITLE: EXPERIMENTS WITH DRY ICE

Name: Aneta Mika
Institution: Stefan Czarnecki High School – Szczecin
Stand No.: 248

The project presents a set of experiments with dry ice. The aim of the experiments is to demonstrate both the process of sublimation itself and the energy processes accompanying phase transition of substances. Moreover, the audience will be able to see other experiments on energy conversion such as a candle pendulum and an underwater vehicle propelled by carbon dioxide.

We will also prepare a set of simple experiments for children. The experiments, from different fields of physics, will include finding the centre of mass of a coin, creating a cloud in a bottle, playing music using pipes as instruments, and constructing a kaleidoscope.

At the poster session, we will present a poster about Science on Stage festivals at Adam Mickiewicz University in Poland.

15.9 – POLAND

TITLE: ARE WE AFRAID OF NUCLEAR POWER PLANTS?

Name: Ewa Pater
Institution: High School - Swinojuscie
Stand No.: 246

'Are we afraid of nuclear power plants?' shows the results of research conducted with my students. I will take a computer with the software and the interface counter GM and present measurements of ionising radiation.

I will print out the poster presenting:

- The location of our experiments
- Ionising radiation results
- Research on the electronic microscope and the results
- Research on the spectroscope
- Results of radiation tests for tobacco from different cigarettes
- Results of radiation tests for percolated air in the basement

I will present another poster depicting the results of a poll of students, parents and grandparents. The questions are interesting and significant. It turns out that we do not sufficiently understand the threat of radiation. I will share some poll patterns.

I would also like to carry out an experiment showing waves in a glass and how sound can break glass.

15.10 – POLAND

TITLE: STUDENT'S CHAIR AT HIGH SCHOOL NO. 1 IN LESZNO

Name: Zbigniew Trzmiel
Institution: I High School – Wielun
Stand No.: 238

Anything that distracts a driver increases the risk of an accident and poses a threat to other road users. You should always be in proper control of your vehicle. We will use a special device, the Reflexometer, to measure the reaction times of drivers who use mobile phones while driving. The device measures two values: reaction time and wheel movement time. The first parameter is essential, but the second is also important because when a dangerous situation occurs on the road, it is crucial to avoid an accident and not just 'touch' the wheel.

This device is also able to show the wheel movement on a computer screen in a chart form.

15.11 – POLAND

TITLE: PHYSICAL PHENOMENA AROUND US

Name: Zenona Stojecka
Institution: I High School – Leszno
Stand No.: 240

An exhibition of the most interesting photos from the last three National Physical & Photographic Contests entitled 'Physical phenomena around us' organised by the Youth Culture Club in Wielun.

Simple experiments to illustrate the transformation of energy.

'Electromagnetic Brake' poster – Research into electromagnetic induction using the Coach system.

Eddy currents are sometimes used to brake very fast trains. This interesting effect can be researched in a simple way in school conditions. What is the motion of the vehicle while braking? Is the braking force constant? How do breaking force and stopping distance relate to train speed? Students can find the answers to all these questions by recording vehicle motion on an air track using an ultrasonic motion detector CMA and Coach software.

15.12 – POLAND

TITLE: CONSTRUCTING A HOME-MADE WATER FLOW SENSOR – MULTIMEDIA PRESENTATION

Name: Joanna Grybos
Institution: The John Paul II Grammar School, Pawlowice
Stand No.: 243

I am going to present the construction of a home-made water flow sensor. This kind of sensor was made by my students. I would like to present the results of the investigations on optical fibre sensors. I will concentrate on the methods which were used to study the basic parameters of optical fibres. Finally, I will present the data for two kinds of optical fibre sensor.

16.1 – ROMANIA

TITLE: COUNTY PROJECT ON TEACHING SCIENCES – TEAM TEACHING PRIMARY SCHOOL TEACHERS WITH SCIENCE TEACHERS IN EACH SCHOOL

Name: Olga Riscau, Veronica Bodocan
Institution: Avram Iancu School, Turda
Stand No.: 236

Group of students from 1st, 3rd and 4th grades.

Materials: old newspapers, water, mixer, two rectangular sieves, polyvinyl acetate.

Procedure: We kept the newspapers in water for 24 hours, then mixed them until we obtained a fine homogenous paste. We added a small amount of water and some polyvinyl acetate in order to bind the composition. The mixture thus obtained was poured through the larger sieve and carefully moulded into a flat rectangular shape. The extra water was allowed to drain away and the remaining mixture dried with paper towels, turned upside down and left on a flat surface for a few days to dry completely. The paper can then be cut into different shapes and painted or decorated with wool.

16.2 – ROMANIA

TITLE: JACOB'S LADDER

Name: Corina Toma, Marza Darius
Institution: Tiberiu Popoviciu Computer Science High School, Cluj-Napoca
Stand No.: 235

Our project demonstrates the spectacular phenomenon of lightning. A 'Jacob's ladder' uses relatively high voltages and currents to produce a V-shaped electric arc which climbs from the bottom to the top of the ladder.

So how does it work? High voltage is needed to 'pierce' the air resistance and initiate an electric arc. The device has two roughly V-shaped electrodes. The electric arc 'climbs' through the top of the electrodes because hot air rises. As the plasma arc ascends, its length increases, thereby increasing its dynamic resistance and thus increasing power consumption and heat. This causes the arc to stretch as it rises and be extinguished on reaching the top of the ladder. At this point, the transformer output momentarily exists in an open circuit state until the breakdown of the air dielectric produces another arc at the base of the ladder and the sequence is repeated.

TITLE: KIRLIAN PHOTOGRAPHY DEVICE

Name: Corina Toma, Marza Darius
Institution: Tiberiu Popoviciu Computer Science High School, Cluj-Napoca
Stand No.: 235

The Kirlian Photography Device reveals the unknown world surrounding any object or living being. We have used the Kirlian technique (electrography, electrophotography or corona discharge photography) to obtain some very interesting photos. The project is interdisciplinary because the Kirlian technique can be used in both the physical and biological worlds.

In 1939 the Russian scientist Semyon Kirlian accidentally discovered that if an object on a photographic plate is connected to a source of voltage, it produces a coloured image on the plate. This discharge, called a corona, appears when there is a high surface charge density at specific points on the object. At these points the accumulated charges interact with the surrounding atmosphere. The type of ionised gas present in the atmosphere determines the colour of the corona.

16.3 – ROMANIA

TITLE: FUNCTIONING MODEL OF URSU LAKE SOVATA

Name: Papp Laszlo
Institution: Ioan Bob School, Cluj-Napoca
Stand No.: 234

The plaster 3D model of Ursu Lake in Sovata is true to the measurements of scientific researchers at the Babes-Bolyai University. A large amount of salt was added to the waterproof basin, and above this an oversaturated salt solution poured in. An additional bottle with a pipette at the end was used to obtain a continuous flow of fresh water over the salty water; the resulting water surplus is removed using a plastic tube just under the water surface. Two thermometers at different depths were used to measure water temperature. The water in the basin was heated with a 500 W spotlight.

This device simulates the heliothermic phenomenon which occurs naturally in salty lakes and is very powerful in Ursu Lake, whereby the water has a higher temperature at greater depths than at the surface. This phenomenon is explained by the difference in density and specific thermal heat between water and air.

16.4 – ROMANIA

TITLE: CHEMISTRY AND BIOLOGY IN OLD MOUNTAIN FARMS

Name: Dana Fenesan
Institution: Pelaghia Rosu School, Marisel
Stand No.: 233

A research and experimental project carried out by 7th-grade students in the Carpathian Mountain Area. The students performed a documentation phase in order to find out from their relatives and neighbours about traditional recipes used in rural farms as well as plants, flowers and trees used historically at home. They then produced their own traditional products (food, drinks, medicine, etc.) and natural colours which they used to decorate various objects. The students also correlated this knowledge with corresponding concepts in the chemistry and biology courses. This project was a follow-up to a physics project ('Physics in old farms – simple mechanisms and devices') and the school now has a permanent exhibition.

16.5 – ROMANIA

TITLE: THERMOELECTRIC EFFECT – APPLICATIONS

Name: Alexandru Neagu
Institution: Ferdinand I Technical High School, Curtea de Arges
Stand No.: 232

The Lorentz force is the force exerted by a magnetic field on an electrically charged particle moving in that field. Our device allows us to indirectly demonstrate the action of the Lorentz force on positively and negatively charged ions moving in an ordered way (continuous electric current) inside an electrolyte by observing this electrolyte. The rotational movement of the electrolyte is due to the interaction between the ions inside the electrolyte, which have a circular motion. This rotational movement can be observed via small plastic pieces that float on the electrolyte's surface.

Our device also allows a qualitative study of the Lorentz force acting on electrically charged particles moving in an external magnetic field. We can also observe changes in the electrolyte's motion by modifying the electric tension, the electric polarity and the magnetic field's intensity.

16.6 – ROMANIA

TITLE: A TOY FOR STUDENTS OF ALL AGES: THE DRIVEN SPINNING TOP

Name: Ioan Grosu
Institution: Medical Sciences University, Iasi
Stand No.: 230

All over the world the spinning top is one of the oldest and best-loved toys. The Earth itself is a huge spinning top, as are other astronomical bodies. Some have a magnetic moment. Protons (in water molecules and organic molecules) have a nuclear spin 76 (angular momentum) and a magnetic moment.

It is fascinating why a toy spinning top can maintain its vertical position while spinning.

The driven spinning top has two permanent magnets. We have used it to make three games. Practical demonstrations will be shown during the presentation. This innovation can make a positive contribution to the technical culture of children. The new spinning top does not need batteries, so it can be used indoors or outdoors. It has received the green light from the Romanian Ministry of Education for use in schools as a teaching device.

- http://drivenspinningtop.blogspot.com
- http://www.youtube.com/watch

16.7 – ROMANIA

TITLE: SOLAR ENERGY – A COMPREHENSIVE APPLICATIVE STUDY (PHYSICS & BIOLOGY)

Name: Marian Anghel
Institution: High School Bals
Stand No.: 231

A photovoltaic solar panel transforms light energy from the sun directly to electricity. In our experiment the electricity produced is stored in an accumulator. Using a pump we then transform the electricity to mechanical energy, lifting the water from a pot at a height of 1 m. The study determines the efficiency of the process.

We ensured illumination close to normal conditions: E=25000 lx for 12 minutes. The convertor charges the 12 V battery and switches to the pump circuit when the panel has no more light. The pump pumps a certain mass of water, the energy used being Ep=mgh=E2. The average efficiency is 0.34.

Modern installations can convey 600 l of water a day to a height of 10 m. On average our unit conveys 240-360 l of water to a height of 1 m in 4-6 hours. Modern solar pumps have much better efficiency and the components of the system are better adapted to the proposed purpose.

TITLE: PHASE TRANSFORMATIONS AND THEIR INFLUENCE ON THE ENVIRONMENT

Name: Marian Anghel
Institution: High School Bals
Stand No.: 231

A quantity of 15 g water is put in a pot (both at 0°C), which is then put under a glass bell. Using a vacuum pump which can bring the pressure under the bell to 0.1 mbar, we permanently remove the water vapours appearing under the bell. By continuously evaporating the water, part of the heat (Q) from the water mass will be used by the evaporated water mass to produce vapours. This continues until the liquid water mass freezes completely. As the external pressure drops, the pressure of the saturated vapours of the liquid can be equal to the external pressure at a lower temperature. At an external pressure of 0.5 atm, the water boils at 82°C, while it boils at 0°C and freezes at a pressure of 4.6 mmHg. As it is not receiving any external heat, the latent heat necessary for boiling is provided by the liquid, which will start to lose temperature. As the air pumping continues, the pressure drops and the boiling does not stop. The water loses more and more temperature and finally freezes. Pumping the air above a liquid until this freezes is a very useful way of obtaining low temperatures.

17.1 – SLOVAKIA

TITLE: SLOVAKIAN PROJECTS

Name: Dr Marián Kireš, Dr Zuzana Ješková, Dr Peter Horváth, Dr Lubomíra Valovicová, Dr Jozef Benuška
Institution: PF UPJŠ Košice, FMFI UK Bratislava, FPV UKF Nitra, Gymnázium Martin
Stand No.: 139-144

The project involves experiments with physical phenomena, moving from observation, via questioning, investigation and exploration, to exact measurement and interpretation. The observation and examination of e.g. rising water in Archimedes' screw or the motion of rotating CDs can inspire student questioning. The investigation and exploration of e.g. magnets falling through a metal tube influenced by eddy currents challenges students to think, analyse and discuss with their peers. The measurement of air density inside a ball or the height reached by a simple model rocket can give more detailed insight into these phenomena, providing fresh understanding and developing the students' competences and experimental skills.

The activities can be used in the class, as homework or as project-work. They can also be used as after-class activities for talented students and within non-formal education.

18.1 – SLOVENIA

TITLE: FIRE!!!

Name: Ambroz Demsar
Institution: Osnovna sola Simona Kosa Podbrdo (Simon Kos Podbrdo Primary School)
Stand No.: 228

A flame is the visible, gaseous part of a fire. It is caused by a highly exothermic reaction. If a fire is hot enough to ionise the gaseous components, it can become a plasma.

A flame usually scares us, and with good reason: the temperature of e.g. a Bunsen burner's yellow flame is around 1000°C, but other burners can reach 4500°C! A match flame reaches 'just' 500°C, but we are still afraid to extinguish it with our fingers. That is why fire is magic and every fire-breather is a magician. However, two famous experiments that look dangerous have 'milder' but still extremely interesting variants: fire holding and fire breathing.

We can hold fire if we use volatile liquids: Zippo lighter fuel is perfect, but even alcohol will do. Fire-breathing can be extremely dangerous not just because of the risk of burns, but also because of the toxicity of the liquids normally used. But instead of toxic mixtures, we can use maize starch.

These two experiments are also appropriate for schools, and with the right precautions, even students can participate.

19.1 – SPAIN

TITLE: 'CIENCIA EN ACCIÓN' FOR SPANISH TEACHERS

Name: R.M. Ros
Institution: Technical University of Catalonia, Barcelona
Stand No.: 343

The last Ciencia en Acción (the Spanish version of Science on Stage, which began in 2000) took place in Santiago de Compostela last October at IES Rosalia de Castro with the support of Tecnopole and the Xunta of Galicia. In 2009 the event took place in Granada in September at Parque de las Ciencias with the support of the local government of Andalucia.

In 2009 and 2010 the Spanish institutions which co-organised Ciencia en Acción were the Spanish National Research Council (CSIC), the Spanish Royal Society of Physics (RSEF), the Spanish Geological Society (SGE) and the Spanish Open University (UNED), with the support of the Spanish Ministry of Science and Innovation.

There are more than 680 projects by different schools and universities, and several proposals from science journalists. The Spanish delegation at Science on Stage was selected from the national finals in 2009 and 2010.

19.2 – SPAIN

TITLE: LIFE IN A CABBAGE LEAF

Name: E. Arisa, C. Alemany
Institution: El Roure Gros Primary School, Santa Eulàlia de Riuprimer
Stand No.: 330

It all began with some cabbage leaves with holes in them and some dark green caterpillars. We placed everything in a terrarium for observation. One day we realised that some of the caterpillars seemed to have more suckers. When we examined them closely with the help of a magnifying glass, we found that they were not suckers at all but a kind of small worm. We started forming our hypothesis right away.

Next day we observed that the caterpillars from which the larvae had emerged were dead and had turned dry and black. We also observed small yellow cocoons aligned from side to side along the caterpillars' bodies. Hours later there were some small flying insects in the terrarium.

We looked for information and found that this was a parasite called *Apanteles glomeratus* which infects the eggs inside the caterpillar and lives and feeds inside the caterpillar. It is an endoparasite.

19.3 – SPAIN

TITLE: MATHS ON STAGE

Name: A. Capel
Institution: Granada University, Granada
Stand No.: 332

Maths on Stage is a project dedicated to promoting mathematics. On the one hand, it is a board game with various tasks from different branches and levels of mathematics which combines the traditional board game with the technology of computers. On the other hand, it is also an Internet blog where you can find several programmes from different categories, each with different questions and strategies that students can use to answer them.

The main objective of the project is for students (especially at secondary school) to be able to learn new things about mathematics while having fun. In this project they will find not only games and puzzles, but also some curiosities of mathematics found in nature. It can be a great complement to the curriculum and help students in developing skills such as logic while discovering a great new world, the world of mathematics.

19.4 – SPAIN

TITLE: IT WILL FLOAT... BY ARCHIMEDES!

Name: S. Clúa
Institution: Pradera de San Isidro Secondary School, Madrid
Stand No.: 333

A wide assortment of fun experiments to illustrate and explain Archimedes' principle and one of its consequences: less dense objects float in denser materials. Participants can also see applications of Archimedes' principle in today's technology.

The initial experiments measure the buoyant force that fluid exerts on a submerged object, and thus deduce Archimedes' principle. These are followed by experiments which help draw the conclusion that less dense objects float in denser materials. We can also observe how temperature affects floatability.

Finally, several experiments demonstrate how boats made of steel and hot air balloons can float.

The experiments are so straightforward that students can conduct almost all of them at home.

19.5 – SPAIN

TITLE: THE PREPARATION OF JAM, A SWEET WAY TO LEARN SCIENCE

Name: J.A. Martínez-Pons
Institution: Antonio de Nebrija University, Madrid
Stand No.: 334

Jam is a traditional form of preserving and consuming fruit. Jams and marmalades are prepared in different ways regulated by corresponding laws but they all consist of fruit gels mixed with sugar, set apart by the presentation and the relative amounts of sugar and fruit.

This project presents the preparation of jam as a teaching resource which serves as a basis for studying a set of physical and chemical phenomena associated with the process, including density and pH of a substance and its influence on gelling, osmosis, sugar concentration, refraction, pH indicators, etc.

19.6 – SPAIN

TITLE: ELECTRICITY, ELECTROMAGNETIC WAVES AND SOUND

Name: M. Hernández
Institution: C.E. San Mames Fundación Peñascal, Bilbao
Stand No.: 335

This is a block of experiments which try to visualise how sound, electromagnetic waves and light are closely related but behave and travel very differently. We will carry out a series of tests which show that sound travels through air, whereas light, as an electromagnetic wave, does not need air to travel. In order to do so, we use a vacuum machine to simulate behaviour in the atmosphere or in outer space.

We ask questions like whether the ray of a storm would be seen in space or not. To answer this we will produce an artificial ray with a Ruhmkorff coil inside a vacuum bell and see a surprising result.

The questions that are posed invite the students to think and create hypotheses, which is a very interesting exercise for the class.

19.7 – SPAIN

TITLE: HOW TO MOTIVATE PUPILS IN SCIENCE USING EXPERIMENTAL INVESTIGATIVE PROJECTS

Name: J. Navarro
Institution: J.M. Rodríguez Secondary School IES Doramas, Las Palmas
Stand No.: 336

We propose an educational strategy based on the innate ability of students to feel curiosity and their need to explore and investigate. We provide them with the scientific knowledge and methodological and intellectual tools, and they generate knowledge and further inquiries from their observations, questions and creativity. The interdisciplinary nature of the methodology, together with its originality and efficiency, make this presentation spectacular.

We have developed investigations that cover different scientific fields. Some examples are: How many sponge-cakes do we need to absorb all the oceans of the world? What mammal's hair is proportionally more resistant? Will it be possible for microorganisms to manufacture food in future space colonies? How do we get the tastiest fried potato in the world? Daphnia: sex, drugs and rock 'n' roll… and many more.

19.8 – SPAIN

TITLE: REAL-LIFE APPLICATIONS FOR ENCOURAGING ACTIVE LEARNING AND CRITICAL THINKING IN CHEMISTRY STUDENTS

Name: G. Pinto
Institution: Technical University of Madrid, Madrid
Stand No.: 331

I have developed a programme to help instructors connect students' everyday experiences with the chemical principles taught in the secondary-school classroom. Several activities related to problems, experiments and analogies are summarised: the chemistry of self-heating food products; the relationship between vehicle fuel consumption and CO_2 emissions; spattering hot cooking oil with water; the rate of dissolution of a fizzy tablet; osmotic hydration of chickpeas; stoichiometry of daily products (medicines, dentifrices, fertilisers and mineral waters); disinfection of water; moth repellents; and, as an example of analogy, using balls from different sports to model the variation of atomic and ionic sizes. Students have expressed keen interest in this type of 'tangible' chemistry where concrete examples of everyday life can put textbook chemistry into context.

19.9 – SPAIN

TITLE: HOW CAN ASTRONAUTS WEIGH ANYTHING WHEN THERE IS NO GRAVITY?

Name: J. Carnicer, F. Reyes
Institution: IES Thádер and IES Gabriel Miró Secondary Schools, Orihuela
Stand No.: 345

In introductory physics courses it is usual when studying Newton's laws to solve the problem of a body's 'weight' when it drops in free fall. The answer to the problem is that the 'weight' is zero, and this leads to a discussion on the concept of weight. There are permanent free-fall situations such as astronauts in a spaceship orbiting the Earth. However, it is important for an astronaut's health to control variations in body mass whilst onboard a spaceship orbiting the Earth. This project aims to provide the solution to the following scenario: how can astronauts weigh anything when there is no gravity or in free fall?

There are two possible strategies: a) the astronaut is fastened to a spring that is also fastened to the floor; and b) the astronaut compresses the spring and is released in such a way that he/she does not gain much speed and can be stopped by the other wall of the ship.

19.10 – SPAIN

TITLE: PICOROVER: A LOW-COST LUNAR ROVER

Name: J. Tristancho
Institution: S.P. Mansilla, Technical University of Catalonia
Stand No.: 344

The PicoRover is a lunar rover designed to win the Google Lunar X Prize, which involves sending your own lunar rover to the Moon, travelling 500 m and transmitting data back to Earth. Our last prototype is a ball of 12 cm diameter and low weight which has what it takes to win the prize: a motor, a battery, a 2 g computer with radio, and a high-definition camera. The ball is made of low-cost materials such as bulbs, wire and fibreglass, but it tolerates extreme lunar temperatures, adheres easily to the Moon's surface and climbs slopes up to 33 degrees. Our rover can be presented to all kinds of audience as it is based on simple ideas (roly-poly, sand, low gravity, slopes, radiation) and the materials are everyday materials. Students of different disciplines at the Technical University of Catalonia, as well as secondary-school students, have participated in designing this prototype.

19.11 – SPAIN

TITLE: LISTENING TO GRAVITY

Name: M.J. Santos, J.A. White, A. González, S. Velasco
Institution: Salamanca University, Spain
Stand No.: 329

We present four experiments (spring, pendulum, free fall and parabolic throw) for measuring the acceleration due to gravity g using the sound card of a computer. In each case, a device is connected to the computer audio input and audio editing software [1] is used to record the electric signal generated by the device. This method allows time measurements with an accuracy of about 10-4 s. In the mass-spring system, the signal comes from the electric current generated in a coil by a small magnet attached to the mass hanger. In the pendulum case, the signal comes from an optocoupler (recycled from a computer mouse) that detects the motion of the thread. In the free fall case, the signal comes from the electric current generated by the passage of a small magnet through three coils located at different heights in a vertical methacrylate tube. In the parabolic throw case, the signal comes from the sound (captured with a microphone) generated by a steel ball stroked by another ball from a known height. The proposed experiments provide fast and accurate measurements, enriching them with other physical phenomena that contribute to learning with the support of new technologies.

19.12 – SPAIN

TITLE: WHEEL TO WHEEL PROJECT

Name: L. Bignoli, M. Sancho
Institution: Montealto Nursery school, A Coruña, Spain
Stand No.: 337

This specific project, designed for children from 0 to three years old, will be presented in a very practical and visual manner.

All the different activities performed by the children in our science workshop will be presented.

Children from different ages and groups experimented with a large number of wheels and simple machines (spinning discs, pulleys, spinning wheels) and watched how they moved and rolled.

Our main objective was that these activities should be enjoyable and fun for them as well as educational.

The specific items used in the activities and images of all kinds will be presented in order to explain and get the audience to understand and come into contact with our project.

19.13 – SPAIN

TITLE: THERMOELECTRIC SOLAR ENERGY

Name: I. Abad, P. Compte
Institution: Cor de Maria Secondary and Primary School, Valls
Stand No.: 346

Society is aware that the current energy model based on hydrocarbons is neither valid nor sustainable. It is therefore necessary to seek alternatives. On the one hand, technological solutions are needed; cleaner energy with higher efficiency obtained from renewable sources. On the other hand, civic outcomes are also needed to help raise awareness of the need to save and rationalise energy consumption.

These two aspects have been examined over the course of this study by upper-secondary students. The students have focused on one of the most promising forms of renewable energy, thermoelectric solar energy. After studying the different technologies for generating solar electricity, the students designed, developed and built – by themselves – several models, prototypes and experiments explaining how solar energy can be used to obtain electricity without using solar cells.

20.1 – SWEDEN

TITLE: RAIDERS OF THE AMUSING RED CART

Name: Lars Gråsjö
Institution: Danderyds Gymnasium
Stand No.: 286

Wondering how to put the wow factor into your physics experiments and measurements? The idea of using an amusement park is that everything mimics your lab, except for the scale.

The core of the assignment is the measurements, for which we use a stand-alone sensor and recording unit containing a three-axis accelerometer and an altitude meter.

The activities at the park are centred around some explicit instructions on 'simple' rides from which the students have to obtain data for subsequent analysis. They are also encouraged to pose and address other problems of their own choice.

The post-visit task for the students is to recover the data and analyse them in order to present their results in a report, hopefully with a discussion. During that period you may overhear their discussions of the problems, particular details or experiences of locations other than in class.

20.2 – SWEDEN

TITLE: THE CHEMISTRY TEACHER'S GUIDE

Name: Helena Danielsson Thorell
Institution: Kungsholmens Gymnasium
Stand No.: 284

The Chemistry Teacher's Guide for high schools, part of the Royal Swedish Academy of Science project 'The Chemistry Lecturer Link', aims to give students insight into the importance of chemistry in society, industry and academia and to strengthen recruitment to higher-education chemistry. The tasks are based on familiar situations, with the students finding their own motivation to understand the context from a molecular perspective. The teacher's role as active supervisor/lecturer is crucial, and time for reflection and discussion is essential. The Guide's tasks have suggested sets of theoretical focuses and labs. Various methods and reporting forms are used. The level is for newly qualified teachers, while more experienced teachers use the parts that are relevant. The Guide has already undergone some testing, and further testing and evaluation will be carried out in the coming year.

20.3 – SWEDEN

TITLE: AN EXAMPLE FROM TEACHING ADVANCED SCIENCE IN ELITE SCHOOLS

Name: Johanna Björk Jonsson
Institution: Kungsholmens Gymnasium
Stand No.: 279

Sweden's National Agency for Education *(Skolverket)* has appointed 20 upper-secondary schools to participate in a new initiative to give top-performing students a chance to take university-level courses. One of these 'elite schools' is Härnösands Gymnasium, which provides a science education with biomedicine as a specialty.

In addition to the required courses in biology and chemistry, the students study biotechnology, microbiology, biostatistics, protein chemistry and pharmacology.

The topic of medicine is also touched on in Swedish, English, etc.

Later on the students can take university courses in biology, mathematics and chemistry, and do their examination project at Mid Sweden University.

So what is our experience of providing these non-standard courses at secondary-school level and how have universities helped provide more opportunities for our high-achieving students?

20.4 – SWEDEN

TITLE: HOW TO USE UNIVERSITY CONTACTS IN A WAY THAT IS BENEFICIAL FOR BOTH STUDENTS AND THE UNIVERSITY

Name: Mia Pontopidan
Institution: Katedralskolan, Uppsala
Stand No.: 281

How do you prepare upper-secondary students to visit a university? Big words and complex research methods often scare them off rather than making them curious. So at a time of lower application rates for many sciences, it is important to use university contacts in a way that is beneficial for both students and the university.

For many students the first contact with a university is a lecture on a short visit. But often the response to PhD students describing their research is: “This isn’t for me. I didn’t understand a word and I definitely don’t want to become a nerdy scientist.”

In our experience, preparation in school is the key to a successful visit, narrowing the gap between upper-secondary school and university. The use of highly trained teachers in schools will give PhD students a chance to get their message across to students with a more positive reaction like: “Science is cool!”

20.5 – SWEDEN

TITLE: YOUNG PEOPLE SPECULATE

Name: Mickey Missler, Computer Science Teacher
Institution: Universitetsholmens Gymnasium
Stand No.: 283

In Sweden there is a project network called Young People Speculate, where young people formulate visions for the future of science and technology. For several years the first-grade students of Universitetsholmens Gymnasium, an upper-secondary school with a technology focus, have taken part, meeting up with researchers from Malmö University, the Science and Maritime House and various museums in Malmö for seminars, workshops and much more.

This inspires the students to think innovatively and create future visions. These visions are presented at the end of the project in the form of exhibitions, oral presentations and a printed magazine with articles about ideas for the future. All the presentations receive feedback from scientists and other experts in various fields.

The students are asked to speculate on questions like: "What do you think society will look like in 2026?"

20.6 – SWEDEN

TITLE: INTRODUCING A VARIATION ON CHEMISTRY SENIOR ASSISTANT MASTERS IN SWEDISH HIGH SCHOOLS

Name: Martin Lundqvist
Institution: Åby-skolan, Klippan and Lund University
Stand No.: 285

In an attempt to increase interest in science among Swedish high-school students, the Royal Swedish Society has initiated a pilot project to introduce a variation on Senior Assistant Masters (SAMs). Over a three-year period the project is being 50% financed by the Knut and Alice Wallenberg Foundation, with the other 50% coming either from a university or high school.

The idea is for the SAM to provide a link between the high school and a subsequent career (ideally at university, but also within the chemistry industry).

There are 12 SAMs across Sweden, each with a slightly different work set-up to investigate different approaches for increasing interest in science. I will mainly present my own set-up working between Åby-skolan High School and Lund University and my experiences so far. I will also briefly present the work of the other SAMs.

20.7 – SWEDEN

TITLE: MATERIALS IN CHEMISTRY, TECHNOLOGY AND ECONOMICS

Name: Associate Professor Helena Lennholm
Institution: Åva Gymnasium
Stand No.: 282

Students are often interested in aspects of different materials. Linking materials chemistry and technology with economics and marketing can give an interesting combination. Add a visit to the local university, and you have the makings of a project.

For six years I have been developing a concept where students aged 16-17 work in groups on topics involving different materials. Together with the Department of Fibre and Polymer Technology at the Royal Institute of Technology in Stockholm, the students perform laboratory experiments with the aim of producing their material. They also attend seminars and meet research scientists at the Institute.

In addition to this work they also produce marketing plans for a product they wish to develop and sell, making commercials about their product and calculating production budgets.

About 200 students have taken part in this project since 2005.

20.8 – SWEDEN

TITLE: THE PAPER PROVINCE
Name: Svea Johansson
Institution: Älvkullegymnasiet
Stand No.: 287

This is a joint project between Karlstad University, Karlstad Upper-Secondary School, Älvkullegymnasiet and the Paper Province, which is an economic association that coordinates and develops cooperation between various participants in the pulp and paper technology business in Sweden. Karlstad University offers many benefits for the region, and the Paper Province uses its close ties with the university to identify and encourage new research and development projects.

Representatives of forest industry companies give an afternoon presentation at the school for year 2 students. The students can then visit any of the companies later in the semester. They gain insight into the industry and its need for skilled workers. They have the opportunity to do project work in conjunction with the forest industry and the university.

20.9 – SWEDEN

TITLE: LEARNING CHEMISTRY BY STUDYING CRIMINAL INVESTIGATION
Name: Christina Sundén
Institution: Älvkullegymnasiet, Karlstad
Stand No.: 280

Only a few students on the Technology Programme study chemistry beyond the obligatory basic course. We therefore decided to start up the criminal investigation course because we want the students to learn more chemistry. Almost all the students have seen *CSI* on TV and would perhaps like to be a CSI agent collecting evidence, conducting analyses and finding the guilty party. In this course they learn a lot of analytical methods and hopefully become so interested by the end of the course that they want to study more chemistry. Most parts of the course are carried out at the upper-secondary school Älvkullegymnasiet, but the DNA analysis, both PCR (Polymerase Chain Reaction) analysis and gel electrophoresis, is conducted at Karlstad University. FTIR (Fourier Transform Infrared Spectroscopy) analysis is also carried out at Karlstad University.

21.1 – SWITZERLAND

TITLE: FANTASTIC CRYSTALS

Name: Franz Steiger
Institution: Kantonsschule Alpenquai, Luzern
Stand No.: 311

For three years I have been growing crystals under different conditions using different methods, observing them under polarised light, and producing high-quality photos and films. The pictures that I have obtained are a link between chemistry and art.

Four graduation works have already been completed http://www.mikroskoptechnik.ch/mtd/video/example/kristalle.php, and more are planned for the coming year. The students will work with a newly developed cooling table which allows substances to be cooled to as low as minus 25°C.

The students will also test Emoto's hypothesis that water molecules have a brain, meaning that water molecules have a large capacity to store information.

This is a technology which can be excellently integrated into school lessons.

21.2 – SWITZERLAND

TITLE: NATURE AND TECHNOLOGY

Name: Pascal Frey, Franz Steiger
Institution: Canton School Alpenquai, Lucerne
Stand No.: 312

In 2009 a new subject, Nature and Technology, was introduced at the Canton School Alpenquai in Lucerne, Switzerland. The curriculum and course units were developed by three biologists (Hardy Fleischer, Pascal Frey, Margrit Keller), two chemists (Franco Antognoli, Franz Steiger), two physicists (Verena Dubacher, Michael Portmann), and two mathematicians (Martine Aeschlimann, Sibille Burkard). The topics are: phenomena (soap bubbles, photosynthesis); measuring (plane table, GPS); candles (based on *The Chemical History of a Candle* by Michael Faraday); forces (spring force, lever law, golden rule of mechanics); and optics (mirrors, lenses, colour, the eye). The subject is taught by one teacher for two hours with the whole class and two hours with half the class.

21.3 – SWITZERLAND

TITLE: NEW METHOD FOR HANDLING GASES

Name: Maurice Cosandey
Institution: Federal Institute of Technology
Stand No.: 310

A new, improved method for handling gases in chemistry courses.

One of the most frustrating problems encountered in handling gases in class is the difficulty of joining rubber tubes of different diameters. This ridiculous problem can be solved by using standardised joints made with syringes and needles. Plastic syringes and inox needles may have different dimensions, but they are all terminated with the same conical end. Cut in half, they will fit into any plastic tube. This technique will be demonstrated in the production and use of H_2, O_2, CO_2, NH_3 and SO_2 in the lab and in the chemistry courses.

22.1 – UNITED KINGDOM

TITLE: PRACTICAL EXPERIMENTS & SOFTWARE RESOURCES FOR CHEMISTRY

Name: Tim Harrison, Alison Rivett
Institution: Bristol ChemLabS, School of Chemistry, University of Bristol
Stand No.: 227

A variety of chemistry-based activities for teachers and students will be presented by the Bristol ChemLabS team (from the School of Chemistry at the University of Bristol). These will include some simple practical experiments to engage students of all ages; a demonstration of the groundbreaking educational software LabSkills, which helps students and teachers get the most out of practical lessons; and an interactive display of Chem@rt – a science-art project bringing chemistry into the classroom to stimulate literacy and creativity.

22.2 – UNITED KINGDOM

TITLE: APEMEN TO ASTRONAUT DISPLAY

Name: Amanda Curtis
Institution: Woodfield Middle School
Stand No.: 226

Space: Past, Present and Future

Cross-curricular activities, practical ideas and resources developed for the International Year of Astronomy, Darwin Year, the 40th anniversary of the Moon landing and the 400th anniversary of Galileo's telescope.

- The Past:

'Once Upon a Starry Night' – inspired by a set of beautiful books by Jacqueline Mitton.

- The Present:

'Return to the Moon' – Mission patch designs sent to the edge of space on board a Zuni sounding rocket payload in Woomera Australia.

'Moonsaics' – National School Observatory projects to assemble large pictures of the Moon using a mosaic of lunar observations taken by the Liverpool Telescope.

- The Future:

'The Future is Wild' – Resources from a dedicated site which has formed the basis of cross-curricular days and weeks in primary and secondary schools. Topics include evolution, habitats, interdependency, food chains, environments and climate change.

22.3 – UNITED KINGDOM

TITLE: CELLULAR DANCES

Name: Richard Spencer
Institution: SRC Bede 6th Form
Stand No.: 219

The aim of this project is to inspire science teachers to invent their own dances to enhance student understanding of complicated biological, chemical or physical processes. Simple dances can be used to bring complicated topics to life and help students learn about cellular processes which they might otherwise find difficult, dry or hard to remember. You will participate in a selection of cellular dances chosen from the Mitosis Mamba, Meiosis-in-A-Minute, DNA Boogie and Aerobics Respiration.

The masterclass is a multisensory approach to teaching about complex biological processes. It shows how simple

actions, set to music, can stimulate students visually, auditorally and kinaesthetically. The dances are a fusion of art and science blending fun and serious biology. Everyone who attends will participate in the action. You don't need to be able to dance, but a sense of humour will help!

22.4 – UNITED KINGDOM

TITLE: DARE WE TEACH TOPS?

Name: David Featonby
Institution: Walbottle Campus/Institute of Physics
Stand No.: 222

Tops are one of the oldest toys and can be found in many different cultures around the world, dating back thousands of years, yet these delightful toys rarely find a place in schools. Almost every child is familiar with a top of some kind or another. Spinning tops are for some the first 'toy' they experience.

The display shows how tops can be used in science lessons to illustrate some basic physics principles and also demonstrates some of the more peculiar properties of tops which challenge our understanding. Tops also offer plenty of scope to develop and demostrate skills, and some of these will be seen. Participants have the opportunity to try things out for themselves.

Reference:
Dare we teach tops? by D Featonby
Physics Education, July 2010
Published by the Institute of Physics

22.5 – UNITED KINGDOM

TITLE: INSIDE THE BLACK BOX

Name: Tim Browett
Institution: Robert Gordon's College
Stand No.: 225

Inside the black box: using the components of a PC to help teach physics.

The inner workings of a PC cover a wide range of physics topics, including electricity, magnetism, heat and optics. This stand will help teachers learn how to dismantle and identify the components inside a PC, then to use them as examples of physics in forms that pupils use regularly without knowing it. Seeing the insides of a PC fascinates many people, and being able to understand how the pieces work in simple terms can be very rewarding. Traditional and novel ways of explaining how components work are shown, as are ideas for reusing salvaged parts.

22.6 – UNITED KINGDOM

TITLE: MARVIN AND MILO

Name: Liz Nourshargh PhD, BSc (Hons), ARCS, MInstP
Institution: The Institute of Physics
Stand No.: 221

Each month the Institute of Physics publishes a cartoon strip featuring the characters Marvin and Milo. They try out a simple physics investigation using household resources. At the time of writing, 63 Marvin and Milo cartoons http://www.physics.org/marvinandmilo.asp have been published by the Institute of Physics.

A number of these cartoons have been incorporated into science schemes of work for pupils aged 11-16 in England. They enable pupils to participate in practical activities with minimal resources. They can be used as whole-class activities and as extension activities for gifted and talented students. Furthermore, they can be used to allow students to complete a practical activity for homework.

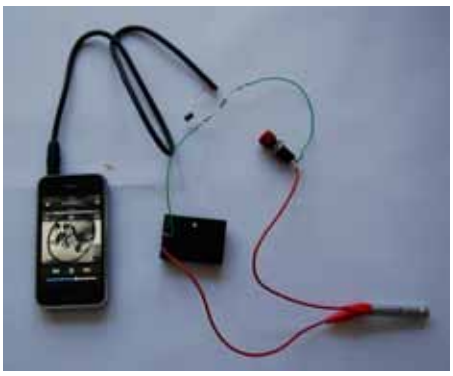
Delegates will be able to view a selection of Marvin and Milo comic strips and to try some of the activities on the stand.

22.7 – UNITED KINGDOM

TITLE: MODULATED LASER PEN!

Name: Alession Bernadelli
Institution: The Institute of Physics
Stand No.: 224

Come and try out this really amazing piece of equipment we have built from very cheap components and using a very simple circuit. Our Modulated Laser Pen is just an ordinary laser pointer, but we have turned it into an amplitude modulating circuit that allows you to connect an MP3 player to it and modulate the intensity of the laser beam with the frequency of the input audio signal. The result is that you can send the beam across the lab to a receiver, which is just a light sensor connected to a speaker, and play music with a laser beam. This demonstration has never failed to amaze the audience and it will certainly entertain you too. So come along and learn how to make one for yourself!



22.8 – UNITED KINGDOM

TITLE: RICKY GOES TO ANTARCTICA

Name: Stuart Naylor
Institution: Millgate House Education
Stand No.: 217

Ricky is very special. He is the first puppet to go to Antarctica on a Fuchs Foundation expedition. Ricky loves to help children to learn science. He wants all the children to experience the problems of survival in the extreme environment of Antarctica. But they can't all go! So he communicates with them through a blog. The blog is interactive, and through it children leave comments, tell Ricky what they have found out in their investigations and ask him questions. Ricky tries to answer the questions, as well as testing some of the solutions that they suggest. Now Ricky the famous explorer is home, but children still want to talk with him and show him their ideas. Ricky and the blog provide a unique set of starting points for scientific inquiry and a long-term resource for teachers. Where will Ricky go next? Watch this space!

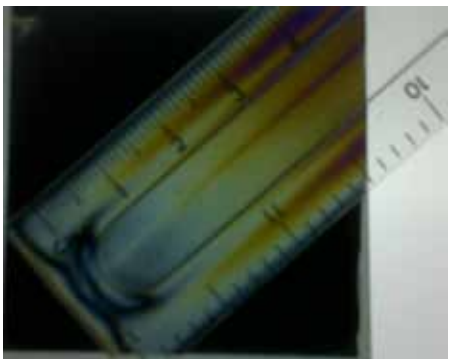
22.9 – UNITED KINGDOM

TITLE: NOW YOU SEE IT, NOW YOU DON'T: THE STRANGE WORLD OF POLARISED LIGHT

Name: Ruth Wiltsher
Institution: IOP
Stand No.: 220

What do insects, fishermen, laptop screens, an octopus and Vikings have in common? Starting with a brief discussion of the history and applications of polarised light, first written about by a Dane, the session will try to answer this question. Transverse waves and plane polarisation will be discussed using simple models and applets. Polarisation by reflection and circular polarisation will be introduced, along with optically active materials such as sugar solution and birefringent crystals. Simple demonstrations and experiments will be used to link these efffects to applications.

Participants will be given information about resources and ideas they can implement in their own classrooms.



22.10 – UNITED KINGDOM

TITLE: SIMPLE EXPERIMENTS

Name: Neal Gupta
Institution: Ockbrook School, Institute of Physics
Stand No.: 218

The advent of readily available and cheap neodymium magnets, which are several times stronger than ceramic magnets, enables us to demonstrate traditional experiments more effectively and also to perform new and exciting experiments showing magnetic properties that hitherto could not be demonstrated. Neodymium (NdFeB – neodymium-iron-boron) magnets first became commercially available in 1984 and are the most powerful permanent magnets known to mankind. Because of their strength, magnetism can now be demonstrated over greater distances, particularly in experiments which show the nature of the magnetic force. These may be standard experiments and demonstrations, but they are just a bit more spectacular using neodymium magnets.

22.11 – UNITED KINGDOM

TITLE: THE OPTOELECTRONICS COLLEGE

Name: Stuart Farmer
Institution: Robert Gordon's College
Stand No.: 223

The Optoelectronics College project was initiated in 2007 to develop innovative investigative hands-on science practical work for students aged 12-14 in Scottish secondary schools. The aim is to encourage students to study science, especially physics, and then to consider careers in science and engineering.

The project began by bringing together 40 science teachers, university researchers, science equipment manufacturers and teacher educators to brainstorm ideas and develop a framework for the project. The ideas were developed and edited into three sets of activities designed to educate students in topical areas of science: Solar Cells in Action; Illumination and Communication; and Colour Vision and Displays. New innovative teaching equipment has been developed as part of the project as well as student activities to promote investigation skills, thinking skills and teamwork. The Optoelectronics College is now being rolled out to schools in the rest of the UK, the first training sessions in the UK having been held early in 2011.

LIST OF PARTICIPANTS / VENUE MAP

Name	Country	Project title	Catalogue ID	Stand no.
A. González	ES	Listening to gravity	19.11	329
Adam Rybaczyk	DK	Learn, play & move out - with smartphones connecting to the mobile internet	7.23	131
Adriano De Giovanni	IT	A Compact Cosmic Ray Telescope for outreach activities	13.1	339
Aff Hjarnø Andersen	DK	Ungeklimaforsker.dk (the “young climate researcher” website)	7.1	138
Agnes Wiesinger	AT	No Music without Physics	1.5	272
Alession Bernadelli	UK	Modulated Laser Pen!	22.7	224
Alexandru Neagu	RO	Thermoelectric effect - applications	16.5	232
Alice Pietsch	AT	Hands-on Natural Science and engineering	1.4	269-271
Alison Rivett	UK	Practical Experiments & Software Resources for Chemistry	22.1	227
Amanda Curtis	UK	Apeman to Astronaut display	22.2	226
Amandine Sultana	FR	The sunny cook	8.4	153
Amrita Prasad	BE	Diffraction	N/A	419
Anastasios Nezis	GR	The Puzzle Experiment	10.10	126
Anders K Brandt	DK	From cow dung to pancakes	N/A	147
Anders Lundgren	DK	Learn, play & move out - with smartphones connecting to the mobile internet	7.23	131
Andreas Patsis	GR	An «experiential flight» to the world of gases: macroscopic as well as microscopic	10.2	120
Androz Demsar	SI	Fire!!!	18.1	228
Aneta Mika	PL	Experiments with dry ice	15.8	248
Angela Cane	IT	From soil to photosynthesis	13.3	322
Angela Capel	ES	Math on Stage	19.3	332
Angela Köhler-Krützfeldt	DE	Choco-Science	9.3	430
Angelika Fussi	AT	Hands-on Natural Science and engineering	1.4	269-271
Anjuli Ahooja	CA	Everything is about physics!	4.1	113
Anna Marie Bartolo	MT	Physics - investigation of physics principles	N/A	215
Antonio Gandolfi	IT	NSC	NSC	342
Antonius Archontoulis	GR	Structure of simultaneous linear motions with pulleys on a horizontal laboratory bench	10.8	123
Antonius Archontoulis	GR	Understanding the necessity of a reference system for the definition and study of body movement	10.11	124
Antonius Archontoulis	GR	Cell Membrane; simulation of the fluid mosaic model	10.1	125
Arlette Damberez	BE	NSC	NSC	421
Axel Karlshoej	DK	Project on air	7.14	150
Barbara Sobanska	DK	Learn, play & move out - with smartphones connecting to the mobile internet	7.23	131
Beáta Jarosievitz dr.	HU	Alice in Chemistryland	11.4	264
Bernadette Anbergen	BE	Eddy currents	2.2	417
Berthold Kaps	AT	Hands-on Natural Science and engineering	1.4	269-271
Birthe Zimmerman	DK	Green roofs and monitoring the climate	7.19	146
Bjarne Juul Johansen	DK	Travel in the 4th dimension - High Speed	7.22	409
Bjarne Winther	DK	Rum & Coke	7.15	315
Bo Holm Jacobsen	DK	The ultimate time-space cross – grasping space and time from personal life projects to galactic life cycles	7.25	134
Brian Lykkegaard Karlsen	DK	Energy balance of a water pump	7.18	320
Carina Peschek	DE	Science in primary schools	9.10	424
Carsten Andersen	DK	Children of Galileo	7.11	133
Catarina Lipertova	CZ	Playful physics	6.3	303
Catherine Tattersall	IE	Colourful science - introducing aqua beads	12.2	108
Cezary Filipiuk	PL	Posters of Hevelius	15.3	241

Name	Country	Project title	Catalogue ID	Stand no.
Charlotte Thorley	UK	NSC	NSC	216
Chris Schembri	MT	NSC	N/A	214
Christina Duranti	IT	Why does this happen?	13.12	326
Christina Frausing Binau	DK	Rum & Coke	7.15	315
Christina Sunden	SE	Learning chemistry by studying criminal investigation	20.9	280
Claudia Girnth Daimba	DK	Molecular Gastronomy in Biotechnology	7.13	412
Claus Brandt Jakobsen	DK	Enzymes - the secret helper in everyday life	7.12	136
Corina Toma	RO	Jacob's ladder	16.2	235
Corina Toma	RO	Kirlian Photography Device	16.2	235
Czaba Sükösd	HU	NSC	NSC	267
Dana Fenesan	RO	Chemistry and biology in old mountain farms	16.4	233
Danni Thorkild Pedersen	DK	Adapting to a world under the water	7.2	319
Danuta Jesiak	PL	Chemical experiments performed in the classroom	15.6	239
Dario Barca	IT	Solar tower	13.8	341
David Featonby	UK	Dare we teach tops?	22.4	222
David Keenahan	IE	Science differentiation in action	12.4	107
Deia Vejby	DK	Project Baltic Sea	7.3	149
Dennis Wowern Nielsen	DK	Science Talents	7.21	316
Dieter Legl	DE	The Light at the End of the Tunnel	9.12	432
Dionisis Karounias	GR	Plastic Bottles - from circular motion to oscillating and wave motion	10.6	122
Dominika Domaciuk	PL	How to break a mobile?	15.2	247
Dorte Christensen	DK	Grasp the terms and make the graspable	7.7	137
Dr. Olaf Gutschker	DE	Physics from the inside out	9.9	429
Eilish McLoughlin	IE	An inquiry-based approach to teaching science	12.1	111
Eilish McLoughlin	IE	NSC	NSC	112
Elias Kalogirou	GR	From rainbows to the chemistry of colours	10.3	121
Elisabeth Inschlag	AT	Students as science and research experts	1.6	275
Elisabeth Martre	FR	The music of the sun	8.3	155
Eloi Arisa	ES	Life in a Cabbage Leaf	19.2	330
Endre Szórád	HU	Experiments and Demonstrations Illustrating the Effects of Rapid Combustion as Influenced by Combustion Temperature	11.1	263
Engelbert Stütz	AT	Barrier-free hearing - Using magnetic fields to improve hearing	1.1	276
Erik Bruun Olesen	DK	NSC	NSC	313
Esteban Jiménez	BE	1) Solar water pump, 2) Truck racing	2.4	418
Eugenia Tsitopoulou	GR	NSC	NSC	130
Éva Kirsch dr.	HU	Acting as good practice in teaching science – physics as an example	11.3	265
Ewa Pater	PL	Are we afraid of nuclear power plants?	15.9	246
Francis Loret	FR	From the blue planet to black holes, the strange geometries	8.1	154
Francis Moreau	BE	Sand of the beach in the classroom	2.3	420
Francisco Reyes	ES	How can astronauts weigh anything when there is no gravity?	19.9	345
Franz Steiger	CH	Fantastic crystals	21.1	311
Franz Steiger	CH	Nature and Technology	21.2	312
Friedlinde Krotscheck	AT	NSC	NSC	273
Gabriel Pinto	ES	Real-life applications for encouraging active learning and critical thinking in chemistry students	19.8	331
Gabriella Salerno	IT	Science Game	13.7	340
Georgia Costi-papasavva	CY	Solid CO2: The Ice that Fascinates and Teaches	5.2	415
Georgios Georgiou	CY	Connecting input and output modules on a transistor/thyristor processing unit	5.1	413

Name	Country	Project title	Catalogue ID	Stand no.
Georgios Pantazis	GR	The concept of the machine	10.9	127
Georgios Papasavvaas	CY	The power of simple materials: “The diver suspended in water”	5.3	414
Gianluca Farusi	IT	Studying chemistry with Pliny the elder	13.10	327
Giovanni Pezzi	IT	Space …effects - weightlessness experiments	13.9	324
Glen Guthrie	CA	Synchrotron soft X-ray analyses of ice precipitates and soil from central Northwest Territories, Canada	4.3	116
Guillaume Lebatard	FR	The sunny cook	8.4	153
Hans Hofbauer	AT	Binomi - the game	1.2	274
Heide Munk	DK	Travel in the 4th dimension - Time Lapse	7.4	410
Helena Lennholm	SE	Materials in chemistry, technology and economics	20.7	282
Helena Thorell Danielsson	SE	The Chemistry Teacher’s Guide	20.2	284
Henrik Kruse Larsen	DK	Enzymes - the secret helper in everyday life	7.12	136
I. Abad	ES	Thermoelectric Solar Energy	19.13	346
Ida Gravgaard Jensen	DK	Learn, play & move out - with smartphones connecting to the mobile internet	7.23	131
Ida Regl	AT	“Cosmi wants to know” - children’s planetary walk Lichtenberg	1.3	277-278
Inger-Marie Hilling	DK	Rockets and Sustainable Robots	7.9	314
Ioan Grosu	RO	A toy for students of all ages: the driven spinning top	16.6	230
Ioannis Gatsios	GR	An «experiential flight» to the world of gases: macroscopic as well as microscopic	10.2	120
Irina Kostadinova	BG	The world of mushrooms	3.6	252
Ivan Lalov	BG	NSC	NSC	251
J. A. White	ES	Listening to gravity	19.11	329
Jan Pavelka	CZ	See the sound, hear the light	6.5	306
Jean-Michelle Laclaverie	FR	The music of the sun	8.3	155
Jerzy Jarosz	PL	Thunderstorm	15.5	237
Jesper Lykkegaard	DK	Science Talents	7.21	316
Joanna Grybos	PL	Constructing a home-made water flow sensor - multimedia presentation	15.12	243
Johanna Björk Jonasson	SE	An example from teaching advanced science in elite schools	20.3	279
Johanna Patry	CA	NSC	NSC	118
Jørgen Klæstrup	DK	Learn, play & move out - with smartphones connecting to the mobile internet	7.23	131
Jose Antonia Martinez	ES	The preparation of jam, a sweet way to learn science	19.5	334
Joshua Tristancho	ES	PicoRover: a low-cost lunar rover	19.10	344
Jozef Beňuška	SK	School Science experiments	17.1	143
József Vida dr.	HU	SURVIVOR - how chemistry and physics help survival	11.7	266
Juan Antonio Navado	ES	How to motivate pupils in science using experimental investigative projects	19.7	336
Juliana Mitrevski	DK	Adapting to a world under the water	7.2	319
Julie Boldoc-Duval	CA	Amusement park physics	4.2	114
Julien Barthess	FR	Newton’s Cradle	8.2	152
Kamma Rasmussen	DK	Science Culture, where students pupils passes on learning to other pupils	7.5	148
Károly Piláth dr.	HU	Physics lesson with the Nintendo Wiimote Controller	11.6	261
Kirsten Noe	DK	Learn, play & move out - with smartphones connecting to the mobile internet	7.23	131
Klara Steinbach	AT	No Music without Physics	1.5	272
Klaus-Peter Möllmann	DE	High speed / slow motion	9.5	434
Ladislav Dvorak	CZ	GPS for science teaching during field exercises	6.1	301
Lars Gjerløw Jørgensen	DK	Rockets and Sustainable Robots	7.9	314

Name	Country	Project title	Catalogue ID	Stand no.
Lars Gråsjö	SE	Raiders of the amusing red cart	20.1	286
Lars Hazelton	DK	Learn, play & move out - with smartphones c onnecting to the mobile internet	7.23	131
Lars Janning	DE	Learning how to experiment autonomously in class 5/6	9.7	423
Laurent Beddou	FR	From the blue planet to black holes, the strange geometries	8.1	154
Leif Poulsen	DK	Climate teaching that really inspires	7.8	145
Lena Gumaelius	SE	NSC	NSC	288
Letizia Vittorelli	IT	Genetic transmission of inheritable characters and biotechnology	13.4	323
Liliana Bignoli	ES	Wheel to wheel project	19.12	337
Line Matthiesen	DK	Træernes sti (Tree Trail)	7.16	411
Liz Nourshargh	UK	Marvin and Milo	22.6	221
Lone Skafte Jespersen	DK	Træernes sti (Tree Trail)	7.16	411
Louise Petersen Matjeka	DK	Learn, play & move out - with smartphones connecting to the mobile internet	7.23	131
Louise Pilegaard	DK	Ungeklimaforsker.dk (the “young climate researcher” website)	7.1	138
Lubomíra Valoviňová	SK	Everyday Science	17.1	142
Luminita Chicinas	RO	NSC	NSC	229
Magdalena Beluhova	BG	Learning about nature - with love	3.7	258
Manuel Hernández-Tavera	ES	Electricity, electromagnetic waves and sound	19.6	335
Marco Nicolini	IT	ACCOMPAGNA – (ACeleration COMPAss Geo NAvigator)	13.2	338
Maria Dobkowska	PL	New technologies in science teaching	15.1	244
Maria Grazia Gallo	IT	Robot@mico	13.5	328
Maria Jesus Santos	ES	Listening to gravity	19.11	329
Maria Nikolova	BG	Science theatre - an unorthodox way to raise interest in natural science	3.5	253
Marián Kires	SK	NSC	NSC	141
Marián Kireš	SK	Physics with platform scales	17.1	139
Mariana Vitanova	BG	Opportunities to raise student interest in studying nature	3.3	256
Marien Anghel	RO	Phase transformations and their influence on the environment	16.7	231
Marien Anghel	RO	Solar energy - a comprehensive applicative study (physics & biology)	16.7	231
Mario Mitov	BG	From living cells to biofuel cells	3.2	255
Martin Götz	DK	Children of Galileo	7.11	133
Martin Lundqvist	SE	Introducing a variation on Chemistry Senior Assistant Masters in Swedish high schools	20.6	285
Martin Søgaard	DK	Supermagnets	7.6	317
Matilde Danvad	DK	Sponsorskolen.dk	7.17	409
Matthias Kusber	DE	Be asTONEished!	9.1	431
Maurice Cosandey	CH	New method for handling gases	21.3	310
Mette Bisp	DK	A Science day at the gymnasium/secondary school	7.24	135
Mette Norup Hansen	DK	Grasp the terms and make the graspable	7.7	137
Mia Pontoppidan	SE	How to use university contacts in a way that is beneficial for both students and the university	20.4	281
Michael Vollmer	DE	High speed / slow motion	9.5	434
Michaelis Hadjimarcou	CY	NSC	NSC	416
Michelle Dunne	IE	Garden party chemistry	12.3	109
Mickey Missler	SE	Young People Speculate	20.5	283
Miklós Jendrék	HU	Visible sound, audible light	11.2	259
Monika Jensen	DK	From cow dung to pancakes	N/A	147
Montserrat Sancho	ES	Wheel to wheel project	19.12	337
Myléne Poudrier	CA	Helping robots	4.5	115

Name	Country	Project title	Catalogue ID	Stand no.
Neal Gupta	UK	Simple experiments	22.10	218
Niels-Gustav Petersen	DK	Energy balance of a water pump	7.18	320
Niki Danvad	DK	Sponsorskolen.dk	7.17	409
Ofelya Rusinova	BG	The world of mushrooms	3.6	252
Ole Gadsbølle Larsen	DK	Climate teaching that really inspires	7.8	145
Olga Riscau	RO	County project on teaching sciences – team teaching primary school teachers with science teachers in each school	16.1	236
Ondrej Pribyla	CZ	See the sound, hear the light	6.5	306
Panteleimon Bazanos	GR	Looking at the world through CD spectroscopy for young and old, experts and novices	10.7	119
Papp Laszlo	RO	Functioning model of Ursu Lake Sovata	16.3	234
Pascal Frey	CH	Nature and Technology	21.2	312
Pascal Langlois	FR	Newton's Cradle	8.2	152
Patrick Woldt	DE	Small, smaller, tiny – introducing nanotechnology	9.11	435
Paul Nugent	IE	Science differentiation in action	12.4	107
Peter Horváth	SK	Rolling CDs	17.1	140
Peter Zilavy	CZ	Electromagnetic induction and related phenomena	6.8	309
Petra Breuer-Küppers	DE	A week in the meaadow	9.8	426
Pia Kannegaard	DK	Project on air	7.14	150
Poul Hedegaard	DK	James Bond and physics	7.20	132
Regina Stocco	IT	The Tesla turbine	13.11	325
Richard Spenser	UK	Cellular Dances	22.3	219
Robert Fischer	BE	Diffraction	N/A	419
Robert Małocha	PL	Double resonant solid state Tesla coil	15.7	242
Rosa Maria Ros	ES	"Ciencia en Acción" for Spanish teachers	19.1	343
Rosa Maria Ros	ES	NSC	NSC	343
Rositza Konova	BG	Electromagnetic engine used for studies and explanations - and can it be used as a generator?	3.1	254
Rune Hilling	DK	Rockets and Sustainable Robots	7.9	314
Ruth Wiltsher	UK	Now you see it, now you don't: the strange world of polarised light	22.9	220
S. Velasco	ES	Listening to gravity	19.11	329
Sally Meadows	CA	PISIM (SUN) project	4.4	117
Santiago Clua	ES	It will float... by Archimedes!	19.4	333
Serafeim Spanos	GR	Functional model of a "green" home	10.4	129
Signe Mørch Allerslev	DK	A Science day at the gymnasium/secondary school	7.24	135
Siri Krogh	NO	The Energy-Network Project	14.1	151
Soléne Chevalier-Thery	FR	NSC	NSC	156
Stefanie Schlunk	DE	NSC	NSC	436
Stephanie Holden	IE	Sharing science teaching ideas	12.5	110
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Stuart Naylor	UK	Ricky goes to Antarctica	22.8	217
Svea Johansson	SE	The Paper Province	20.8	287
Sybille Hasler	IT	Science Box: force-movement-energy	13.6	321
Theodoros Pierratos	GR	Planning a trip to Mars	10.5	128
Thomas Michael Braun	DE	"Chebiku" - Interdisciplinary teaching of the subjects chemistry, biology and fine art	9.2	427-428
Thomas Necas	CZ	Experiments for teaching meteorology	6.4	304
Tim Browett	UK	Inside the black box	22.5	225
Tim Harrison	UK	Practical Experiments & Software Resources for Chemistry	22.1	227
Trine Søholm	DK	The flavours and colours of nature	7.10	318

Name	Country	Project title	Catalogue ID	Stand no.
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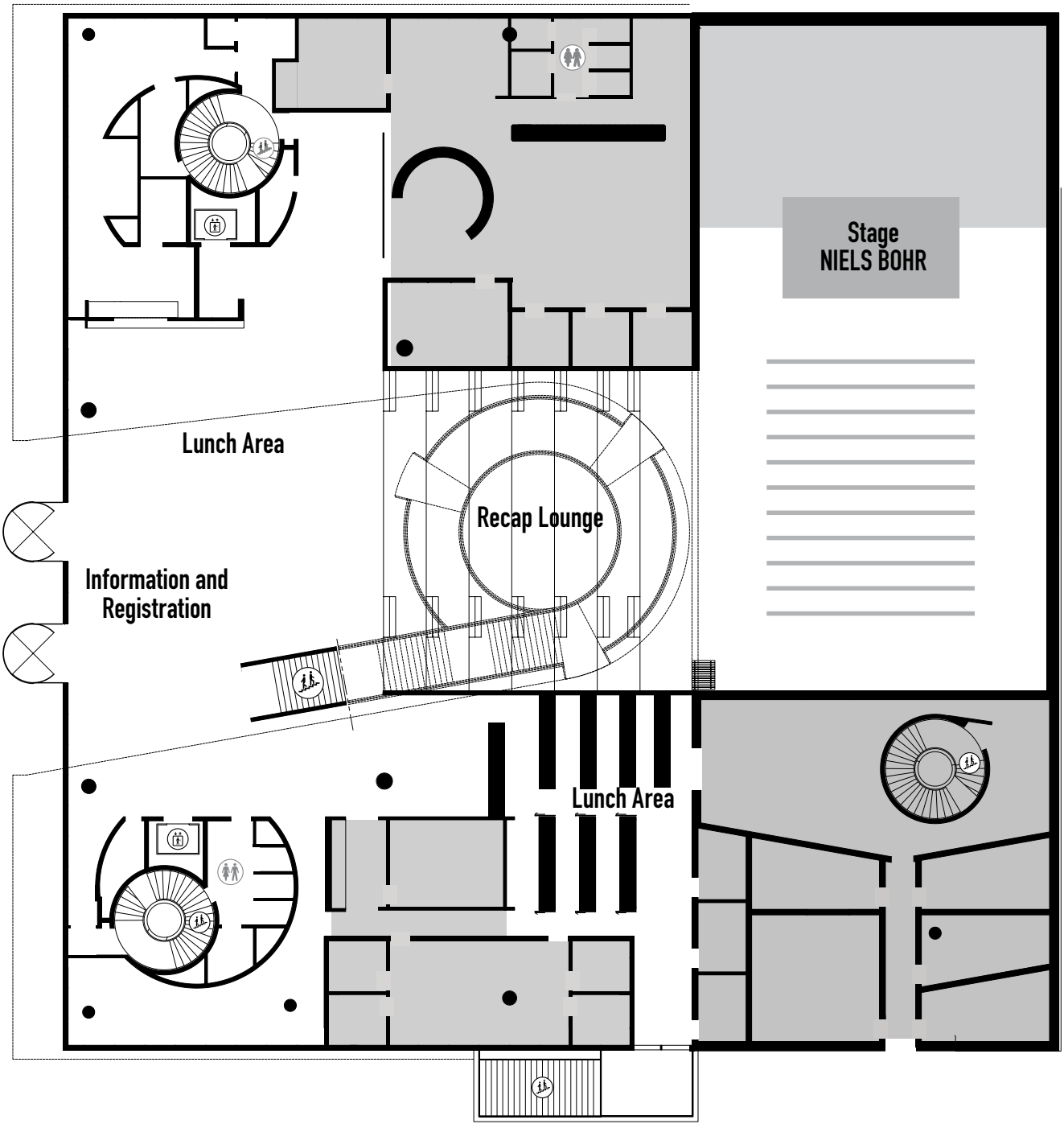
Urszula Grabowska	PL	From junior high school to university	15.4	245
Veronica Bodokan	RO	County project on teaching sciences – team teaching primary school teachers with science teachers in each school	16.1	236
Veronika Gallus	DE	Radioactivity - curse or blessing?	9.6	425
Vladimira Erhartova	CZ	Strong Czech eggs	6.2	302
Wilfried Meyer	DE	Exploring soap skin	9.4	433
Wojciech Nawrocik	PL	NSC	NSC	249
Yolina Hubenova	BG	From living cells to biofuel cells	3.2	255
Zbigniew Trzmiel	PL	Students's chair at High School No. 1 in Leszno	15.10	238
Zdenek Drozd	CZ	NSC	NSC	305
Zdenek Polak	CZ	Infrared radiation in school experiments	6.6	307
Zdenek Rakusan	CZ	Physics explores the musical instruments	6.7	308
Zenona Stojecka	PL	Physical phenomena around us	15.11	240
Zoltán Murányi dr.	HU	SURVIVOR - how chemistry and physics help survival	11.7	266
Zoltán Sebestyén	HU	Cannot live without experiments	11.8	262
Zsuzsanna Farkas	HU	Ages and Scientists	11.5	260
Zuzana Ješková	SK	Computer based measurements	17.1	144

GROUNDFLOOR



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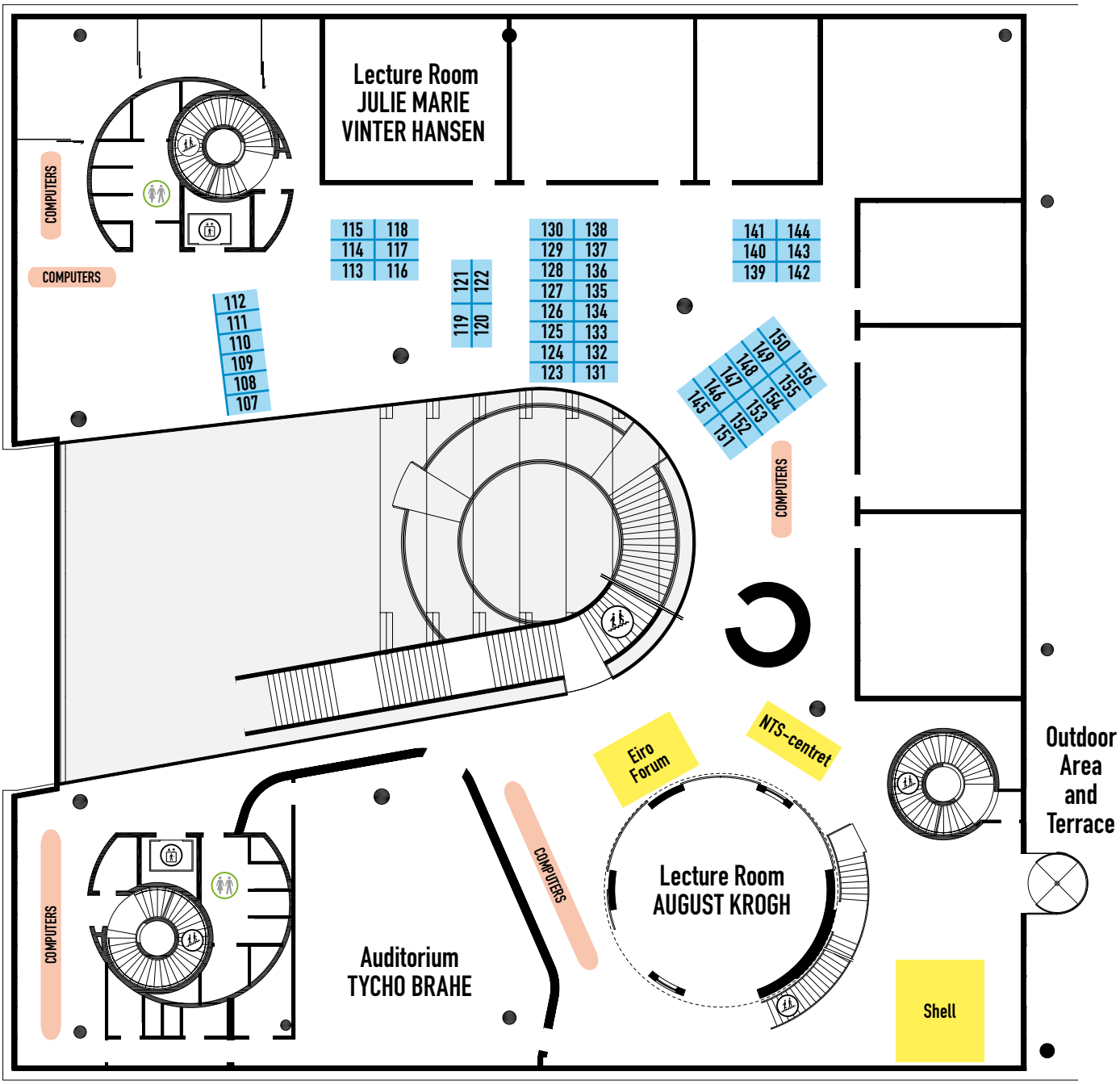
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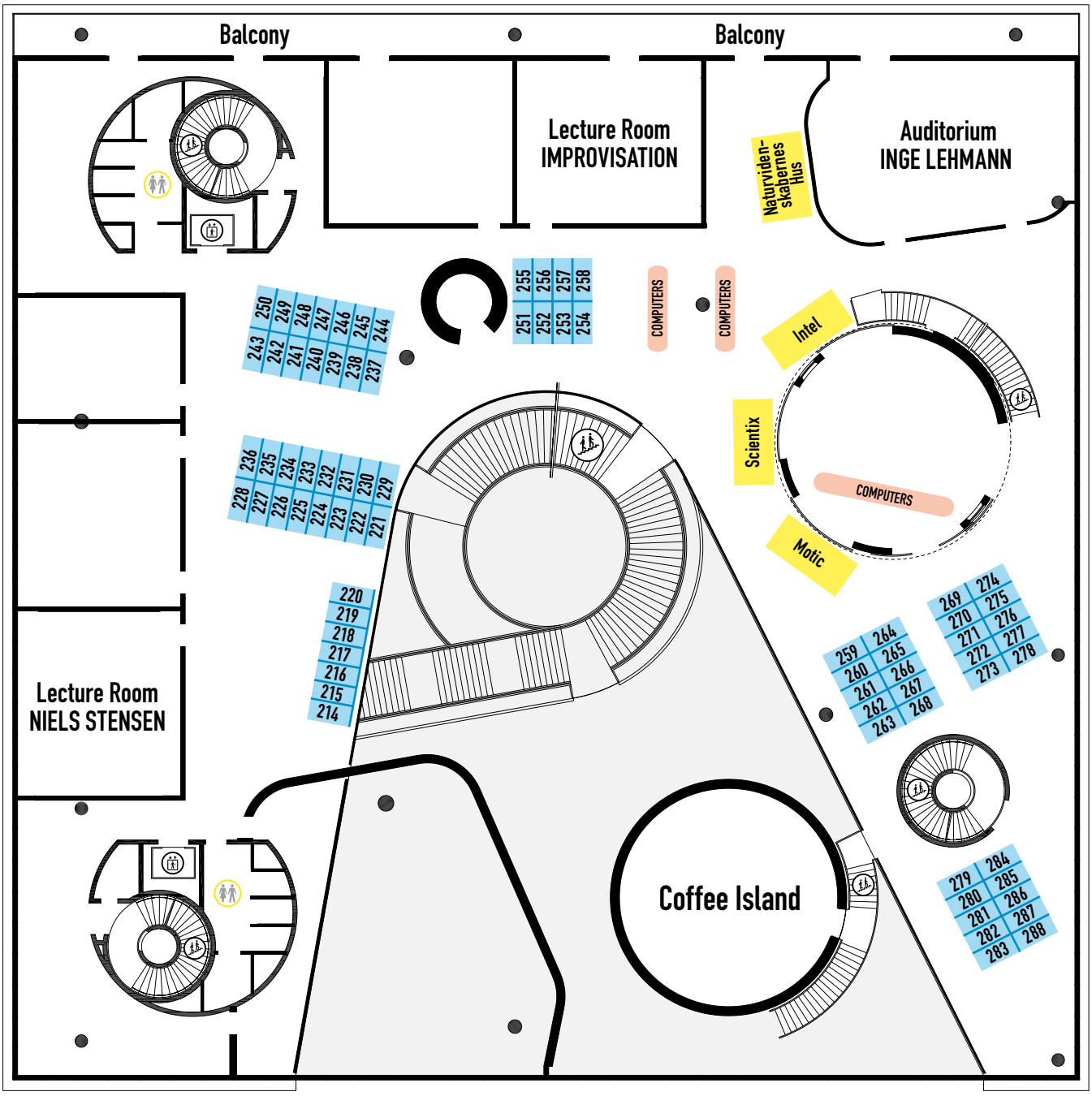
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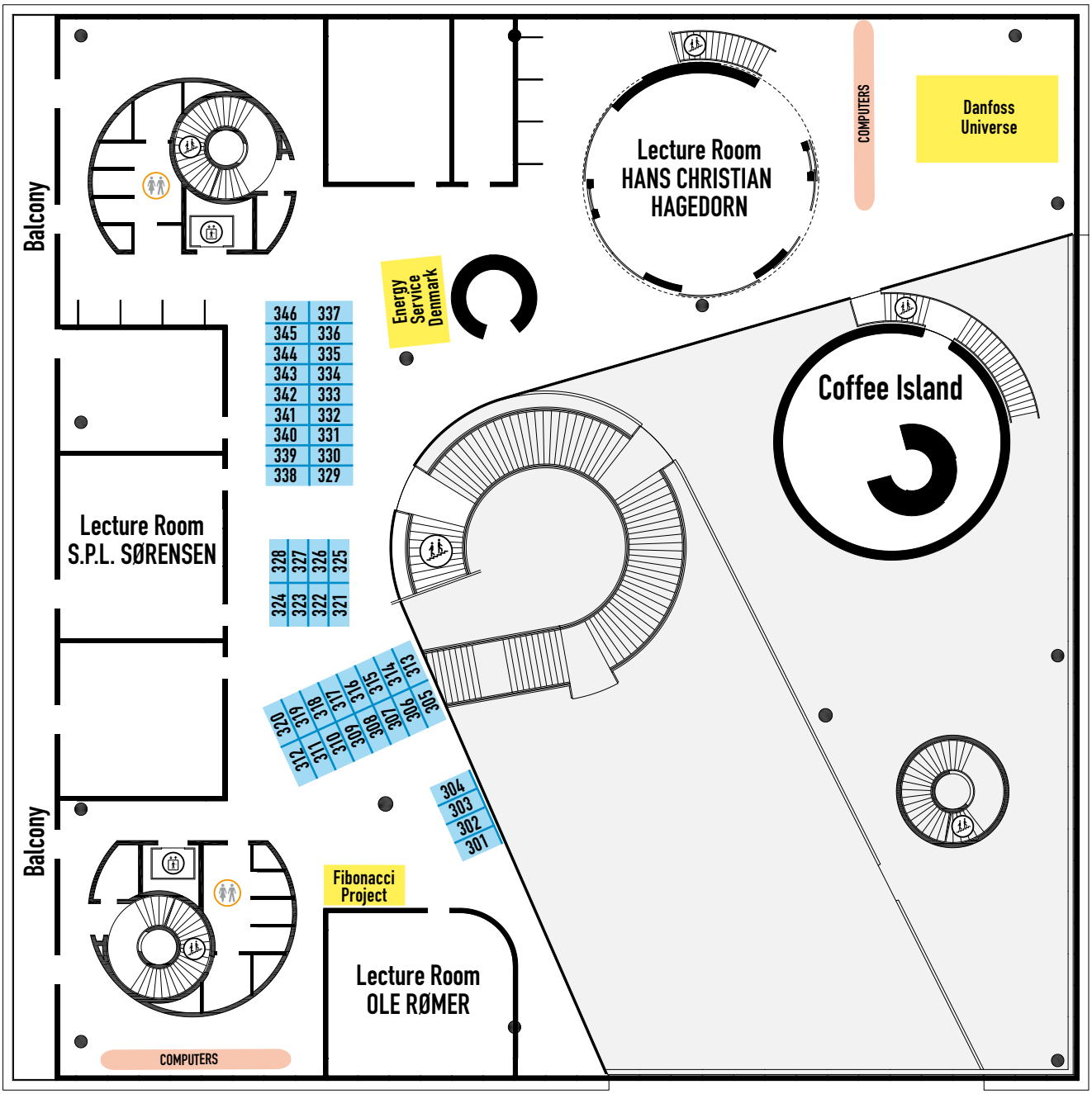
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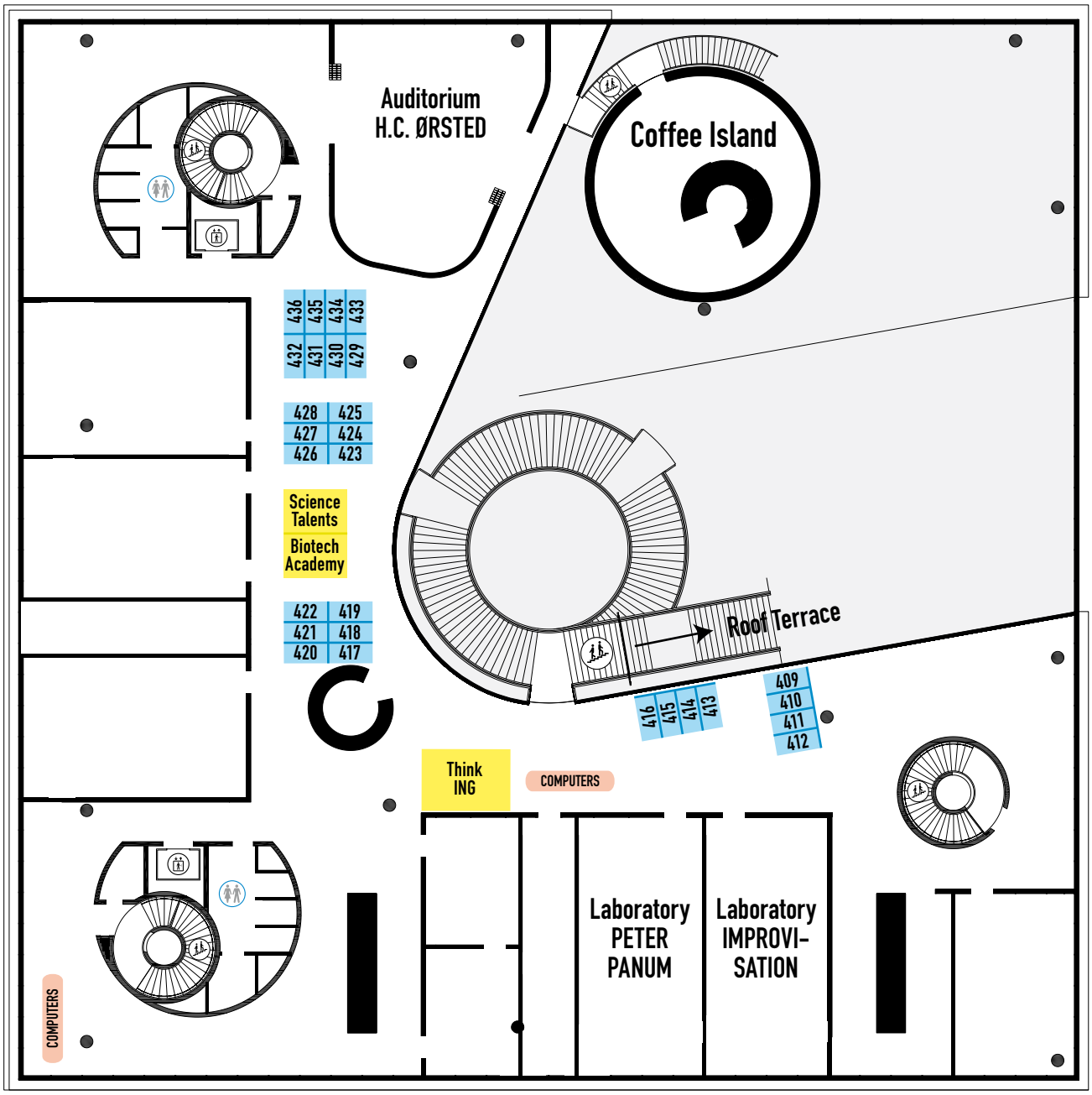
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NATIONAL REPORTS

NATIONAL REPORTS – SCIENCE ON STAGE

Science on Stage Europe offers a platform for European science teachers to share their teaching ideas and concepts. On 16-19 April 2011 the Science on Stage festival is taking place in Copenhagen. Under the motto 'Science teaching: winning hearts and minds', around 200 teachers from across Europe will present innovative teaching ideas in the fields of science and engineering in workshops, on-stage performances, speeches, and at a fair. The participants have been chosen at competitive national events in 27 countries. Below are some examples of activities from different countries.

By Andrew Brown, *Science in School*, issue 18

France: solar-powered curry and musical sunshine

The French organisers of Science on Stage, Science à l'Ecole, collaborated with a national science contest for middle- and high-school students called CGenial. On 15 May 2010, 81 projects were presented in Nantes and 12 teachers were selected to attend the international Science on Stage Festival this year.

Guillaume Lebatard and Amandine Sultana described how their students, aged 11-12, used little more than an old satellite dish and some aluminium foil to make a steaming hot gourmet meal. The foil was used to line the surface of the dish, creating a parabolic reflector capable of concentrating the Sun's energy. This solar cooker proved sufficiently powerful to boil water and even to make a delicious chicken curry!

Mathematics teacher Francis Loret challenged his 14-year-old students to battle against him in the Internet's biggest virtual sailing race, the Vendée Globe. Students were given expert training in the basic principles of sailing and in meteorology and the interpretation of weather maps. They had to grapple with the unfamiliar concepts of spherical geometry which underpin the calculations necessary to sail in the race. Of the 340,000 race participants, Francis's most accomplished student sailor finished in an impressive 216th place.

Mozart, Bach, Beethoven, Rachmaninoff… and the Sun? Who would have thought that in addition to sustaining all life on Earth, the Sun also produces music? Jean-Michel Laclaverie and Elisabeth Martre's students studied the frequency of vibrations emitted by the Sun and used them to show how this 'music' compares to that produced by more traditional musical instruments.

Greece: rainbows and Mars

On 15-16 October 2010, 3,000 visitors – including 2,000 students – flocked to the Hellenic Science on Stage event at the Laboratory Centre for Physical Sciences of Aigaleo. There, teachers and students from across Greece presented 110 high-school projects, including laboratory exhibits and two student performances.

Physics teacher Elias Kalogirou described how his students designed experiments to explain the wonders of the rainbow using their understanding of optics: why is a rainbow coloured, why is it bow-shaped and how can we create one in the classroom? (Elias has also written an article on microscale chemistry for *Science in School.* See Kalogirou, 2010.)

Using everyday materials, Ioannis Gatsios built 10 devices designed to teach his students about the behaviour of gases. One consisted of an inflated balloon attached to a metal bottle. When the bottle was plunged into liquid nitrogen at -190°C, the balloon deflated, illustrating that the volume of a gas is reduced by a decrease in temperature.

Theodoros Pierratos encouraged his students to think like astronauts. He asked them to consider everything that is required to plan a trip to Mars and live on its surface. Classroom experiments helped answer questions such as: how does the solar wind affect electronic equipment, and how can we produce the energy required to maintain a manned base on Mars? (Theodoros's work has also been featured in *Science in School.* See Patterson, 2009.)



By Eleanor Hayes, *Science in School,* issue 17

Germany: chocolate and soap bubbles

On 1 October 2010, 47 of Germany's most creative science teachers and educators met in Berlin to present their teaching ideas and compete to represent Germany at the Science on Stage international teaching festival in Copenhagen, Denmark, in April 2011.

Chemistry teacher Angela Köhler-Krützfeldt and her students investigated, among other things, the science of chocolate, while Dieter Legl and Alexander Frisch developed a play, *The Light at the End of the Tunnel*, which took a trip through the human digestive system. Martin Busch and Patrick Woldt's project was similarly creative: their students were 'hired' as trainees in a fictional nanotechnology company, where they learned all about what the job involved. For younger students, Wilfried Meyer developed a workshop in which primary-school children investigated the shapes, sizes, colours and other characteristics of soap bubbles.

Representatives of these and eight other projects were chosen to join about 350 colleagues from across Europe, celebrating the importance of science teaching, under the motto 'Science teaching: winning hearts and minds', at the Science on Stage international festival.

Hungary: drama in science

On 2 October 2010, one room of the Palace of Wonders science centre in Budapest, Hungary, was packed: as many as 300 members of the public arrived to watch the demonstrations, performances and experiments at the Science on Stage Hungary festival, opened by the president of the Hungarian Academy of Sciences, József Pálinkás.

The audience watched with bated breath as chemistry teacher Endre Szórád set fire to a bank note – without damaging it. (It was soaked in a 50:50 mixture of alcohol and water; as the alcohol burned, the water evaporated, keeping the paper below its ignition point.) Also full of drama was the stage performance by Beáta Jarosievitz's secondary-school students, in which Alice found herself in Chemistryland, and the White Rabbit and his friends guided her through the wonders of chemical reactions. They made ice cream and sorbet using liquid nitrogen, transformed a cup of tea into lemonade and finished the performance with a colourful firework display.

Endre, Beáta and seven other lucky participants were chosen to represent Hungary at the international teaching festival in Copenhagen.

Slovakia: recycling materials for the science classroom

On 4-7 May 2010, the Smolenice Castle echoed with the noise of the Science on Stage Slovakia teaching fair: 50 primary-school, secondary-school and university teachers sharing ideas and inspiration.

Peter Horvath, for example, developed ways to teach the moment of inertia of rotating objects, using very simple materials. In one of his demonstrations, he connected CDs together using screws either close to the centre or close to the edge; how did this affect the moment of inertia?

Other activities included simple experiments about the relative humidity of air, electricity and magnetism; a workshop using coloured wooden blocks to introduce young children to the concepts of torque, centre of gravity and equilibrium; and a presentation about a physics summer camp for children aged 10-15.

The final decision has not yet been made, but representatives of five projects will be heading to Copenhagen in April 2011 to share their ideas with their European colleagues.

Romania: reaching out to the public

For the organisers of the Romanian Science on Stage event, it was important to involve the public and raise their awareness of science. For this reason, the event took place in the city centre park in Cluj, attracting 800 members of the public as well as 200 teachers and 1,200 school students from both primary and secondary schools.

From each school, teams of students took turns at their stand, describing and demonstrating their projects to visitors. Olga Riscau's primary-school students, for example, produced their own paper, used it for their paintings and exhibited the beautiful results on their stand. In the project, Olga and her students were assisted by the science teacher from a local secondary school.

With so many people involved, it was an important event in its own right – as a chance for teachers and school students to present their ideas, and for the general public to see some of the exciting science that is being done in Romanian schools. In addition, a small number of particularly inspiring projects were selected to attend the Science on Stage international teaching festival in Copenhagen.

Among the lucky winners was Laszlo Papp, whose students built a model of Lake Ursu in Transylvania, central Romania, which simulated both the flow of water through the lake and the heliothermic phenomenon that occurs in saline lakes, causing the water further down to be warmer than at the surface. Other winning projects included Olga's paper project, Corina Toma's 'Jacob's ladder', in which a high-voltage electric current climbed two brass rods, Monica Vascan's impressive model of the kidney and Dana Fenesan's project about biology and chemistry used in traditional farms in the Carpathian mountains.

SCIENCE ON STAGE – THE EUROPEAN SCIENCE TEACHER NETWORK

The European initiative Science on Stage – initially launched as Physics on Stage in 1999 – is designed for European teachers to share good practice in science teaching and to discuss (new) ways of improving the quality of science lessons. This is driven by the foreseen future lack of young scientists in all European countries. Science on Stage Europe believes that a good way to encourage schoolchildren to consider a career in science or engineering is to motivate and educate their teachers. Science on Stage Europe therefore provides a forum for science teachers to exchange teaching ideas and gives them access to science teaching resources.

The main sponsor of Science on Stage Europe is the Federation of German Employers' Associations in the Metal and Electrical Engineering Industries (GESAMTMETALL) with its initiative THINK ING.

Science on Stage Europe cooperates with EIROforum, the partnership of European intergovernmental research organisations.

Science on Stage Europe is organised in a bottom-up structure. The basis is the Science on Stage community in the participating countries. Each country has a national steering committee (NSC). The NSCs get together in the Science on Stage assembly and elect the executive board. The board is supported by invited experts and by the Science on Stage Europe office, which is temporarily hosted by the Science on Stage Germany office in Berlin.

The Science on Stage international festivals take place every two years as the culmination of all the national Science on Stage activities. The festivals are organised jointly by a European festival programme committee and a national organising committee.

HOW TO JOIN

Your benefits:

- Get into contact with teachers from other countries
- Exchange and share teaching ideas and projects for your science lessons
- Discuss current issues of (science) teaching with colleagues from all over Europe
- Get the opportunity to present your projects

If you would like to join the Science on Stage activities in your country, please send an e-mail to info@science-on-stage.eu. We will forward the information to the contact person on the National Steering Committee and they will contact you.

Contact:
Science on Stage Europe
Poststraße 4/5 · 10178 Berlin, Germany
Tel. +49 (0) 30 40 00 67 40
info@science-on-stage.eu · www.science-on-stage.eu

FOUNDING PARTNER

The EIROforum
www.eiroforum.org

EIROforum is a partnership of European Intergovernmental Research Organisations (EIROs). The EIROforum partners design, construct, operate and exploit large Research Infrastructures on behalf of the user communities of their Member States and beyond. EIROforum is growing. The European XFEL has recently joined and several other major new organisations have shown interest in joining the partnership, which currently comprises:

CERN	European Organisation for Nuclear Research
EFDA-JET	European Fusion Development Agreement-Joint European Torus
EMBL	European Molecular Biology Laboratory
ESA	European Space Agency
ESO	European Organisation for Astronomical Research in the Southern Hemisphere (European Southern Observatory)
ESRF	European Synchrotron Radiation Facility
XFEL	European X-Ray Free-Electron Laser Facility
ILL	Institut Laue-Langevin

The eight EIROforum organisations have extensive expertise in the areas of basic research and the management of large, international infrastructures, facilities and research programmes.

It is the mission of EIROforum to combine the resources, facilities and expertise of its member organisations to support European science in reaching its full potential.

EIROforum simplifies and facilitates interactions with the European Commission and other organs of the European Union, national governments, industry, science teachers, students and journalists.

By combining international facilities and human resources, EIROforum exceeds the research potential of the individual organisations, achieving world-class scientific and technological excellence in interdisciplinary fields. EIROforum works closely with industry to foster innovation and to stimulate the transfer of technology.

By cooperating on large-scale outreach activities, EIROforum communicates the importance and fascination of science to a wide audience.

By promoting inspiring science teaching, EIROforum motivates and encourages young people to explore scientific subjects, and shows them that science is a rewarding career.

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"THINK ING. informs about the content, the studies and career possibilities of engineers and presents projects to promote sciences, mathematics and technology in schools. | www.think-ing.de."

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Biotech Academy is a non-profit student organization developing case oriented educational material for the Danish high school for the subjects biology, chemistry and biotechnology. The aim is to create interest in the life sciences among high school students and to show science as a creative field.

www.biotechacademy.dk mab@bio.dtu.dk

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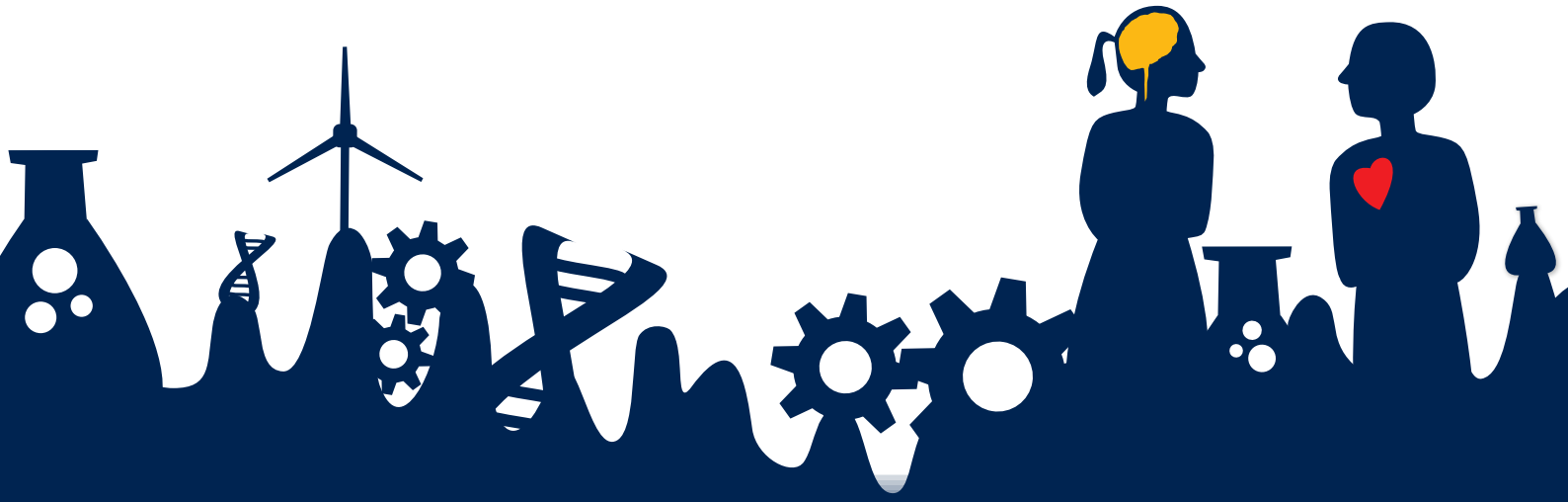

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More information at
www.science-on-stage.eu