SCIENCE ON STAGE 2017 DEBRECEN

FROM TEACHERS FOR TEACHERS

29 JUNE – 2 JULY 2017

INVENTING THE FUTURE OF SCIENCE EDUCATION

SCIENCE ON STAGE FESTIVAL 2017 DEBRECEN | HUNGARY

#SONS2017

GUIDEBOOK

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WELCOME

Dear participants,

on behalf of the European Commission for Education, Culture, Youth and Sport I welcome the participants of the Science on Stage festival.
One of the tasks of the Commission is to identify how to invest in and modernise Europe's education systems, so that they help people to find rewarding work and support economic growth.
Since teachers are the driving force of the education this is where we have to start, and the motto of Science on Stage *„From teachers for teachers"* reinforces this message.
I sincerely hope that during the event the participants from all over Europe will be able to learn good practices from each other and show their excellence in science education.
As a matter of fact STEM teaching is the basis of Europe's long term high tech innovation success we are looking for and a part of education that Europe cannot afford to neglect.
Science cannot survive without creativity and this statement is also valid for science education. This is well reflected in the main theme of the festival *„Inventing the future of science education"*.
After the event, I trust you will come back home with good memories of the city of Debrecen, and full of new ideas on how to improve and promote scientific education.
I wish you all the best!

Sincerely,

Tibor Navracsics
European Commissioner for Education, Culture, Youth and Sport

WELCOME

Dear guests,

it is a great honour for Debrecen to host Europe's most outstanding experts of natural science who have the opportunity to present their innovative and creative experiments, best practices to each other and to those interested, by contesting their knowledge and skills at the same time.
From the aspects of our city and country's future, it is highly important to inspire children to think at the youngest possible age, and implant the love of natural sciences in them, where process in-class experiments have a decisive role.
The festival that has been organized Europe-wide since 2005 aims to promote natural science subjects, make them even more attractive to children and encourage the exchange of ideas between teachers in public education. I hope that this festival can provide opportunity for all participants to make the knowledge to be shared in the framework of physics, chemistry or biology classes even more colourful and exciting, and your experiences of the event will facilitate to make your own presentations more attractive and easier to learn.
I am delighted that through the organization of this event Debrecen can testify its commitment to sciences, and I really trust that during your stay you will have the chance to visit Debrecen's outstanding spectacles.
As the mayor of Debrecen, I am particularly proud that Debrecen has been given the chance to host such a prestigious event as the European Science of Stage festival 2017, the largest educational event organized for the teachers of technical and natural science subjects.
I wish every participant successful and fruitful work, hoping that you will earn plenty of experience during the festival.

László Papp, Mayor of Debrecen

MESSAGES

Every time our festival shows that we have so many excellent STEM teachers in Europe. On behalf of Science on Stage Europe I would like to thank all participants for their input and commitment. I hope that you will find a lot of new ideas and also gain new friends. We invite you to stay in touch with these passionate colleagues through our international activities; please speak to the SonSEu team to find out more. We also warmly thank the Hungarian organisers for the great cooperation and especially the City of Debrecen for being such a wonderful festival host!

Stefanie Schlunk, Chair, Science on Stage Europe,
on behalf of the whole board

Welcome to Hungary, welcome to Debrecen, welcome to the Science on Stage festival 2017!
Some of you surely wonder about the motto of this festival "Inventing the Future of Science Education". It might be clear to everyone that science helps in foreseeing the future, but what do we mean by inviting you to "invent" it? Whereas "foreseeing" is somewhat passive, "inventing" is an active attitude. We foresee what happens in the future without influencing it. On the contrary, inventing means that we are active players in determining our future. Science education plays a crucial role in the development of society, because it forms scientific minds who will be able to solve the global and local challenges of the 21st century. We cannot afford to stay idle, and to just look at what will happen. We have to act, we have to be creative!
Let me recall here Dennis Gábor, a famous scientist of Hungarian origin who won the Nobel Prize in 1971 for inventing holography. The title of his famous book is "Inventing the Future". Following his advice, we should not remain passive spectators but invent the future of science education!
I hope this festival will be a good start for that: I wish you and ourselves much success!

Csaba Sükösd, Chair, Science on Stage Hungary

LIST OF CONTENT

CATEGORIES & GUIDING THEMES

CATEGORIES OF ACTIVITY

FAIR
The fair is the main element of the festival, where all participants present their projects.

ON STAGE PERFORMANCES
In six on-stage presentations teachers present scientific and technical subjects in form of a performance on stage (duration of 20 minutes) in the Great Hall of Kölcsey Convention Centre.

WORKSHOPS
In 21 workshops (50 minutes each) teachers introduce their teaching methods to a group of pedagogues.

HIGHLIGHTS
A selection of projects is presented on the greatest stage in the Great Hall on Friday and Saturday.

SOCIAL EVENTS
Carry on your conversations in a fun and relaxed environment.

GUIDING THEMES

SCIENCE FOR THE YOUNGEST
Projects for pre-school and primary school children.

SCIENCE AND OUR ENVIRONMENT
Projects which use science to explore environmental, health and sustainability issues.

ICT IN SCIENCE EDUCATION
Projects which use information and communication technologies in the classroom.

INCLUSIVE SCIENCE
Projects which address socio-economic, gender and cultural inequalities.

COOPERATION FOR SCIENCE TEACHING
Projects developed in cooperation with schools, the industry or universities.

LOW-COST SCIENCE
Projects which are simple and can be adapted by everyone.

JOINT PROJECTS
Projects developed in cooperation between teachers from different countries, one of whom at least participated in a previous festival.

PROGRAMME

THU 29 JUNE

10:30-15:00	**Arrivals and registration** **Set-up Fair**
15:00-17:00	**Fair and Forum ready to open** **Final clear up**
17:00-18:00	**Opening Ceremony**
18:00-20:00	**Fair and Forum opens – VIP Tour**
20:00	**Dinner**

FRI 30 JUNE

09:00-10:00	**On Stage presentations**
10:00-11:30	**Fair & Forum**
11:30-12:30	**Workshops**
12:30-13:30	**Lunch**
13:30-16:00	**Fair & Forum**
16:00-17:00	**Workshops**
17:00-17:45	**Highlights session and wrap up of the day**
17:45-19:15	**Light dinner and discretionary time**
19:15	**Social events:** **various options**

PROGRAMME

SAT 1 JULY · OPEN DAY

09:00-10:00	On Stage presentations
10:00-11:30	Fair & Forum
11:30-12:30	Workshops
12:30-13:30	Lunch
13:30-16:00	Fair & Forum
17:00-17:45	Highlights session and wrap up of the day
17:45-19:00	Discretionary time
19:00	Gala dinner

OPEN DAY 10:00–17:00

SUN 2 JULY

09:00-10:00	On Stage presentations
10:00-12:00	Fair & Forum
12:00-13:15	Presentation of results, Awards Ceremony
13:15-16:00	Lunch Dismantling Fair & Forum

- **On Stage Performances** (performances or lectures; 20 min.)
- **Workshop** (50 min.)
- **Fair & Forum**
- **Social Events**

TIMETABLE

FRIDAY, 30 JUNE

9:00-10:00 On Stage performances

TITLE	PRESENTER	COUNTRY	ROOM	STAND NO.
Physi-chemistry	László Csatári, István Kozsup	Hungary	Great Hall	49
Project IKARUS	Reto Speerli, Felix Speerli	Switzerland	Great Hall	202
Pupils' night of applied sciences	Daiga Krievina, Mara Rabante	Latvia	Great Hall	56

11:30-12:30 Workshops

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Circus show	Konstancja Nowakowska	Poland	405	181
Energy-scientists – 6-graders explore renewable energy	Dieter Schmidt	Germany	404	185
Engaging students with STEM learning through a magical substance: the water!	Gabriel Pinto	Spain	105	25
Light-interacting materials: Beauty meets Science	Annamaria Lisotti, Rui Baptista	Italy & Portugal	402	168
Sustainable development and biofuel	Stefan Preisig, Gjertrud Jenssen	Norway	102	212
Test and taste	Nelly Fare, Carine Vinsot, Anne Laure Balac	France	403	95
Women Leadership & Entrepreneurship	European Institute of Innovation & Technology		104	

TIMETABLE

FRIDAY, 30 JUNE

16:00-17:00 Workshops

TITLE	PRESENTER	COUNTRY	ROOM	STAND NO.
Beer brewing – a practical application of several scientific principles in biology, chemistry and physics	Patrik Claes	Belgium	102	5
Chemistry experiments with natural and supermarket products	Brigitte Nihant	Belgium	105	12
Journey to the centre of the Earth	Liliana Fernandes, Ana Costa	Portugal	404	112
Organic Light Emitting Diodes – Embedding a future technology in chemistry classes	Daniela Schwarz, Amitabh Banjeri	Germany	405	151
Physics experiments with ultrasonic amplitude modulated transceiver set using low-cost 40kHz techniques	Károly Piláth	Hungary	403	51
Slime moulds – Physarum polycephalum	Hans Mulder, David Teasdale	Netherlands & United Kingdom	402	171
Three projects from the Content Pedagogy Research Program	Hungarian Academy of Sciences (MTA)		104	

SATURDAY, 1 JULY

9:00-10:00 On Stage performances

TITLE	PRESENTER	COUNTRY	ROOM	STAND NO.
Phantoms or Physics?	Nuria Muñoz Molina, Silvio Rademaker	Spain & Netherlands	Great Hall	169
Atomic Life Pictures	Kossuth Lajos Teacher Training Grammar School University of Debrecen	Hungary	Great Hall	

11:30-12:30 Workshops

TITLE	PRESENTER	COUNTRY	ROOM	STAND NO.
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Bring Your Own Device (BYOD)	Csilla Képes	Hungary	105	77
Colours, light and shadow	Poul Hedegaard	Denmark	403	16
Natural clear	Szilvia Tóth, Zsuzsanna Napsugár Tóth-Gál	Hungary	404	47
Return home	Honorata Pereira, Fernando Jesus	Portugal	405	209
Rise and Shine: Chemistry at Breakfast Time, Italian versus English style	Francesca Butturini, Gordon Kennedy	Italy	102	208
National Instruments' presence in Education	National Instruments		104	

SUNDAY, 2 JULY

9:00-10:00 On Stage performances

TITLE	PRESENTER	COUNTRY	ROOM	STAND NO.
Under pressure	Aleš Pilgr, Janet Prokešová	Czech Republic	Great Hall	219
Techno-Lab Kursaal	Francisco Jesús Rivera	Spain	Great Hall	232

PERFORMANCES

PHYSI-CHEMISTRY

László Csatári, István Kozsup
Friday, 30 June, 9:00-10:00

How to complement the dry, school-bookish curriculum with the help of experiments?
On stage we perform physical and chemical experiments which are meant to be really spectacular as students expect show elements that are hard and perhaps unnecessary to provide at school.
We also wish to give special experience to students who have not learned either physics or chemistry before, but are interested in nature. There is not any scientific explanation at all, we just give a taste for sciences. We concentrate on the sight and sound effects to raise students' interest without direct teaching.
We have refined our show of experiments for years through working together on several school occasions and project days. Now it is supplemented with show elements especially for the general public. Highlights of the experiments: firewall-redefined, making fire with water, there is fire but nothing is burnt, flying objects, smoky experiments, lasers and friendly helium.

PROJECT IKARUS

Reto Speerli, Felix Speerli
Friday, 30 June, 9:00-10:00

We chose to go to space! Not because it is easy, but because it is hard! The crowning conclusion of this project were several weather balloon missions to the edge of space. Teaching objectives of the interdisciplinary project were topics such as natural sciences, meteorology, Swiss geography and rocket science. In the latest project three space missions into the stratosphere were successfully carried out in May 2016. The balloon probes of the pupils have reached an altitude of 32,000 meters above ground level and captured with the built-in cameras spectacular aerial photographs of Switzerland. In order to achieve this goal, the class has intensively worked on the relevant topics and acquired the necessary knowledge and skills by doing research and thoroughly experimenting with the physics phenomena using everyday materials. In our lecture, we present our IKARUS project, and the didactics behind it, as well as the original footage and a few selected and simple experiments on stage.

PUPILS' NIGHT OF APPLIED SCIENCES

Daiga Krievina, Mara Rabante
Friday, 30 June, 9:00-10:00

Every great person started small and complexity evolves from simplicity as long there is a chance to improve. You will be able to see this during our performance! Pupils' night of applied sciences allows to learn, to show and to understand something new using everyday substances and items. During the performance viewers will not only be able to see how ideas are being created but they also become part of the show. Members of the audience will be able to slip into the role of pupils in the night of applied sciences and learn to create a real orchestra of experiments.

PHANTOMS OR PHYSICS?

Nuria Muñoz Molina, Silvio Rademaker
Saturday, 1 July, 9:00-10:00

Ghosts, spirits and a long list of supernatural happenings have fascinated humanity as far back as we can recall. Well known writers made numerous references in their works about ghosts during the romantic period. Therefore we are going to travel back to the 19th century and we will transform our stage into a theatre of that time. We shall demonstrate some of the great historical feats of „magic": Pepper's Ghost Effect, Flying people, the Magic Box, Houdini's escapism trick and more.
We will also give some examples of modern mysteries, which can be solved by the correct application of our scientific knowledge, such as Vic Tandy's "haunted laboratory", the fearful Ouija board game, the Chi Wheel and other.
And we will show how these experiments can be adapted to the classroom and demonstrate that Physics is behind every single trick. We shall illustrate our ideas with models and life sized demonstrations.
It's not magic – it is just science we sometimes cannot see!

ATOMIC LIFE PICTURES

Kossuth Lajos Teacher Training Grammar School University of Debrecen
Saturday, 1 July, 9:00-10:00

In our school the 17-year experience of dramatizing the history of physics proves that even in teaching science subjects an important role can be attributed to drama practice. In our projects students act out authentic or fictional scenes from the history of physics and while doing so they also make experiments. This method has, among others, three very important benefits. On the one hand the lines memorised and the experiments carried out offer students scientific knowledge in a direct, experience-like way. On the other hand, as laws and phenomena are typical of a given era, the scientists personated and their role in the history of science will be better imprinted. Among its long-term effects the most important one is the positive reshaping of the participants' attitude towards sciences. This activity offers a sense of achievement not only for those who do well at physics.
In the actual play you can have a peep on the world of atoms.

UNDER PRESSURE

Aleš Pilgr, Janet Prokešová
Sunday, 2 July, 9:00-10:00

VIDA! Science Centre has its own science theatre. Every year more than 1080 science shows are presented there. Every four months a new show is created. A team of experts – university graduates and students, PhDs and field experts – works on each show and for each show a different dramatic language is chosen. Different drama techniques are used such as a circus, stand-up, TV, magazine. This style helps to convey complex scientific topics, complicated physical and chemical laws to a wide audience.
For the Science on Stage festival VIDA! Science Centre brings the Under Pressure show. The main theme is a conflict between two presenters. Each understands pressure to be something different – a threat or a starting point.
"Do you feel pressure in your life? Don't be afraid! Without pressure we wouldn't be alive!"

TECHNO-LAB KURSAAL

Francisco Jesús Rivera
Sunday, 2 July, 9:00-10:00

This project originated from different ideas of the students. We started this project (during break times and voluntarily) as a workshop, which was open to all students. We brainstormed and through consensus we decided what issues we are going to discuss. We try to resolve specific problems to improve the lives of all students – independent of their difficulties. Older students help the younger ones. With this methodology, the number of participants and the quality of the projects has increased. Participating students help in class when we are teaching topics related to our projects.

Projects:
1) Guide Robot: it helps a blind classmate to move around the school.
2) How is Algeciras?: showing information about our city in visual and sonorous support (3D, AR, etc.).
3) Control of devices by voice.
4) Simple projects with sensors.

WORKSHOPS

CIRCUS SHOW

Friday, 30 June, 11:30-12:30 | Room 405

The „Circus show" workshop refers to teachers who are looking for activating methods by combining different areas of life and exploring the role of physics. So we will move to the famous Copernicus circus to take part in the show and to admire the performances of acrobats, jugglers and trainers. In our show we will see how one group of students becomes circus performers who perform gymnastic pyramids, walking on the balance beam, plates and hoops juggling, and train the dragon. At the same time, the second group of students will do physical experiments referred to the show. The main purpose is to present the impact of centre of gravity, inertia, Magnus effect, centrifugal force or resilience on the circus show. The main aim of the project is answering the question whether tightrope walking, juggling, hat throwing and acrobatic shows are supernatural or whether is it just pure physics.

ENERGY-SCIENTISTS: 6-GRADERS EXPLORE RENEWABLE ENERGY

Friday, 30 June, 11:30-12:30 | Room 404

Our school, the Integrierte Gesamtschule Oyten, is an integrated comprehensive school with reform pedagogical approaches. The workshop will start with a short introduction of what „Theme Oriented Education" means. Afterwards the workshop will focus on the basic and sophisticated experiments the pupils perform within these topics:

- Electrical energy from the sun
- Electrical energy from the wind
- Warmth from the sun
- Electrical mobility
- Low-energy house

The participants of the workshop will get an impression of the experimental and the corresponding working materials. The workshop will end with a short discussion and how we plan to improve the project.

ENGAGING STUDENTS WITH STEM LEARNING THROUGH A MAGICAL SUBSTANCE: THE WATER!

Friday, 30 June, 11:30-12:30 | Room 105

In this workshop, contextualized experiments and inquiries to investigate STEM topics are proposed. These topics include a variety of physicochemical properties (e.g. density, miscibility, boiling point, refractive index and heat capacity), chemical reactions, evaporative cooling, etc. Examples of questions to solve are: Where would an ice cube melt faster – in pure water or in saline water? What have the botijo (Spanish water cooling pitcher), the African pot-in-pot refrigerator, and the drinking bird toy in common? What happens when ethanol, oil or other liquids are added onto an ice cube? Can the osmotic hydration rate of beans easily be measured? Does it change with temperature? What happens when a drop of water is poured into hot oil? Why? How does artificial snow work? And self-heating drinks? Water is present in all cases and through these experiences we learn about other interesting facts as ocean thermohaline currents or applications as the use of condensing boilers.

LIGHT-INTERACTING MATERIALS: BEAUTY MEETS SCIENCE

Friday, 30 June, 11:30-12:30 | Room 402

Materials Revolution is here! Engage and experiment with light interacting materials. An inspiring workshop mixing Physics, Art &Technology to boost students' scientific knowledge and experimental skills while spurring their creative thinking and innovator's potential.

Light may be considered as a "material" in itself . "Building with light" is now possible thanks to aesthetic and functional properties of new materials such as dichroic sheets, plastic micro-optics, fiber optic textiles and many more!

Light manipulation is behind many a key-enabling technology for a sustainable society. Explore fluorescent acrylic sheets and their mechanism of light transmission testing their efficiency as solar concentrators; evaluate cool roof paints potential to tackle the *urban heat* island issue; discover indoor photovoltaics for IoT; imagine rural streetlamps based on photoluminescent pigments.

From MoM-Matters of Matter: Future Materials in Science Education project www.mattersofmatter.eu

SUSTAINABLE DEVELOPMENT AND BIOFUEL – ENERGY FROM WOOD

Friday, 30 June, 11:30-12:30 | Room 102

The participants will measure and calculate the volume/density of different types of wood using small samples (cubes). They will learn about the energy contents of the different tree types and then use this to calculate the total energy content of a given volume of wood. What is important for the volume calculation of a whole tree is the height. The participants will have the chance to try different ways to measure/calculate the height of a tree.
The workshop is an extract of an interdisciplinary day project; participants will understand the project plan and will be able to implement the project at their own school.
Hands on factor: high.

TEST AND TASTE

Friday, 30 June, 11:30-12:30 | Room 403

The pupils, guided by three teachers, created a model to avoid dietary deficiency thanks to electronics, infrared rays and removable perforated cards, which correspond to recipes and are divided into three categories: starters, main courses and desserts. We will show you the steps of our invention and beside we will show you various activities to do at school.
With younger pupils you will be able to perform experiments, work on the food pyramid, understand the link between dietary deficiency and diseases and create perforated cards (=recipes)
With older pupils you will be able to study the spectra of the visible light including the infrared wave, code information in binary and make a little of combinatorial logic.
Imagine your pupils performing experiments and drawing conclusions; imagine them welding electronic circuits, creating punch cards, and understanding how the electronic world works.
What about pressing a button and discovering what is lacking in your menu for dinner?

BEER BREWING – A PRACTICAL APPLICATION OF SEVERAL SCIENTIFIC PRINCIPLES IN BIOLOGY, CHEMISTRY AND PHYSICS

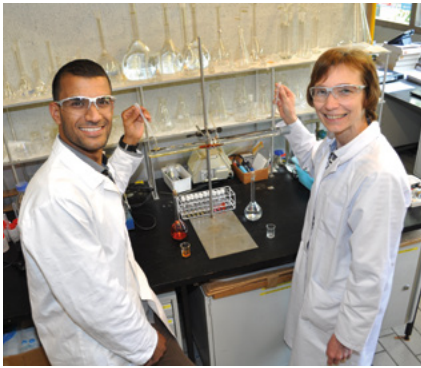
Friday, 30 June, 16:00-17:00 | Room 102

Beer brewing is an excellent way to explain and apply several topics in biology, biochemistry and even physics and chemistry. It is also possible to introduce inquiry-based learning in the lab. The brewing process can be done with a low-cost setup in the school lab. During the brewing process several parameters have to be measured (density, acidity, conversion of starch into glucose, etc.), and brewing is an excellent way to talk about processes like germination, enzymatic conversion of starch, fermentation, protein denaturation, isomerisation and other. The process “only” requires three hours and some short moments of aftercare in the following days. Fermentation can be done in simple plastic PET-bottles. Several tips will also be provided on how the student can experiment by altering parameters like brewing temperatures and time, pH, aeration during fermentation, use of fining agents and subsequently measuring the effects of these alterations on the final beer.

CHEMISTRY EXPERIMENTS WITH NATURAL AND SUPERMARKET PRODUCTS

Friday, 30 June, 16:00-17:00 | Room 105

Scientific knowledge rests on experimental data integrated in an interpretative framework. It can always be challenged by new experiments and/or by a new ways of conceptualizing the data. During our workshop, the teachers will have the opportunity to see several experiments starting from products which can be easily found in nature or supermarkets. These experiments can contribute to develop skills that are addressed in different sections of the school curriculum: the acid-base concept and the setting-up of the pH scale using natural products, e.g. Although not a direct part of the school curriculum in most countries, experiments with light sources (fluorescence) are particularly attractive and allow consolidating previously acquired knowledge on chemical bonds, acid-base and redox reactions. The addressed skills will be identified for each type of experiment so that it will be easier to implement classes based on the data sheets.



JOURNEY TO THE CENTRE OF THE EARTH

Friday, 30 June, 16:00-17:00 | Room 404

In this workshop teachers will have the opportunity to engage in a fabulous trip, along with Professor Lidenbrock and his crew, in an adventure that will allow them to look at our planet in a completely different perspective. They will meet an awesome crew, make journey plans, select and build the most adequate transport, learn awesome facts about a wide span of subjects, from animals and plants to volcanoes or food. Along the path, teachers will be invited to experiment arts and crafts, build human body cells, code robots and drones, investigate, learn and share experiences. In a more playful moment, they will be able to make a volcano erupt, using simple and everyday items (say goodbye to the stinky vinegar), and, who knows, discover a new animal species!!! In the end there will be some minutes for teachers to try and use an Educational APP, called Plickers, which was used along the project with the students, to perform formative evaluation tasks (newcomers will have the chance to learn how it works and, along with long term users, acknowledge some tips to use in primary school classrooms). Teachers are invited to bring their own devices in order to experiment and get familiarized with the suggested educational APPs.

ORGANIC LIGHT EMITTING DIODES – EMBEDDING A FUTURE TECHNOLOGY IN CHEMISTRY CLASSES

Friday, 30 June, 16:00-17:00 | Room 405

Semiconducting polymers are an example of cutting edge research technology leading to innovative applications as flexible or transparent electronic devices. These high-tech materials are already being used in so called Organic Light Emitting Diodes (OLED) or Organic Photovoltaic (OPV) modules. In this workshop the participants will examine their own smartphone display and learn about RGB-matrix technology. In the lab-phase the participants will have the opportunity to build own OLEDs in a hands-on experiment. Afterwards, the theory of semiconducting polymers and the electroluminescence (the principle behind the light emission) will be explained to the participants using special learning models and multimedia tools. An experimental kit, including all necessary materials for building OLEDs, will also be introduced during the workshop.

PHYSICS EXPERIMENTS WITH ULTRASONIC AMPLITUDE MODULATED TRANSCEIVER SET USING LOW-COST 40KHZ TECHNIQUES

Friday, 30 June, 16:00-17:00 | Room 403

I developed amplitude-modulated ultrasonic transceiver systems that use a low cost distance measuring sensor pair. These sensors operate at a frequency of 40 kHz. The carrier signal (40 kHz) is modulated with an audible tone (400 Hz) signal. The results on the receiver site after the demodulation are hearable sounds because the device produces 0.85 cm wavelength sound wave in the air. This method helps to demonstrate the Lloyd's mirror experiment or Young's double slit experiment in ultra sound range. But it also helps to demonstrate a Michelson-interferometer or an A4-sized paper engraved Fresnel-zone plates, which will allow the focusing of ultrasounds. The results of these ultrasonic experiments are hearable with small active speakers. In my workshop you will be able to try out these experiments.
During the workshop we will provide the transceiver systems for 8 groups, as well as mirrors, slits, and Fresnel lenses made of paper for the experimentation.

SLIME MOULDS – A HANDS ON INTRODUCTION

Friday, 30 June, 16:00-17:00 | Room 402

In this workshop we will teach you what slime mould is, discuss the experiments we have conducted ourselves and make suggestions about how you can use it to develop projects in your own school. We will explain and share some teaching materials which we have developed. Additionally, all participants will have the opportunity to setup and take away their own starter culture of slime mould in a self-poured agar plate. We hope this workshop will provide the necessary theoretical underpinning, teaching resources and practical experience to allow you to set up your own slime mould projects.

BRING YOUR OWN DEVICE (BYOD) – A NEW WAY OF LEARNING

Saturday, 1 July, 11:30-12:30 | Room 105

The aim of the project is to motivate the students using their devices as educational materials. I am going to show the wider usage possibilities of the electronic devices by working with applications. By the expansion of the learning methods we can ensure the opportunity of the device usage, which are means of subsistence for this generation.
I would like to present during the workshop what kind of possibilities can be found in the different applications, websites, how can these devices facilitate the learning, what is the hidden opportunity of the augmented reality during the education.
Based on my experience, the programmes increase the students' participation, can be personalised and furthermore increase the cooperation and the communication between the students.
The creative online activities can increase the interactivity and meanwhile decrease the digital divide.
Don't ban it, use it well!

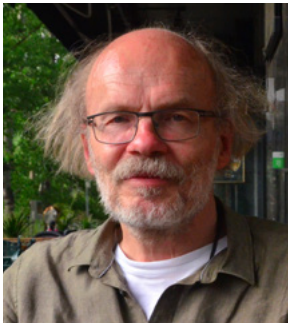
3-DIMENSIONAL VISION AND ITS ILLUSION IN CINEMAS

Saturday, 1 July, 11:30-12:30 | Room 402

This workshop starts with an overview of the sequence on the illusion of 3-dimensional vision, based on an advance organizer which can be used in class. I will use this opportunity to give a brief explanation of the concept of advance organizers. The workshop's main part is your activity to try and to investigate the technique of anaglyphs independently. You will experiment with anaglyph glasses and colour filters and assess which colours can pass. To achieve this we will need some preparations, for example how 3-dimensional vision actually takes place and how the additive colour system works. The workshop concludes with a discussion about potential additional topics regarding 3-dimensional vision and their applications.

COLOURS, LIGHT AND SHADOW

Saturday, 1 July, 11:30-12:30 | Room 403



In this project, students plan and carry out experiments in which they investigate the rules for additive colour mixing and the position of colours on the colour circle, to find explanations for coloured shadows and complementary colours.

Besides colour mixing and coloured shadows you can work with these experiments:

- Complementary colours and afterimages (*)
- Colour vision and afterimages (*)
- Colour blindness (*)
- The Bohr atomic model and light sources
- How to measure wavelengths using rulers and cheap gratings, or using a smartphone to take pictures through a grating
- Diffraction and the meaning of n, d and φ in the grating equation $n \cdot \lambda = d \cdot \sin(\varphi)$, examined using cheap laser pointers and gratings with different values of d
- The rate of photosynthesis, using different colours of light, and counting the number of bubbles rising from the cut end of a piece of Elodea (pondweed) or Cabomba.

(*) Please bring your own computer if you want to do some of these computerized experiments.

NATURAL CLEAR

Saturday, 1 July, 11:30-12:30 | Room 404

Our hypothesis is that using tales in teaching natural sciences makes it easier for students to understand the basic principles of the world surrounding them. It is important because teachers must pay attention not only to the students' spiritual development but also their physical and mental upbringing. Based on a self-written framework the students' task is to plan experiments connected to salt in biology, chemistry and geography lessons using everyday materials and ICT tools. Our project shows that natural sciences can not only be funny but interesting and easily understandable. After performing the tale there is a possibility for getting acquainted with the themes in details, displaying and observing the prepared models as well as carrying out some simple experiments. The participants are provided with some ideas how they can adapt the project to their own local conditions and circumstances. With a video conference (e.g. Skype) even our students can join the workshop and relate their experiences in the project.

RETURN HOME

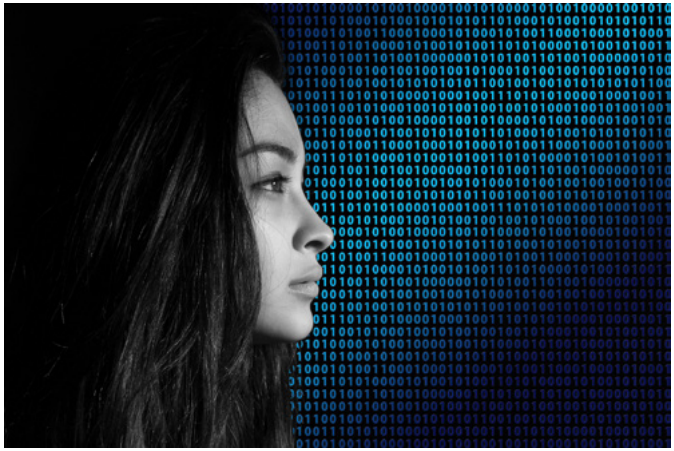
Saturday, 1 July, 11:30-12:30 | Room 405

Return Home – Learning by project is a new teaching methodology that promotes the development of 21st century skills by encouraging research, innovation and liaison with the business world.
So, we will start by describing the profile of today's students. We will relate the profile of students with the skills required in the 21st century. We describe how we evaluate competencies and how we draw the profile of students' functionality. We will use the alumni functionality profile to establish work groups and promote collaborative work. Having said that, we will use a case study to explain the methodology of the Return Home project, through the phases of inquiring, selection, establishment of partnerships, research, analysis, conclusion and presentation. The workshop will be developed using digital tools (padlet, learning design ...) so participants should have their laptop or tablet.

RISE AND SHINE! CHEMISTRY AT BREAKFAST TIME

Saturday, 1 July, 11:30-12:30 | Room 102

In this workshop we will demonstrate the practical aspects of two laboratory experiences from the Rise and Shine project: fermentation and the use of eutectic mixtures in the preparation of the classic Sicilian granita (græ|ni:ta). The aim is to give participants enough information to allow them to repeat the experiments using their own materials and adapt it to their own contexts.
We will first demonstrate a simple apparatus for measuring the carbon dioxide produced by brewer's yeast during the anaerobic fermentation of different carbohydrate sources at various concentrations and how the data can be collected live to show the kinetic profile of the process over time. From this data it is possible to calculate the efficiency of anaerobic fermentation.
In the second demonstration we will show how mixtures of salt and crushed ice in carefully chosen proportions can be used to reach temperatures which are low enough to permit the ingredients of the granita to congeal.



WOMEN LEADERSHIP & ENTREPRENEURSHIP

Friday, 30 June, 11:30-12:30 | Room 104

HeforShe, Junior Achievement, Skool, Ernst & Young, European Association of Teachers, the European Institute of Innovation & Technology, the interaction of attending science teachers in the audience.

Discussion topic 1:
Skills in the 21st century – what skills our children need in order to succeed and not to be replaced by robots (digital, entrepreneurship, transversal?) STEM – skills shortage in Europe and growing employment potential.

Discussion topic 2:
Women empowerment – what problems women face in their career/ jobs, especially in areas with gender stereotypes (e.g. IT, engineering, executive management)? Who could help women and how – concretely what should be done and how the education system can help to prepare for that?

THREE PROJECTS FROM THE CONTENT PEDAGOGY RESEARCH PROGRAM OF THE HUNGARIAN ACADEMY OF SCIENCES (MTA)

Friday, 30 June, 16:00-17:00 | Room 104

In a 4 year project started in 2016 and financed by MTA 19 research groups work on innovative teaching methods, each proposition tested in classroom experiments conducted in close cooperation of researchers and teachers. Three groups will present results obtained in the first year of activity:

Dr. Edina Kiss
(MTA-ELTE Research Group on Inquiry-Based Chemistry Education)
Designing, realizing and interpreting some traditional chemistry experiments by the students themselves and development of their scientific thinking skills

Prof. Zoltán Gingl
(MTA-SZTE Research Group on Technical Informatics Methodology)
Construction of universal open-source hardware and software to support multidisciplinary experimental education

Dr. Péter Juhász
(MTA-Rényi Research Group on Discovery Learning in Mathematics)
The Discovery Learning Method of Lajos Pósa: Teaching maths in an enjoyable and efficient way

NATIONAL INSTRUMENTS' PRESENCE IN EDUCATION

Saturday, 1 July, 11:30-12:30 | Room 104

Mentoring young minds is the most important goal of NI Hungary's Community Relation programs, since 2010 hundreds of talents met robotics and science from a different point of view. Nowadays we reach schools not only in Debrecen: we have connections with more than 150 institutions in different parts of Hungary, Romania, Slovakia and Serbia.
We offer the schools LEGO® MINDSTORM® NXT kits and NI myDAQ. Some schools also use LEGO® MINDSTORM® EV3 and NI myRIO. With these tools the next generation of innovators can meet the newest technologies and use the same instruments as the best engineers all over the world. Thanks to our NI Mentor Program more than 4 500 students can learn science in a special way and meet graphical software.
We not only equip and educate the younger generations, but we also provide them the opportunity to show the world their achievements on our competitions, such as the First LEGO League and the World Robot Olympiad. We are continuously working on our STEM relations and hope that we can inspire other enterprises to mentor young talents!


FAIR

ADVENTURES IN THE REALM OF NATURAL SCIENCES (ARNS)

Stand number	**104**
Country	Hungary
1st teacher	István Tóth
Institution	Székesfehérvári Vasvári Pál Általános Iskola
2nd teacher	Istvánné Tóth
Institution	Tóvárosi Általános Iskola
Subject	Maths, Physics, Biology, Computer Science, Technology, Geography

This is an integrated playful competition for students in the 7th grade. The students compete in teams by participating in the trials. The team is considered as a family during the competition. The family symbolizes the togetherness, where everything has to be done for the child's success. The members of the team are: the child, which has to solve most of the problems; the patrons, which are passive helpers and do as if they would be the parents; and the master as the child's smartest helper. The competition requires theoretical and practical knowledge. The playfulness is very important in the competition.

BIO-GARDEN IN THE GROUP „SUN"

Stand number	**105**
Country	Bulgaria
1st teacher	Mariyanka Hristova
Institution	Kindergarten "Radost"
2nd teacher	Tsanka Nencheva
Institution	Kindergarten "Radost"
3rd teacher	Ivanka Toteva
Institution	Secondary school "Vassil Levski"
Subjects	Physics, Biology, Astronomy

The projects by the Radost Kindergarten were based on the introduction and observation of scientific devices like microscopes and telescopes. The aim of the first one is to increase environmental awareness in children; in particular growing organic vegetables by introducing them to the use and purpose of microscopes. By growing plants the children learned about seeds and obtained skills to observe and care for vegetables.
In the development of the projects, the kindergarten was assisted by the physics and astronomy teachers of a secondary school. The other project "Club – Little astronomer" is a collaborative work of the school and the kindergarten.

BRINGING THE SCIENTIFIC METHOD TO THE YOUNGEST

Stand number	**106**
Country	Spain
1st teacher	Teresa Pastor Ramos
Institution	Ciutat d'Alba
2nd teacher	Mercedes Aguas Mestre
Institution	Ciutat d'Alba
Subjects	Physics, Biology, Chemistry

Scientific method is firmly based on experiments, usually encoded in a mathematical way. This implies a difficulty in bringing the methods used in science to the level of primary school where there is only a basic level of mathematics. The goal of our activity is to create a joint project between teachers and parents that work as scientists to bring the methods of science to the young students. To do that, the scientists bring the ideas and methods that will be tuned by the teachers to fit in the curriculum of the students. The experiments are done during school time so that it is completely integrated in the activities of the science week at the school.

CHILD LABOUR IN MINING, BUT WE CAN GO TO SCHOOL!

Stand number	**107**
Country	Germany
1st teacher	Frank Walter
Institution	Christian-von-Dohm-Gymnasium Goslar
2nd teacher	Ute Eckhof
Institution	Christian-von-Dohm-Gymnasium Goslar
Subjects	Maths, Chemistry, Geology, History, Social sciences, Politics, Ethics, Art

For many kids around the world school is still a privilege one first has to earn through hard work. Students learn about historical changes and political regulations from medieval times to today in Germany and around the world. Students research countries in which child work is still accepted, analyse a film report about the status of child workers in Bolivia and do practical experiences and experiments as stamp boys and miners. The project design is cross primary and secondary levels, group-overlapping and multidisciplinary.
In an open inquiry based set up, students learn in mixed teams including high performers in a self organised learning circle and do an excursion to an off campus learning.

COGNITIVE SKILLS DEVELOPMENT FOR ELEMENTARY SCHOOL STUDENTS THROUGH EXTRACURRICULAR ACTIVITIES

Stand number	**108**
Country	Ukraine
Teacher	Halyna Hodovana
Institution	Kharkiv Karazin University, Children and Youth Center for Creative Activities of Kharkiv Municipal Council
Subjects	Maths

Joint creative activities of children with their parents are a key element for the development of a successful individual. Besides enhancing the school curriculum and providing an alternative plane for introducing children to physical and mathematical concepts as well as their practical implementations, such experience can model intellectual challenges encountered both in school and subsequently in life, stimulating acquisition and evolvement of cognitive skills essential for a child's overall development.

ENERGY TRANSFER

Stand number	**109**
Country	Belgium
Teacher	Philippe Wilock
Institution	Centre Scolaire du Sacré-Cœur Charleroi
Subjects	Physics

The project presents different experiments of physics topics such as energy, mass and sound waves. All are carried out with simple material and can illustrate the theme "Living and traveling in space".

HELPERS OF THE FOOD INDUSTRY

Stand number	**110**
Country	Hungary
1st teacher	Katalin Lázár
Institution	Tóth Árpád Gimnázium
2nd teacher	Eszter Derecichei
Institution	Tóth Árpád Gimnázium
Subjects	Biology, Chemistry

A complex, microscopic and experimental investigation – which requires interaction from participants – is on display to present the work of the TÁG-TUDOR Öveges Laboratory and think tank. Our aim is to raise the students' attention to the role of yeast in our daily life (leavening) and to ist wide applications in various industries (fermentation). Observing them under a microscope magically makes the invisible visible. By carrying out the experiment, students gain spectacular experiences; however they are also taught the dangers of the releasing gas. In addition, we can highlight that the amount of carbondioxide does matter: health and safety practices in wineries.

IMPROVEMENT THE DIGITAL LITERACY OF TALENTED STUDENTS AND ROBOT PROGRAMMING IN PRIMARY SCHOOL TISZI

Stand number	**111**
Country	Hungary
Teacher	Andrea Éva Kőteleki
Institution	Tiszaújvárosi Szent István Katolikus Általános Iskola
Subjects	ICT, Computer Science

Our school has successfully applied for creating a project to improve and manage the digital literacy of talented students. Within the framework of this program we have started robot programming courses with junior primary students. The goal was to develop their skills, especially within algorithmic thinking. The students have e.g. created different models using the LEGO WeDo Education Set. In general we work in cooperative groups during the IT lessons, but we also organize afternoon programs for parents where we do programming with them and present them our results. I would like to show these methods and tools used in teaching IT to junior primary students.

JOURNEY TO THE CENTRE OF THE EARTH

Stand number	**112**
Country	Portugal
1st teacher	Liliana Fernandes
Institution	Agrupamento de Escolas de Vila Verde
2nd teacher	Ana Costa
Institution	NUCLIO
Subjects	Maths, Social studies, Language

Students take a trip into the centre of planet Earth, along with book characters, investigating and building models of the different parts of the planet. Autonomous investigation plays an important role along the project, as students are asked to fulfil a number of different tasks, so they can learn and then present to their pears.

LABORATORY MICE

Stand number	**113**
Country	Spain
Teacher	Maria Montaña Cardenal Domínguez
Institution	Colegio San Jorge
Subjects	Physics, Chemistry

“Laboratory mice” is a project of scientific divulgation directed to primary students. This is an innovative initiative because it uses the radio medium to bring science to the youngest students in a fun way. The project has several parts: first, the children have to work with a series of audio-visual materials in the classroom; later, the students work on the topic through scientific workshops and eventually develop radio podcasts in order to present the gained knowledge.

LITTLE EXPLORERS – KIDS DISCOVER THE WORLD OF SCIENCE

Stand number	**114**
Country	Poland
Teacher	Emilia Khan
Institution	1st Polish-English Nonpublic Kindergarten with Nursery Division “Little Explorers Academy” in Rogoźno
Subjects	Physics

Knowing that children already are curious researchers and explorers, they learn by doing, picking up their experiences “by the hand, heart and head”, this project presents 10 experiments about air and its properties. It is well known that the existence of the air we breathe is an abstract phenomenon for a child and therefore, on the other hand, the most interesting discovery. When we ask children: “Is there something inside the empty glass?” We will get the following answer from a preschooler: “There’s nothing.” I decided to change that and encourage children to explore the common world through simple experiments that can be carried out also in the house.

MAGNETISM IN OUR DAILY LIFE

Stand number	**115**
Country	Spain
Teacher	Nagore Lekerika Moreno
Institution	CPEIP Ramón Sainz de Varanda
Subjects	Science, Physics

When the students investigated what objects are attracted by magnets, they realized only nickel, cobalt and iron are attracted. Roller coasters and some elevators brake using magnets, which they demonstrated using with a Lenz tube made out of a cardboard tube, aluminium foil and a cubic neodymium magnet. Ferric components are separated with magnets. They proved it with a jar, aluminium filings and iron filings. Using magnets, two CDs and a hot-glue gun, they demonstrated how the Magnetic Levitation Train or Maglev train works. They made a compass inserting a magnet into a Styrofoam® ball and using a magnet, paper and iron filings they showed how a compass points to the magnetic north of the Earth. And many more things.

MAGNETS AND STATIC ELECTRICITY

Stand number	**116**
Country	Latvia
Teacher	Sanita Sabanska
Institution	Zemgale region Human Resource and Competences Development Centre
Subjects	Maths, Physics

The Zemgale Region Human Resource and Competences Development Center (ZRKAC) organizes various activities for pre-school children and school students to educate them in science and technology. During these activities scientific experiments and demonstrations are conducted in an easy and comprehensible way to understand technical phenomena. The objective of these activities: students' early familiarization with natural and technological developments in order to develop their research skills and promote their interest in natural sciences.

MATERIALS AND TECHNOLOGIES

Stand number	**117**
Country	Italy
Teacher	Federico Andreoletti
Institution	BRESCIA – IST.DON BOSCO
Subjects	Physics, Technology, Science

In this project children can:

- discover and analyze the features of recently developed materials, besides the ones traditionally studied at school;
- understand and experience technology as ability to manipulate and transform materials;
- develop hands-on abilities through practice on some materials (manipulating, cutting, blending, etc.)
- stimulate observation through practical studies on everyday objects;
  use recycled or easily available materials to build objects with brand new functions.

MY LITTLE SCIENCE BOX

Stand number	**118**
Country	Romania
Teacher	Mariana Brad
Institution	„Ion Creanga" School
Subjects	Physics, Biology, Science

The project consists of 6 boxes, each containing simple thematic experiments. These experiments are in accord with the sciences primary school curriculum and propose the following themes: light, water, air, astronomy and electricity. The experiments, devices and didactic toys are realised by means of simple reusable materials, which are not dangerous for the student's safety. For each experiment and task there are worksheets, illustrative materials and short explaining movies.

PHYSICAL TALE IN CUP

Stand number	**119**
Country	Czech Republic
Teacher	Jitka Soukupová
Institution	Osmileté gymnázium Stříbro
Subjects	Physics, Chemistry

The Project "Physical tale in cup" tries to achieve several goals:

1. Increasing children's interest in physics;
2. Presenting new and fun possibilities of using cups in diverse disciplines of physics and chemistry for children in Kindergarten and elementary school while making physical experiments from simple tools;
3. Showing possibilities of using common appliances such as cups, while demonstrating various physical and chemical effects and phenomena for children; 4. Creating a database of simple physics and chemistry experiments with cups so they can be performed by children and teachers in Kindergartens, elementary schools or science clubs. All experiments are fast and low cost.

PHYSICS AND OUR SENSES: FROM PRACTICE TO THEORY

Stand number	**120**
Country	Italy
1st teacher	Maria Grazia Furinghetti
Institution	IC S. Teodoro Genova
2nd teacher	Lucia Dragotto
Institution	IC S. Teodoro Genova
Subjects	Physics

Teaching sciences at school often means telling about the scientists' knowledge. But this project proposes an experience that starts from „to-do". Pupils arrive in the classrooms with a bunch of knowledge. Questions and discussions can stimulate their thinking; for example can we ask: "Is it harder to move the purse horizontally with a rope or vertically with the help of a pulley?" A discussion with the children can help them understand that the used force is the same. Other problems will integrate modern technology (i.e. smartphone) with real experiments.

PHYSICS FOR LITTLE EXPERTS

Stand number	**121**
Country	Ukraine
1st teacher	Alla Zihanzhynova
Institution	kindergarten #128
2nd teacher	Tetiana Zihanzhynova
Institution	secondary school # 2
Subjects	Physics

There are lots of different interactive exhibits and equipment at the play lots in our kindergarten. Kids are able to become acquainted with various physics phenomena: mechanic, electrical, magnetic, sound optical etc. They can play and learn at the same time.

PLAY TO LEARN – MAGIC CASTLE IN ORDER TO MAKE NATURE SCIENCES MORE POPULAR FROM KINDERGARTEN TO UNIVERSITY

Stand number	**122**
Country	Hungary
1st teacher	Gábor Koncz
Institution	Kisvárdai Bessenyei György Gimnázium és Kollégium
2nd teacher	Katalin Jámbrik dr.
Institution	Kisvárdai Bessenyei György Gimnázium és Kollégium
Subjects	Physics, Biology, Chemistry

Magic Castle is an experimental project based on fairy tales. It is interactive, contains scientific extracurricular activities and uses inquiry based teaching. The aim is to make the practical and experience based learning more popular while the children have chances to make their own experiments and to get more experienced by that. The whole project is developed by considering the children's manual skills, imagination and, most important, the nature science based point of view. All the experimental development is carried out by teachers and students together, based on the method of inquiry based learning.

PLAYING AND LEARNING WITH ASTRONOMY

Stand number	**123**
Country	Romania
1st teacher	Eugenia Victoria Marcu
Institution	„Constantin Brancusi" School
2nd teacher	Timar Stela
Institution	"Constantin Brancusi" School
Subjects	Science, Astronomy

This project consisits from a set of games and boxes containing each simple thematic experiments. These experiments are in accord with the sciences primary school curriculum and starts from astronomical facts and phenomena for every day life offering active and hands-on learning activities.

PROJECT OF TECHNOLOGY

Stand number	**124**
Country	Finland
Teacher	Kirsi Rehunen
Institution	Saimaanharjun päiväkoti Satulaiva preschool
Subjects	Chemistry, Geology

"The aim of this project is to advance thinking, discovering skills and innovation. It starts from the kids' own new technical objects and the old ones of their family. Why do we actually need technology? Technology helps people. In order to understand better, a connection to real life and bridges between subjects, from technology to metals and magnets, from mine to chemistry should be made.
At the day of Technology every pupil brings something technological. Who is the user? What is the benefit? How was it made? Pupils introduce their technology in small groups and discuss what subjects belong together, where does technology get the energy from, where is the battery, what is made of wood or metal?"

PROJECTS EXPERIENCE

Stand number	**125**
Country	Canada
Teacher	Colin Olchowski
Institution	Humbolt Public School
Subjects	Maths, Science

The project helps students take ownership in their learning by collaborating with other students to create science and math experiences. Designing a project experience results in investment in learning and increased engagement for children involved. We began by presenting students with earthworms and allowed them to explore and form questions. Children shared experiences and knowledge and decided what they wanted to know more about. The project approach allows for incorporation of multiple outcomes as well as interdisciplinary teaching. Students have the opportunity to practice observation, questioning, predicting, investigating, creating, recording, analyzing and communicating results.

USING COMPUTER TECHNOLOGIES IN PRIMARY SCHOOL PROJECTS

Stand number	**126**
Country	Ukraine
Teacher	Maryna Korniienko
Institution	Kharkiv gymnasium # 55
Subjects	Computer Science, Science

In life we expect a lot of travel. Now you can take a virtual trip to many wonderful places. The route for your journey you can develop yourself – and the computer will help you with that. Ukraine borders with different countries and by creating your own virtual tour to any of these countries, new possibilities for travel open up. While working on the project the students learn how to work on a computer and with the internet safely; they search for material in the internet; they process the found materials with the help of the relevant programmes; they create a presentation and eventually defend their project.

PROJECTS THROUGH THE AGES

Stand number	**127**
Country	Canada
Teacher	Michelle Olchowski
Institution	St-Brieux School
Subjects	Maths, Science

Mapping ideas in a visual strategy allows learners to make connection and helps solidify the understanding of concepts. Concept maps or mind maps can be used in flexible ways as part of planning, throughout learning or as a summary to reflect understanding in a unit or project. Concept maps have been using to help students demonstrate their understanding in both upperlevel science and math classes. The idea behind concept maps is very simple, but they can be used as a very powerful tool for student learning. How can you support students while making their own or a class concept map? How can concept maps be used for planning projects and learning experiences?

ROBOTICS, PROGRAMMING AND 3D DESIGN

Stand number	**128**
Country	Spain
Teacher	Carlos Rodrigo Quirós
Institution	Colegio Ábaco
Subjects	Maths, Physics, Science Robotics

“Robotics, Programming and 3D design” is a practical project divided in two parts: in the first term the children will learn about the three different tools we will use. In the second and third terms they will plan, design and program their own projects in groups. Students learn: Scratch (4th), Lego EV3 (4th & 5th), Bitbloq Arduino (5th & 6th), App Inventor 2 (6th) and OpenScad (4th to 6th). Our aim is to develop in our students the “21st Century learning Skills”: communicating, collaborating, creative thinking and critical thinking. Students present their best projects: RC BB8 robot, their own 3D printer, RC football players, and more.

SCIENTIFIC EXPERIMENTS FOR CHILDREN

Stand number	**129**
Country	Bulgaria
Teacher	Daniela Georgieva
Institution	Vth Primary School “Hristo Botev”
Subjects	Physics, Chemistry, Science

These scientific experiments are a simple and clever way to familiarize your child with some basic physical and chemical laws and show clearly why things are happening around us. How do we e.g. know if the eggs are fresh? Or how do we get a whole egg in a bottle? The experiments in the classroom were simultaneously aiming to have fun and to learn new things. The proposed experiments do not require special conditions and training and are quick, easy and practical.

SIMPLESCIENCE.NL CHALLENGING CHILDREN TO THINK, ACT AND IMPROVE

Stand number	**130**
Country	Netherlands
Teacher	Bert Nagel
Institution	Simple Science
Subjects	Science

A lifelong impact on children with primary science in just a few hours. Tips and tricks and very practical solutions are presented in this project. Could the magic of a Lego block also be achieved with simple materials such as paper, cupboard, polystyrene and bbq sticks? The goal of this project is to challenge children to think and to awaken their natural curiousity. When children pick up challenges to improve results of a science investigation it gives a fertile ground to develop their strong points which is very useful for their now uncertain future.

STRONG AS A BEAR THROUGH LEVERAGE – FEEL THE LEVERAGE POWER

Stand number	**131**
Country	Germany
Teacher	Heidrun Boll
Institution	Berta-Hummel-Schule Bad Saulgau
Subjects	Maths, Physics

The topic of levers does not pose a problem to children. A door can be opened, a nail pulled out. Kids have to be made aware of the problem so that they can recognize it. Therefore, the kids should be given various tasks to be performed without the help of levers. They are only partially successful in this. Performing the task makes them aware of the need of help to solve the problem more easily, e.g. a door handle, pliers etc. In a child-friendly form they can work out and begin to grasp terms such as lever and pivot. Transfer tasks involving a seesaw and a mobile (a moving element hung from a string) enable the kids to apply their newly gained knowledge and communicte with others.

THE BOAT FULL OF HOLES

Stand number	**132**
Country	Denmark
Teacher	Majken Grünfeld
Institution	Sct. Mariæ Skole
Subjects	Physics, Chemistry, Science

Many students believe that a boat full of holes in the hull will take in water and end up sinking. By using only a bowl of water, a pack of margarine, a knife and a pin it is possible to challenge this conviction. To see an object float in water without taking in water even though the bottom of the object is full of holes, conflicts with the students' expectations and provokes a wonder followed by an immediately urge to seek a logical explanation for the phenomenon. In this way, the students experience the essence of the scientific method – to experience a phenomenon, which surprises them, which rouses their curiosity, and which they want to investigate further.

THE DRIESPRONG LABORATORY – SOLVE THE PLASTIC PROBLEM

Stand number	**133**
Country	Netherlands
Teacher	Patricia Jansen
Institution	Bs. De Driesprong
Subjects	Science, Sustainability

Plastics are cheap and used very often. Unfortunately plastic also is often thrown away, which pollutes environment and oceans. Besides, plastic is made of fossil fuels, which causes the earth's natural resources to become depleted. In the project, which aims to change children's attitudes towards plastic, children in primary education learn about this issue theoretically and practically. They learn about the impact of plastic on environment and animals, they research about bio based plastics made of starch, they design and make their own bio based plastics and finally exhibit their designed products.

THE LITTLE RED HEN

Stand number	**134**
Country	United Kingdom
Teacher	Evelyn Clawson
Institution	Brambleside Primary School
Subjects	Maths, ICT, Food technology, Primary science

Enriched by a range of STEM professionals the aim of this creative project is to highlight outdoor scientific enquiry and future careers in STEM professions at the primary level. Through story telling and drama this project offers open ended investigations which inspire an enthusiasm and interest in; nature, food and farming, food technology, greater understanding of ICT, handling data and communication skills. The story themed context captures children's imaginations and inspires many ideas for outdoor investigations, giving children a deeeper understanding of the different methods of scientific enquiry in a real life conext.

THE MANUKA HONEY PROJECT: CHILDREN AS SCIENTISTS

Stand number	**135**
Country	United Kingdom
Teacher	Carole Kenrick
Institution	Gillespie Primary School
Subjects	Maths, Biology, Medicine, Scientific processes

As Scientist in Residence at Gillespie Primary School, Carole Kenrick, invites children into her classroom-sized lab for science lessons and clubs, and to investigate their own scientific questions. When a parent asked a seemingly simple question about honey nearly two years ago, Carole was surprised to find that even Google couldn't answer it! So began a year-long journey during which a team of children aged seven to eleven, nicknamed the "Beesearchers", devised and carried out a double blind control trial to answer a hitherto unanswered question. Along the way they learnt a great deal about what scientists do, and crucially they came to the conclusion that they themselves are scientists.

WHAT CAN WE LEARN FROM VIKING POO?

Stand number	**136**
Country	United Kingdom
Teacher	Emma Crisell
Institution	Richard Taylor CE Primary School
Subjects	Biology

Our project was linked to our history topic work on Saxons and Vikings. Initially the archaeological science project (funded by the Wellcome Trust) was to explore mineralised Viking Poo samples to see what we could identify. This then evolved to include researching teeth and bones. This novel research, supported by STEM professionals, enabled us to inspire children to ask scientific enquiry based questions, at the same time as being involved in real research. The children are now able to name and describe uses of teeth and have an awareness of what parasites are.

A STEREOSCOPIC WORLD

Stand number	**172**
Country	Netherlands
1st teacher	Ildikó Budayné dr. Kálóczi
Institution	Tóth Árpád Gimnázium
2nd teacher	József Gőz
Institution	Tóth Árpád Gimnázium
Subjects	Science

This microscopy research is an example of studies carried out in TÁG-TUDOR Öveges Laboratory and Intellectual Workshop. Our goal is to make participants recognize and protect the values and wonders of the living world and to improve their way of thinking. The latter is achieved by identifying the samples and matching them with photographs and texts. By changing the magnification rate we draw attention to the differences resulting from the level of perfection of various tools applied in scientific investigations. Aesthetic competences improve as a result of studying the samples. We may also refer to connections between phenomena in nature and their application in human technology.

AN EDUCATIONAL PROJECT IN CHEMISTRY. THE PH OF WATER: ACIDS, BASES, COLOURS

Stand number	**173**
Country	Italy
Teacher	Paolo Pagliai
Institution	AUSL Romagna
Subjects	Chemistry

“Students are confronted with the results of an experiment which conflict with the general definition of pH as it is generally taught to high school students: pH only varies in function of the concentration of H+ ions and in an aqueous solution such value can ranges only between 0 and 14.
In this project students see strange behaviours of pH in concentrated solution and above all they must face the fact that the experiment clearly shows that aqueous solutions with pH <0 actually exist. To explain the results of the experiment, the teacher comes up with a new definition of pH, containing a new parameter named ‘activity’. Finally a few environmental examples of negative pH will be given.”

ARGAN OIL, MAGIC OR NATURAL EFFECTS

Stand number **174**
Country France
Teacher Khadija Bensaihi
Institution Ecole 11 janvier
Subjects Science, Geology, Environment

Argan oil is a natural and exceptional oil with biological effects. It is produced by the fruit of the Argan tree, whose seeds require specific meteorological and agricultural conditions in order to cultivate them. The purpose of this project is to educate students about the oil for preserving this heritage. By experimenting with the Argan oil the children will get to know its daily use, its effects on health and its economic role.

ASTRONOMY AND CULTURE

Stand number **175**
Country Romania
Teacher Dumitru Georgescu
Institution Mihai Viteazul National College
Subjects Maths, Physics, Astronomy, History

This project applies and develops a NASE (Network for Astronomy and School Education) idea to understand the "game" of cosmic appearances with the help of history and local geography. The main objective is to comprehend the movements of the Sun in the sky depending on season and latitude. In order to do this, we aimed to acquire pictures of the Sun at dusk, at different moments of the year, and we tried to see how this matter is reflected in local history.

BEAUTIFUL MATHS IN MY COUNTRY

Stand number **176**
Country Turkey
Teacher Meltem Yontar
Institution Kanyon College
Subjects Maths, Science, Geography, History

No matter which age group, human beings are generally prejudiced against mathematics. However, math is everywhere in our lifes but most students can't recognize it and associate it with real life. This project's goal is to overcome the prejudice and to teach students how important matmematics is in our life. My Project is in partnership with 11 countries. Every country forms a mathematical problem of anything which is famous in the respective country. The students in the other countries solve these problems then together. Through that, we not only receive information about the country but we also learn how universal mathematics is. Thus, we learn to look at it from different perspectives.

BISA – BIRDS IN SCHOOL ASSESSMENT

Stand number **177**
Country Germany
Teacher Thomas Gerl
Institution Ludwig-Thoma-Gymnasium, Prien am Chiemsee
Subjects Physics, Biology, Computer Science, Languages

Within the BISA-project we tried to determine the ability of young people to identify common bird species with an online test. In order to improve the pupils' knowledge we created online tutorials. They contain hints and clues how to identify birds as well as playful exercises. Our next aim was to inspire pupils to do observations using an online documentation tool. Within the project we also built a nesting box with electronic devices, that streams data (e.g. pictures, temperature, etc.) of the nesting birds on a webpage, so that pupils get into emotional contact with the wildlife in their near surroundings, which is required to take action against the loss of species all over the world.

BUBBLE ALARM VERSUS SURFACTANT

Stand number	**178**
Country	France
Teacher	Jean-Brice Meyer
Institution	National Education
Subjects	Maths, Physics, Biology, Chemistry

When a water drop falls on the water, one can hear a particular sound. A scientific experimental approach can show that it is an air bubble vibration, which is created after the impact that gives this sound. The vibration frequency depends on the surfactant concentration of the liquid where the bubble is. As the surfactant can do environmental damage, the results can be used to develop an innovative method for measuring the surfactant concentration of wastewater. The playful side of this environmentally friendly method contributes to raise awareness to a wide public. With this project, students have seen with deep pleasure that science is a solution for environmental problems.

BUILDING A SUSTAINABLE FUTURE

Stand number	**179**
Country	Norway
Teacher	Gerald Decelles
Institution	Skagerak Int School
Subjects	Science

Our world is changing rapidly. The students of today need to be able to design solutions to meet these changes in the future. Building on their understandings of energy and environment, students try to design the homes of tomorrow. Utilizing software and hands-on building skills, students begin by experimenting with factors that impact the energy efficiency of homes, then move on to create a home that meets the design specifications of the future.

CHEMISTRY AND CULTURAL HERITAGE

Stand number	**180**
Country	Italy
1st teacher	Giorgia Messori
Institution	ITI Fermi, Modena
2nd teacher	Daniela Dallari
Institution	ITI Fermi, Modena
Subjects	Physics, Biology, Chemistry, ICT, Computer Science, Geology

The aim of our project is to introduce students to the cultural heritage of their country, highlighting the role of chemistry in its characterization and conservation. Our purpose is also to promote good practices such as active citizenship to increase the sensitivity and responsibility towards the landscape and the historical and artistic heritage. After the study of the material and the causes of deterioration, the adopted monument or the artifact is presented as an indicator of the health of the environment and the results are shared with other countries.

CIRCUS SHOW

Stand number	**181**
Country	Poland
Teacher	Konstancja Nowakowska
Institution	Junior High School in Złoty Stok
Subjects	Physics, Technology, Sport Acrobatics

The educational project “Circus show” presents a performance that aims at explaining various phenomena and laws of physics used during a show by circus artists. These artists are acrobats on the ground and on the line, jugglers, tumblers, magicians and trainers. In the presentation you learn about the impact of the center of gravity, inertia, the Magnus effect, centrifugal force or resilience on the circus show. The main aim of the project is to find an answer to the following question: Are tightrope walking, juggling, hat throwing and acrobatic shows supernatural or is it just pure physics?

CRYPTIC BIODIVERSITY IN YOUR SCHOOL

Stand number	**182**
Country	Spain
Teacher	José Luis Olmo
Institution	IES Azuer
Subjects	Biology, Ecology

In the school and high school many and diverse ecosystems can be found. The main goal of the project is to investigate, identify and recognize the cryptic biodiversity, i.e. hides. For this reason, samples have been taken from different ecosystems such as the soil or mosses. The samples were brought to the laboratory where they added water to activate the microorganisms. Subsequently, in vivo were filmed with a camera attached to the microscope and a laptop computer. A total of 52 species were identified and more than 200 videos were recorded which has allowed us to characterize the communities present in each ecosystem.

DRY WATER

Stand number	**183**
Country	Switzerland
Teacher	Amandine Forny
Institution	Lemania
Subjects	Physics, Chemistry

This experiment is dealing with the scientific concepts of “hydrophilicity” and “hydrophobicity”. For primary school, it may be explained in simple words such as “likes” vs. “does not like” water. For secondary school, it introduces important chemistry topics such as polarity or hydrogen bonding. The experiment is making use of two powders, “A” and “B”, dropped at the surface of water. “A” dives into water leading to the formation of a homogeneous suspension: “A” is hydrophilic. But “B” remains at the surface of water even under intense hand stirring: “B” is hydrophobic. But what if we use a blender? This is what the audience would discover by attending this demonstration.

EFFECT OF ACID RAIN

Stand number	**184**
Country	Portugal
Teacher	Ana Rodrigues
Institution	Escola Sec. Quinta das Palmeiras, Covilhã
Subjects	Science

As magma approaches the surface during a volcanic eruption, the pressure decreases and gases are gradually released. The gas escaping alters the atmospheric composition which leads to acid rain. In this project a volcanic eruption is simulated and the released gases are collected in a flask. By adding water ‘acid rain’ is orginated with a lowered water pH. This acidified water can then be used to verify a change in the behavior of living beings as Daphnia.

ENERGY-SCIENTISTS – 6-GRADERS EXPLORE RENEWABLE ENERGY

Stand number	**185**
Country	Germany
Teacher	Dieter Schmidt
Institution	IGS Oyten
Subjects	Technology, Science, Social sciences

Interdisciplinary, project-, context-, activity-, team- and student-oriented – all of this is realized by the IGS Oyten through a theme-oriented teaching in five 75-minute-blocks per school week. The topic „energy scientists“ in grade 6 has the main goal to examine a energetic-autark living home more closely. After having learned basic principles – theoretically and experimentally – in the so called basisphase the students optimize models during the so called projectphase: a low-energy house, a wind wheel, a solar collector, a photovoltaic module and a solar car. They finally present their knowledge and their scientific results to their parents.

EVERYTHING BANANA

Stand number	**186**
Country	Switzerland
1st teacher	Sacha Glardon
Institution	Gymnasium Bäumlihof
2nd teacher	Thomas Scheuber
Institution	Gymnasium Kirschgarten
Subjects	Biology, Chemistry

Which banana is the sweetest: green, yellow or brown ones? Bananas are popular fruits. On the basis of simple experiments with bananas the interrelation of glucose and starch metabolism can be shown exemplary. Bananas of different ripeness stage will be e.g. analysed of their sugar content and their starch content and the presence of amyloplasts will be demonstrated microscopically. Bananas serve well as a starting point for problem based learning in biology and chemistry but this can also be extended to other fields: assimilation, dissimilation, comparison to human physiology, colour extraction, historical approaches like colonialism, fair trade or global economics.

FEELING THE FOREST – INTERACTIVE FIELD TRIP IN THE GREAT FOREST OF DEBRECEN, HUNGARY

Stand number	**187**
Country	Hungary
Teacher	János Kapusi
Institution	Debreceni SZC Bethlen Gábor Közgazdasági Szakközépiskolája, és Tóth Árpád Gimnázium
Subjects	Biology, ICT, Geography, History, Cultural studies, Urban planning, Tourism

The purpose of this project is to improve students' geographic thinking and environmental awareness by visiting the recently renewed Great Forest in the city of Debrecen. The project relies on geographical inquiry and makes use of the forest's outstanding location, its natural and cultural values, attractions, study paths and facilities. It is actually a walk through the forest by stopping at 'stations' where students are given interactive tasks about the features of the forest to reveal the pieces of the mosaic of one of the most complex urban parks of Hungary. By stepping out of the classroom comfort zone, this project encourages students to be active observers of their environment.

FROM NATURE... BIOPRODUCTS!

Stand number	**188**
Country	Italy
Teacher	Anna Madaio
Institution	ITT Focaccia Salerno
Subjects	Biology, Chemistry, Biochemistry

Environmental and toxicological problems generated by the use of raw materials from non-renewable sources determined the use of biomass as a source of raw materials from which to obtain biochemicals, biofuels and bioplastics, for better environmental, economic and social sustainability. The project, aimed at students of the last three years of a Technical Institute for chemical purposes, falls inside the scope of Sustainable Chemistry, and was realized in a series of laboratory activities that use biomass (especially dyeing plants, such as woad for indigo dye, and food waste) for the production of different bioproducts usable in the different field of energy, food, nutraceutical and dyeing.

GREEN GREENS?

Stand number	**189**
Country	Ireland
1st teacher	Robert Clarke
Institution	Confey College
2nd teacher	David Keenehan
Institution	Institute of Physics
Subjects	Physics, Biology, Chemistry, Science Geography

This project outlines the organisation of a collection of student inquiry-based research projects that are designed to question ethical and sustainability issues surrounding global food production, consumption and the possible resulting impacts on climate change and biodiversity. It challenges students' assumptions that the all-year-round availability of non-seasonal fruits and vegetables is necessary, or moral, through the critical analysis of data and personal case studies. It encourages students to appreciate the role of science in society on a global and personal scale and to evaluate commercial and media-based arguments in terms of global sustainability.

HOW ABOUT THOSE PLANTS?

Stand number	**190**
Country	Denmark
1st teacher	Line Mikkelsen
Institution	Sankt Pauls School
2nd teacher	Asger Senbergs
Institution	Rosskilde katedralskole
Subjects	Maths, Physics, Biology, Chemistry, Science, Geography

The project will demonstrate the importance of plants in the environment by showing the students how the photosynthesis works. The experiment will be about the measuring of temperature in four aquariums with four different conditions involving plants and CO2. If successful, the students will be shown how CO2 works as a greenhouse gas, keeping more warmth inside than normal air, and after some time how the photosynthesis works and the level of CO2 will drop while at the same time more warmth will be able to escape. The temperature will then go down. The students will be able to compare the different conditions and conclude how important plants are when we are talking about the climate.

HOW SCIENCE WORKS; INSPIRING AND ENGAGING OURSELVES AND EACH OTHER

Stand number	**191**
Country	United Kingdom
Teacher	Anna Dove
Institution	Dowdales School
Subjects	Maths, Technology, Science, Engineering

The students were given the challenge 'If their school was on an island how could they make it self sufficient.' The students had the support of a local engineer to guide them during their planning sessions and a technology and science teacher to support with the practical aspect of their plan in school. The students could investigate this question anyway they wanted, which gave them the opportunity to take the project in a direction that really interested and inspired them. This enabled the students to develop their knowledge of science but also their communication, teamwork and presenting skills and all the students involved felt it improved their motivation, confidence and self esteem.

IMPLEMENTING THE SCIENTIFIC METHOD, AND MODELLING OF EVERYDAY PHENOMENA IN SCIENCE

Stand number	**192**
Country	Norway
Teacher	Hossein Rostamzadeh
Institution	Asker upper Sec school
Subjects	Maths, Physics, Biology, Science, Geography

This project is within the sustainable development and focuses on the importance of the biodiversity and the role of endangered species in nearby ecosystems. The most engaging phases in this fieldwork arrive when students look for their previously selected endangered species in the field, and when they discuss the ethical issues of what happens when one species disappears from nature. At the end, they design an artful and creative brochure for their selected species. These brochures contain not only detailed information about the species, but also useful environmental measures to local authorities. In this fieldwork, the students learn and use some useful surveying and samplings technics.

INDUCTION IN MANY FORMS

Stand number	**193**
Country	Czech Republic
Teacher	Peter Žilavý
Institution	Gymnázium Pierra de Coubertina, Tábor
Subjects	Maths, Physics, Electricity

The word induction brings together a number of phenomena in physics, mathematics and also in chemistry and biology. Examples are the electrostatic, electromagnetic or mathematical induction or the inductive effect in the particles of organic compounds. By using experiments we will investigate some of these phenomena and seek their mutual relationship. Impressive experiments with an induction cooker as well as experiments with a self-made electric charge indicator will be presented.

LIFE IN THE ECO STYLE!

Stand number	**194**
Country	Ukraine
1st teacher	Julia Batura
Institution	Sumy Comprehensive Secondary School №5
2nd teacher	Vita Chmelenko
Institution	Comprehensive Secondary School №5
Subjects	Biology, Chemistry

In this project students learn the basics of making hand-made soap which is phosphate-free and does not harm the environment. The students research first industrial and household soap and identifiy natural ingredients that are used in soap making. Environmental friendly soap can be produced by secondary schools students (following the instructions given by their chemistry or biology teacher). It is possible to produce a lot of different sorts of hand-made soap (varying its shapes, flavor, colour). Students also like to develop their own soap recipes.

LIGHT POLLUTION IN THE CLASSROOM

Stand number	**195**
Country	Austria
Teacher	Thomas Schubatzky
Institution	BRG Kepler Graz
Subjects	Physics, Biology

This project aims to identify ways of addressing the issue of light pollution using smartphones. In the department of physics education at the University of Graz, several proposals and activities concerning this matter have been developed over the past few years. Two of the products were an experiment that simulates light pollution and a role-playing game in which the opinions of various expert-groups on the subject of light pollution are to be met.

LÜTJE NATUR

Stand number	**196**
Country	Germany
1st teacher	Malte Puck
Institution	Hoffmann-von-Fallersleben-Schulzentrum Lütjenburg
2nd teacher	Anne Puck
Institution	Gemeinschaftsschule Lütjenburg
Subjects	Technology, Natural sciences

The project „Lütje Nature" is characterized by several aspects – a nature trail, an herb garden, a green classroom, a school pond and a school apiary. The project connects the various areas of the 1.5-hectare outdoor area of the Hoffmann-von-Fallersleben-School-Center for learners and teachers as well as for visitors and people walking through. Students of the school center and schools in the district are to be allowed to experience teaching amidst nature and to discover, explore, and capture real life with the biological phenomena of their environment. The idea of sustainability and protection of the environment and species is of paramount importance.

MANTIS – BIOLOGICAL LIFE CYCLE

Stand number	**197**
Country	Poland
Teacher	Cezary Filipiuk
Institution	1st Eugeniusz Romer High School in Pszczyna
Subjects	Physics, Biology, Photography

The project was based on one-year-long observation of two different species of mantis. During this time the full life cycle of both species was recorded. The research focused on how the environment affects the coloration of the insects, how the number of intaken food affects their growth and evolution and how mantises adapt themselves to live as predators. Apart from the observations a photographic documentation was completed.

PROTOTYPE ROBOTIC PHOTOVOLTAIC DETECTOR WITH PARTIAL SIMULATION OF EARTH'S MOTION

Stand number **198**
Country Greece
Teacher Petros Poutos
Institution 1st Vocational Lyceum of Salamis
Subjects Maths, Physics, Analog and digital electronics, Robotics, Mechatronics

This project refers to the manufacture of an experimental device which enables the study of:
a) The Photovoltaic Phenomenon through a real world application
b) Experimental methods for the improvement of the efficiency of the PhP, by means of several courses within the Lyceum Curriculum.
The device consists of:
1. The Photovoltaic Panl driven by robotic mechanism and sensors so as to always follow the light source;
2. The data logging part to collect, log and monitor the data affecting the efficiency of the PhP;
3. The partial earth motion simulation system to simulate the motion of the earth relatively to the sun hence affecting the incidence of solar light on the PhP.
The device can be used both in- (lab) and outdoors.

MODERN METHODS OF INTRODUCING BASIC PHYSICS CONCEPTS: THE COORDINATES AND THE GPS

Stand number **199**
Country Romania
Teacher Ioana Stoica
Institution Tudor Vianu National High School
Subjects Physics, Astronomy, Space Science

The purpose of this project is to point out an interactive method to introduce basic physics concepts to the youngest students. I will emphasize the way one can use modern methods such as GPS localization, educational software and geographic maps, in order to lure students into developing experimental skills. I will focus upon the advantages of this kind of approach. Finding out about and understanding typical mathematical concepts, terminology and calculations procedures, and using educational computer software during the teaching-learning-assessing process, the students can have outstanding achievements.

NATURES IMPACT ON YOUR WELL BEING

Stand number **200**
Country Sweden
Teacher Anna Hellman
Institution Östrabogymnasiet
Subjects Biology, Sustainable development, Environmental studies

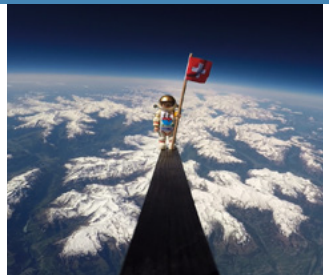
We are living in a time when many people are stressed out and feel mentally ill. The project leads up to inspire students to use nature as a feel good factor. That specific plants can have effect on our health has been known since thousands of years but research about what really happens in your body and brain when visiting nature has just went on for a few decades. By measuring blood pressure and pulse and doing a self-assessment of the mood before and after a visit in the nature, the students will explore something that can be useful for the rest of their lives!

POLAR LIGHT AT SCHOOL

Stand number **201**
Country France
Teacher Philippe Jeanjacquot
Institution Lycée Charlie Chaplin
Subjects Physics, Astronomy

When someone has the chance to see an aurora borealis, one is submerged by the beauty of such a phenomenon. How can nature create such a spectacle? One wants to understand what hides behind the aurora borealis. Why not use the auroras to give desire of doing sciences? But this phenomenon appears only in the areas of high latitudes. Photographs and films cannot replace reality and the emotion it causes. Would it be possible to reproduce polar lights in a laboratory? If one considers the history of sciences, one discovers the stages, hesitations, errors and projections in the comprehension of the polar lights. But a treasure, a beautiful experiment is discovered: the experiment of Birkeland.

PROJECT IKARUS



Stand number	**202**
Country	Switzerland
1st teacher	Reto Speerli
Institution	Schule Oberägeri
2nd teacher	Felix Speerli
Institution	Tagesschule Elementa
Subjects	Maths, Technology, Science Engineering

Throughout the school year, a primary school class has dealt with topics such as natural science, meteorology, Swiss geography and rocket science in a variety of disciplines. The crowning conclusion of this project was three space missions in the stratosphere. The pupils have reached an altitude of 32,000 meters above ground level with their weather balloon probes and captured spectacular aerial photographs of Switzerland with the built-in cameras. In order to achieve this goal, the class has intensively worked on the relevant topics and acquired the necessary knowledge and skills by doing research and thoroughly experimenting with the physics phenomena using everyday materials.

REBELLION IN THE SEA: THE NEW BIOLOGICAL ROLE OF JELLYFISHES

Stand number	**203**
Country	Spain
Teacher	Ana Villaescusa Lamet
Institution	Colegio Maria Auxiliadora
Subjects	Maths, Physics, Biology, Chemistry, Ecology

Massive jellyfishes blooming on Spanish coasts are a phenomenon with relevant socio-economic implications. The aim of this study is to combine the changes in the abundance of these organisms in the beaches of the Strait of Gibraltar with several changes in the environment and to analyze their influence. Monitoring the observed populations and studying the biological cycles of these animals completed a project from 2014 to March 2016. The investigation was coordinated by researchers in a clear example of the so-called citizen science.

RENEWABLE ENERGY

Stand number	**204**
Country	Turkey
1st teacher	Hatice Ergi
Institution	Hisar School
2nd teacher	Özge Aydemir
Institution	Hisar School
Subjects	Maths, Physics, Technology, Science

The project concentrates on energy sources and their effects on the environment.
It explores the different types of renewable and non renewable energy sources. Students describe renewable and non renewable energy sources and compare their effects on the environment and include overall costs and benefits. Based on their research they design a model to supply the energy need of one of the science laboratories in Hisar School to decrease the use of fossil fuels.

RESEARCH COMPETENCES FORMATION AT BIOLOGY LESSONS AND BEYOND

Stand number	**205**
Country	Ukraine
Teacher	Natalia Boiko
Institution	Lemeshivska school
Subjects	Biology

The main goal of the project is to enable students to develop research competences
Students conduct research in three main areas:

- large scale: studies of local ecosystems
- local: the identification of physiological characteristics of plant
- practical: study of plants in the school yard, determine the level of health and disease among students, research of influence of computer games on children.
  Interesting results were obtained in all major research areas. Special attention is paid to developing students' ability to record the research results, e.g. in form of tables, diagrams and reports as well as to create visual aids for presenting and defending their work to other students.

RESEARCHING THE GENETICS OF LYME DISEASE USING TICKS, PCR, ELECTROPHROESIS AND SIXTH FORMERS.

Stand number	**206**
Country	United Kingdom
Teacher	Simon Lewis
Institution	The Thomas Hardye School
Subjects	Biology

The project carried out “authentic” scientific research within a school environment. The general public collected more than 400 ticks in “tick boxes” for us. Working in an after school club, students extracted DNA from 140 of these ticks, used PCR to amplify the DNA in their samples and then ran electrophoresis gels to identify the presence of Borrelia DNA (the cause of Lyme disease). Students have written up and presented their results at local and national forums. Students have also used this project to raise awareness of symptoms of Lyme disease following a tick bite.

RETURN HOME

Stand number	**207**
Country	Portugal
1st teacher	Honorata Pereira
Institution	EPTOLIVA – Escola Profissional de Oliveira do Hospital, Tábua e Arganil
2nd teacher	Fernando Jesus
Institution	EPTOLIVA – Escola Profissional de Oliveira do Hospital, Tábua e Arganil
Subjects	Physics, Biology, Chemistry, Science

Imagine you would have the opportunity to make the place where you live your classroom. Suppose your region is the scene of a crime and you are a Sherlock Holmes with the ability to relate and recover ancestral knowledge, perceive the mysteries and solve the problems that the natural world around you, offers! At this project, the school has a leading role in the formation of individuals, with nature offering a world of opportunities. In a dialectic school, family and society we intend to recover and innovate the ancestral customs, share knowledge leading to society and family to participate in the acquisition of knowledge and skills.

RISE AND SHINE: CHEMISTRY AT BREAKFAST TIME, ITALIAN VERSUS ENGLISH STYLE

Stand number	**208**
Country	Italy
1st teacher	Francesca Butturini
Institution	Liceo Agli Angeli – Verona
2nd teacher	Gordon Kennedy
Institution	talkingaboutscience.com
Subjects	Chemistry

Breakfast offers an excellent example of the meeting of culture, health and chemistry. Using techniques from analytical, physical and organic chemistry together with simple and easily found materials, we have been able to bring some of the abstract concepts of chemistry to the breakfast table examining the composition of food (sugars, proteins, vitamins...), the properties of mixtures (ice-salt, eutectic point), the extraction and separation of substances (caffeine) and the process of anaerobic fermentation which is fundamental to bread-making. In summary, breakfast time is a moment for real chemistry.

SPECTRAL IMPRINT OF LED LIGHTS ON PLANTS

Stand number	**209**
Country	Slovenia
Teacher	Darja Silan
Institution	Gimnazija Jozeta Plecnika
Subjects	Physics, Biology

The experiment explains in a simple way the effects of the absorption of the different wavelengths of light (using red, blue and green LED lamps) by photo-receptors of plants and their response in photo-morphogenesis. Different parameters of plant morphology and physiology can be measured.

SUN INSPIRE US...

Stand number	**210**
Country	Portugal
Teacher	Wilson Simões
Institution	Escola Secundária Dr. Joaquim Gomes Ferreira Alves, Valadares
Subjects	Maths, Physics

The amount of waste produced by humans and the energy wasted are two problems for our environment. Our project is based on the reutilization of some materials in a recreational way, illustrating forms of saving energy. We intend to build and study the efficiency of 3 kinds of solar ovens and a solar collector: a parabolic solar oven, involving the study of concave mirrors, the phenomenon of reflection and the study of parabola; a black box solar oven, involving the study of emissivity of bodies and the greenhouse effect; a solar oven built with washing machine doors, involving the study of the greenhouse effect and, a solar collector, which helps students understand heat transfer processes.

SUNDIALS – HANDS-ON-ACTIVITY FOR ASTRONOMY TEACHING

Stand number	**211**
Country	Finland
1st teacher	Irma Hannula
Institution	LUMA Centre
2nd teacher	Meeri Hannikainen
Institution	Kainuu Vocational College
Subjects	Maths, Physics, Environmental education

Students are very interested in astronomy. Since ancient time people have looked at the sky and made observations and measurements of the celestial phenomena. Some of them have had a vivid imagination which has helped them to describe the celestial phenomena to each other. There are many familiar objects in the sky, such as the sun, the moon and some brightest stars. Everyone knows the daily phenomena, the sunrise and the sunset, as well as the seasons. People know very well also the phases of the moon and the tides. Rarely seen objects or phenomena are the eclipses, planets, comets, meteors and auroras. In this lesson students learn to determine the time and position of the Sun using sundial.

SUSTAINABLE DEVELOPMENT AND BIOFUEL

Stand number	**212**
Country	Norway
1st teacher	Stefan Preisig
Institution	Skjetlein upper Sec school
2nd teacher	Gjertrud Jenssen
Institution	Skjetlein upper Sec school
Subjects	Maths, Science

Our school owns a huge area of forest. Therefore the the local resource wood can be used to design a day-long project. The objective of the project is to calculate and produce renewable energy from wood. The students will measure and calculate the volume of different types of wood, learn about the different energy contents of tree types and use this to calculate the total energy content of a given volume of wood. Mathematics, Combined Sciences and the core subject of the agricultural curriculum have to be combined for solving the problems. Clearly defined goals will guide the students through the project and help the staff to evaluate the learning outcome. We follow the 5E-teaching model.

THE FIRST EXPERIMENTS – FRODO'S CHALLENGE

Stand number	**213**
Country	Bulgaria
Teacher	Kameliya Todorova
Institution	Children's Complex "Yovko Yovkov"
Subjects	Biology, Chemistry

The main goal of this project is to provoke interest in children who are now just getting familiar with chemistry. Furthermore, the project will encourage young students to expand their existing knowledge in biology. The presentation is made through a theatrical performance, which consists of two chemical experiments and a biology trivia. The plot develops during the Halloween preparations in the laboratory of a young chemist named Dennis, who goes by the nickname „Mr. Frodo". He is visited by his old friend Mrs. Todorova – a passionate biologist. During their conversations, they get into an argument about whether chemistry or biology is the most important subject.

THE MAN AND THE MOUNTAIN: MOUNT BLANC

Stand number	**214**
Country	Italy
Teacher	Marina Porta
Institution	Liceo Banfi Vimercate
Subjects	Physics, Biology, Chemistry, Geology, Art, Philosophy, History

The project is about scientific theater. The purpose of the project is to experience a laboratory of creative writing with a flipped classroom: the lectures and assignments, in a cooperative learning mode, are turned upside down. A debate on personal studies is carried out in class and the creative writing will be a theatrical script where the students are authors/ actors. The writing takes inspiration from a news event regarding the mountains. In building the story, interdisciplinary topics intersect with the event, from chemistry and biology to physics or art and philosophy and history, with real facts and characters.

THE MYSTERIOUS POWER OF OLIVE OIL

Stand number	**215**
Country	Slovenia
Teacher	Nika Cebin
Institution	Gimnazija Ledina
Subjects	Biology, Chemistry

Olive oil has many protective effects as a result of the high content of biophenols (antioxidants). The project shows the history of olive oil, how it is obtained, the chemical parameters and its sensory evaluation. Extra virgin olive oil will be included in experiments, which are related to everyday life. Ist use will be seen in natural cosmetics and healthy cuisine.

THE RHYTHM OF NATURE

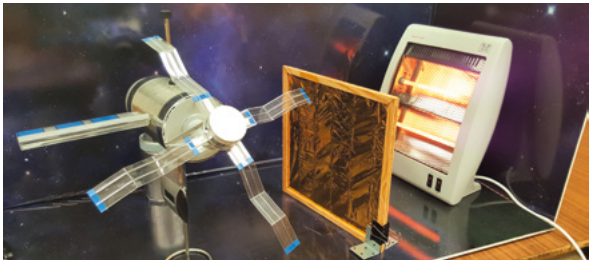
Stand number	**216**
Country	Spain
Teacher	José Viñas Diéguez
Institution	IES David Bujan
Subjects	Biology, ICT, Computer Science

The main objective of this project is to bring and make people, especially young people, sensitive about environmental projects through the technology we have at hand – our mobile phones. Our students have identified the most important environmental problems of the surroundings (invasive species, deterioration of the natural spaces in our city, climate change and responsible behavior in natural areas). For that, they have used their computer skills and implemented the philosophy of citizen science to provide solutions.

THERMAL PROTECTOR 'SUNSHADE'

Stand number	**217**
Country	Hungary
Teacher	Annamária Komáromi
Institution	Balassi Bálint 8 évfolyamos Gimnázium
Subjects	Physics, Geography

Skylab, the first American space station, was built on the modified S-IVB third stage of the Saturn V rocket in the Apollo programme. It was sent orbiting the Earth unmanned. At launch, one of its solar panel arrays was destroyed and its protection from solar heating was also removed. The first crew, in a spacewalk, installed light reflecting and thermal insulating 'sunshade' outside the space station, making the inner area temperature tolerable. It may be attempted under Earth conditions how a thermal shield can protect objects behind it from the heat of a thermal source, e.g. a heater.



TO BUILD UP A SCIENCE

Stand number	**218**
Country	Bulgaria
Teacher	Tonka Ivanova
Institution	High School of Economics “Knyaz Simeon Tarnovski”
Subjects	Physics, Biology, Chemistry, History, Ecology

In this project you will meet with “the wonders of the science of physics” through adventures, offering great variety of themes, which will surely win your imagination. Accept the challenge to test your knowledge on themes like mechanics, rotational moment, electricity, fluids and others. We have the gift to ask simple, direct and honest questions. Give your thoughts some inspirations and participate in the physics adventures.

UNDER PRESSURE

Stand number	**219**
Country	Czech Republic
1st teacher	Aleš Pilgr
Institution	VIDA! science centre
2nd teacher	Janet Prokešová
Institution	VIDA! science centre
Subjects	Physics, Atmospheric pressure

Do you sometimes feel under too much pressure? Imagine what it would be like if all that horrible pressure suddenly disappeared. Wouldn’t it be great? Who knows? Lets see what pressure and its absence can do to us.

WHICH FERTILIZER WOULD YOU USE TO GROW ONIONS?

Stand number	**220**
Country	Cyprus
Teacher	Alexia Alexandrou
Institution	Agios Ioannis Primary School
Subjects	Science, Environmental Education

When we are about to buy vegetables we definitely want to buy what is best. Do we know what is best for us and how these vegetables end up in our homes? Which fertilizer is better for the vegetables: chemical fertilizers, organic fertilizers, compost or manure? The learning module was chosen based on the debate about chemical and organic fertilizers. It was developed using the PARRISE project’s SSIBL (socio-scientific based learning) framework. The activities were developed by primary school teachers who participated in the PARRISE (1) Cyprus TPD course and aim to help students becoming familiar with the procedure of growing vegetables and the concepts of eutrophication and soil pollution.

A RELATIVELY MODERN PHYSICS LESSON

Stand number	**75**
Country	Norway
1st teacher	Henning Vinjusveen
Institution	Asker upper Sec school
2nd teacher	Magdalena Kersting
Institution	University of Oslo, Physics Department
Subjects	Physics, Science

In this project, we have developed a collaborative online learning resource that promotes teaching and learning of Einstein's general theory of relativity. A simple video demonstration with a falling bottle of water helps students to understand the principle of equivalence, which is a key concept in general relativity. By working with the video demonstration that we supplement with interactive animations and illustrations based on a historic approach, students are asked to discuss the physics of gravity from Einstein's point of view. This way, they are able to understand several new phenomena such as gravitational redshift and time dilation in a qualitative manner.

AMATEUR ASTRONOMY IN BULGARIA

Stand number	**76**
Country	Bulgaria
Teacher	Nadya Kiskinova
Institution	People's Astronomical Observatory 'Yuri Gagarin'
Subjects	Maths, Physics, Astronomy

The website http://astronomy4all.com offers material for self-training of amateur astronomers in Bulgarian language. The content of the site is designated for students from high schools and universities, as well as for teachers and is constantly updated. The main page also contains a multimedia presentation called "The Universe through Hubble's eyes" which emotionally introduces the viewer to the contemporary understandings about our world (about 25 minutes long). The site offers an overview of theoretical preparation for students interested in astronomy who would like to participate in astronomical contests, school and non-school projects, conferences and science festivals.

BRING YOUR OWN DEVICE (BYOD)

Stand number	**77**
Country	Hungary
Teacher	Csilla Képes
Institution	BGSZC Pestszentlőrinci Közgazdasági és Informatikai Szakközépiskolája
Subjects	Maths, Biology, ICT

The aim of the project is to motivate the students using their devices as educational materials. I am going to show the wider usage possibilities of the electronic devices by working with applications. By the expansion of the learning methods we can ensure the opportunity of the device usage, which are means of subsistence for this generation. During the workshop I would like to present what kind of possibilities can be found in the different applications and websites, how can these devices facilitate the learning and what are the hidden opportunities of the augmented reality during the education. The creative online activities can increase the interactivity and reduce the digital gap.

BUILD YOUR OWN AUTOMATON!

Stand number	**78**
Country	Netherlands
1st teacher	Saskia van der Jagt
Institution	Coornhert Gymnasium
2nd teacher	Martijn Hoogland
Institution	Coornhert Gymnasium
Subjects	Technology, Research, Maker education

During this project, secondary school students design and build their own automaton. An automaton can be described as a machine or control mechanism designed to automatically follow a predetermined sequence of operations. The specific task to our students is to design an automaton that can be used as a toy by children between 1 and 4 years old. After formulating design principles and sketching their ideas for such an automaton, the students make computer drawings of each component. These components are cut by a laser cutter. After building their prototype the students reflect on their design principles and improve their design.

CONSTRUCTION OF AN USB FLASHLIGHT WITH A SUPER CAPACITOR AND DATA LOGGING WITH MICROCONTROLLERS

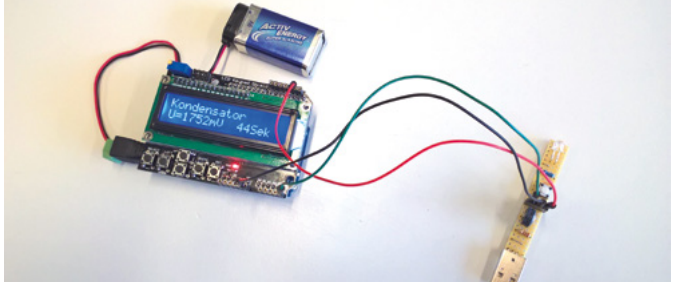
Stand number	**79**
Country	Germany
1st teacher	Leif-Erik Grabe
Institution	Carl-Benz-Schule Koblenz / Berufsbildende Schule Technik
2nd teacher	Patrick Schmitz
Institution	Carl-Benz-Schule Koblenz / Berufsbildende Schule Technik
Subjects	Maths, Physics, Computer Science, Technology

The students design and build an USB flashlight with a super capacitor. On the flashlight, the learner does various calculations and measurements. The measurements are performed with a microcontroller. The project promotes multidisciplinary teaching by linking the subjects mathematics, physics, computer science and engineering. Through measuring with a microcontroller, the everyday reference in the classroom can be increased since information technology and particulary the microcontroller in conjunction with various sensors are found everywhere in everyday life.

COSMOS ON STAGE – MEASUREMENTS INSPIRED BY THE KEPLER PROJECT

Stand number	**80**
Country	Hungary
Teacher	Csaba Fraller
Institution	Hévízi Bibó Gimnázium
Subjects	Physics, Computer Science, Astronomy

Children are interested in modern science. The project demonstrates that it is possible to study the recent results of the natural sciences in an interactive way (especially physics and astronomy) in the classroom. I have made an attempt to show the children how research methods work nowadays – on the earth or even in the sky above. These years the Kepler space telescope is the most effective device to discover planets out of our solar system. It uses such methods, which are understandable for an average high school student. In this project, three of these current methods have been modelled to bring science closer to the students and to place science onto the stage.



DON'T THROW IT OUT, CREATE A ROBOT!

Stand number	**81**
Country	Hungary
Teacher	Ákos Vecsei
Institution	Élményműhely
Subjects	Maths, Physics, Biology, ICT

In this project you can developed a robot building kit. The speciality of this building kit is that recycled materials are used as robot parts, so the kit consists of only the most necessary parts to make programmable and workable robot models. In this way the kit can be cheap and it can develop the environment friendly behaviour of the children. The built robots can be controlled by a computer or mobile phone over Bluetooth using a self-made robot control application.

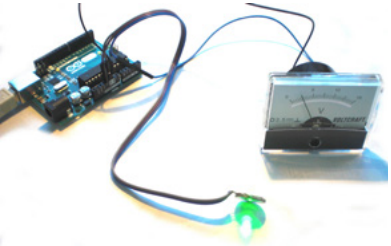
DRONESENSOR

Stand number	**82**
Country	Portugal
Teacher	Nelson Correia
Institution	Agrupamento de Escolas Gil Paes, Torres Novas
Subjects	Physics, Computer Science, Robotics

DroneSensor is a drone with a camera and sensors, built and programmed by students, to promote the interest of students in physics, electronics, robotics and computer science. Students use resources from the Raspberry Astro Pi and PocketLab projects, to install a camera and some sensors on the drone and to analyse the data collected by the sensors.

HOW TO GET YOUR PULSE ON YOUR SMARTPHONE

Stand number 83
Country Germany
1st teacher Lars Pelz
Institution Humboldtgymnasium Berlin
2nd teacher Michael Abend
Institution Käthe-Kollwitz-Schule Berlin
Subjects Physics, Biology, Computer Science



In this teaching project, materials were created that enable students to build a heart rate monitor. The hardware is based on an optical pulse sensor and an Arduino microcontroller board. Students learn how to build the electrical circuit and how to program the microcontroller to measure their heart rate. Teaching materials are designed to encourage self-organized learning, to facilitate natural language learning and to include students with disabilities. The materials are made available online using a Creative Commons license.

INQUIRY BASED LEARNING IN VET

Stand number 84
Country Hungary
Teacher Tibor Vizi
Institution A Debreceni Szakképzési Centrum Brassai Sámuel Gimnáziuma és Műszaki Szakközépiskolája
Subjects Physics, Computer Science, Technology, Engineering, Robotics

It is not enough to teach only from books. An immense knowledge can be acquired, but real experiments are needed. It is not necessary to teach more, but to teach in another way. I learned about the inquire based learning method on an EDX online course. But to use this method, some real tools for collecting proper data is needed. For that, I developed a tiny wireless device to help measuring signals, and a software tool to analyse and visualize these. Students need real experiments. Teachers have to help them to make decisions, conclusions in order to improve their job related skills.

INVENTIVITY WITH ROBOTICA DURING PHYSICS CLASS

Stand number 85
Country Netherlands
Teacher Kees Hooyman
Institution St. Bonifatiuscollege
Subjects Physics, Technology

Small robots are not just toys. They can be used as an educational tool. More strongly, they can fill the gap between science and technology. Especially in a competition with other robots participants will have to use their skills in designing and programming. These skills are also needed for a career in science & technology. Therefore, these skills should have a place in science education.

LEARNINGAPPS ON SCIENCE LESSONS

Stand number 86
Country Hungary
1st teacher Aranka Szamper
Institution Hamvas Béla Gimnázium
2nd teacher Marianna Vizes
Institution Temesvári Pelbárt Ferences Gimnázium és Kollégium
Subjects Maths, Physics, Biology

LearningApps.org is a Web 2.0 application to support learning and teaching processes with interactive modules. They can be used directly in learning materials, but also for self-studying and for creative content production. LearningApps include no specific framework or a specific learning scenario, so they are not suitable as complete lessons or tasks. Instead they must be embedded in an appropriate teaching scenario. The project highlights especially the collaborator teachers' community in Hungary, who help each other to include this gamificated, ICT-supported teaching method in their practice.

MANAGE YOUR MONEY WELL!

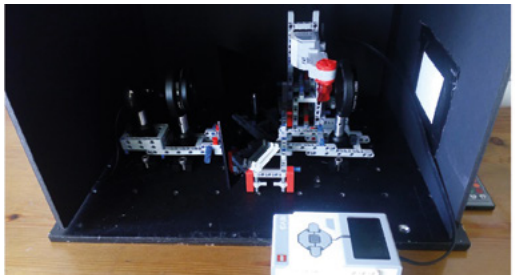
Stand number	**87**
Country	Hungary
Teacher	Anna Tóth dr.
Institution	Svetits Katolikus Óvoda, Általános Iskola, Gimnázium és Kollégium
Subjects	Maths, ICT

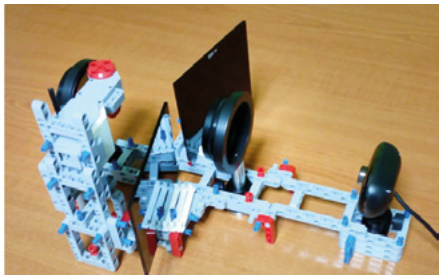
The project “Manage your money well!” was carried out in mathematics lessons with 25 students of grade 9 (15 years old). Students got to know basic financial terms: budget, loan, interest, investment, APR, and so on. Students worked in groups and compared offers of different banks useing the homepages of the banks. They made pie charts and column charts, calculated mode, median. (The national curriculum requires that students of grade 9 have to learn these mathematical statistic terms.) Each group made at least two presentations: one was about basic terms in their own topic and the second was about bank offers.

OPTICAL PROJECTION CT SCANNER WITH LEGO AND ARDUINO – GUMMY BEAR TOMOGRAPHY

Stand number	**88**
Country	Greece
Teacher	Michalis Orfanakis
Institution	General Lyceum of Makri Gialos, Gymnasium of Koutsouras
Subjects	Maths, Physics, Biology, Chemistry, Computer Science, Technology, Science

The development of X Ray Computed Tomography has been a real innovation in medical and industrial imaging. Optical Projection Tomography (OPT) implements the same principles like X Ray Tomography utilizing however, visible light, which is harmless for living organisms. OPT is used excessively for studying objects or organisms that are transparent to light. Within the framework of this project, low-cost OPT Computed Tomography Scanners using both LEGO Mindstorms and Arduino microcontroller have been developed. The goal is to present the basic principles of Computed Tomography in upper secondary education in action by CT Scanning Gummy Bear candies and other transparent objects.





PHYSICS WITH CAMERA OF THE MOBILE PHONE AND TABLET

Stand number	**89**
Country	Czech Republic
Teacher	Radim Kusák
Institution	MFF UK
Subjects	Maths, Physics, ICT

At the stand you will have an opportunity to try experiments with a mobile phone, especially with its camera. It will be possible to shoot a slow motion video of the falling water drop, to make a magnifier from the camera or use internal probes inside the device. Furthermore, it will also be possible to use an USB microscope and look for interesting things around us. All of these activities will have examples for how to use them in the classroom.

SCIENCE SMART KIT PROJECT

Stand number	**90**
Country	Italy
Teacher	Alessandro Foschi
Institution	Liceo Falbucci – Forli’
Subjects	Maths, Physics, Chemistry, Science

The Science Smart Kit project includes a set of laboratory activities for physics, mathematics, science and chemistry: instructions for teachers and a basic materials kit to be used with tablets and smartphones for the realization of qualitative and quantitative experiments. It involves the use of mobile devices already owned by students or disseminated in schools. The project is being disseminated through seminars and workshops at local and national levels.

SMART TRAILS IN EDUCATION

Stand number	**91**
Country	Hungary
1st teacher	Tamás Balogh dr.
Institution	Debreceni Egyetem
2nd teacher	Attila Mikulán
Institution	Debreceni Egyetem
Subjects	Maths, ICT

Nature trails including explanatory boards are very popular in several countries. As ICT develops rapidly, it has become possible to introduce a new generation of nature trails: besides the info-boards, a smart phone application is built that provides not only steady information for the users (i.e. students, school groups etc.), but also problems to be solved and to be evaluated rapidly. The trails could be set up even in school yards or buildings, serving as a new practice field for all kinds of school material. With this new idea, students' cooperative skills could develop, while being encouraged to do physical activity and use their smart phones in a useful and joyful activity.

SPACE CAMP GAME CENTER

Stand number	**92**
Country	Finland
Teacher	Petteri Mönkkönen
Institution	Kauniainen Upper Secondary School
Subjects	Physics, Astronomy, Space technology

Space Camp Game Center is a unique course designed for approximately 17 year old students on space physics, astronomy and space technology. During the course students will develop learning games related to astronomy, space physics and space technology with the help of Construct 2, Gamemaker, Pygames or Scratch. The cognitive apprenticeship model is used as a learning method.

TEACHING ATMOSFERIC PRESSURE VARIATION WITH ARDUINO

Stand number	**93**
Country	Portugal
Teacher	César Marques
Institution	Escola Profissional de Almada
Subjects	Physics

How is pressure related to height and how does this physical principle effect the function of drones, airplanes or parachute equipment? At this project the students are taken out of class in order to examine the link between pressure and height at school stairs, stepladders, city streets, malls, mountains, caves or any place with different height levels. With Arduino and their mobile phones they are collecting data, measuring different pressures, determining averages and drawing graphics. In this way they are guided to discover the hydrostatic equation by analysing graphics and using simple maths.

TECHNOLOGY MEETS SCIENCE IN ANCIENT GREECE

Stand number	**94**
Country	Cyprus
Teacher	Christina Aristodimou
Institution	Apostolou Petrou & Pavlov Lyceum
Subjects	Physics

Taking into consideration that new technologies create new approaches in the learning process, this project creates an interactive class by using computer games in Physics and History lessons. The students, as architects of the 12th century, use Minecraft to create their own Mycenaean palace and as engineers of the 12th century use Algodoo to build their own engine in order to lift stones for the construction of the cyclopean walls. In the end of these activities the teachers and students select the best palace and the most efficient machine. The students are given the opportunity to create, to be original and to cooperate with their classmates.

TEST AND TASTE

Stand number	**95**
Country	France
1st teacher	Nelly Fare
Institution	Collège Paul Eluard
2nd teacher	Carine Vinsot
Institution	Collège Paul Eluard
3rd teacher	Anne Laure Balac
Institution	Lycée Lucie AUBRAC
Subjects	Maths, Physics, Biology, English

This aim of this project is to educate children about balanced diet and dietary deficiency. France is famous for its food – but food can have consequences on health. This project makes children aware of these consequences and motivates them finding a solution in order to avoid food disorders. Through experiments in physics and biology children can realise how important it is to eat healthy. This project was a big adventure which has finally led to creating a „cookbook stand".

THE SCIENCE POSTER PROJECT

Stand number	**96**
Country	Canada
Teacher	Robin St-Pierre
Institution	École secondaire des Patriotes
Subjects	Physics, Biology, Chemistry, Technology

With students of 13-14 years old creation of science posters with Microsoft Publisher.
A project of human hand model, with wood, bungee elastics and cord. A microscope build with a recycled hand laser lens and a phone camera. Fabrication of DYI conductive ink and projects with it. Technology projects where students compete against each other. It's amazing what we can explain to students just by mesuring the lenght of a shadow of a street lamp each day at the same hour.

USING 3D PRINTERS AND CELLPHONES FOR SCIENCE EDUCATION

Stand number	**97**
Country	Czech Republic
1st teacher	Pavel Saal
Institution	Science center iQLANDIA
2nd teacher	Petr Desenský
Institution	Science center iQLANDIA
Subjects	Maths, Physics, Technology, Science

The project shows the possibility of how to use 3D printers in school science education for making easily accessible and good quality learning aids. Many objects such as cells and the DNA model can be created. It is also shown how the cellphone can be used as a learning tool for optics by creating a microscope with it.

USING I-PHONE FOR DEMONSTRATION DIFFERENT PHYSICS PHENOMENA AND COGNITIVE SKILLS DEVELOPMENT

Stand number	**98**
Country	Ukraine
1st teacher	Oleksandr Panov
Institution	Kharkiv National Pedagogical University of G.S. Scovoroda
2nd teacher	Alina Miachkina
Institution	Kharkiv National Pedagogical University of G.S. Scovoroda
Subjects	Physics

The project demonstrates how the cognitive interest of secondary school students can be increased by doing impressive presentations with radio waves. By conducting experiments on the transmission of electromagnetic waves through the cardboard, aluminum foil, water or a glass, children are being encouraged to study electromagnetic phenomena. Moreover, all experiments contribute to the development of analytical thinking.

USING MOBILE TECHNOLOGY TO BALANCE CHEMICAL REACTION EQUATIONS

Stand number	**99**
Country	Hungary
Teacher	Zsolt Béla Bárány
Institution	Hőgyes Endre Gimnázium és Szakközépiskola
Subjects	Chemistry

Although there is no doubt that the most spectacular aspect of chemistry is experimentation, it should not be forgotten that chemistry means much more than a vivid multitude of colours and blowing things up. Quite often rather complicated processes take place in the background. These processes are described by chemical reaction equations. The workshop aims to familiarise participants with web2.0 applications such as Quizlet, Socrative or PhET. These apps will make participants practise balancing chemical equations playfully and help them check their acquisition of the material. Those who take part in this workshop will be able to try out these tools with their own mobile devices.

WEIGHING JUPITER BY VIRTUAL OBSERVATION OF THE JOVIAN MOONS

Stand number	**100**
Country	Sweden
Teacher	Jonas Hall
Institution	Rodengymnasiet
Subjects	Maths, Physics, Astronomy

By using the free program Stellarium, we observe the Jovian Moons carefully, determining their angular separation from Jupiter and their orbital time with some accuracy. Together with the current distance between Earth and Jupiter, taken from Wolfram Alpha, we determine the actual radius of the Jovian Moons orbits. Plotting the radiuses versus the orbital times enables us to find a relationship between these, based on Keplers laws of motion. Using this relationship we determine the mass of Jupiter, discuss actual measurements and methods used in astronomy now.

WHO KILLED MAYA FOSTER? A CLIL CRIMEQUEST, INTERACTIVE COMPUTER CLASS ROLE PLAYING GAME

Stand number	**101**
Country	Italy
1st teacher	Sabina Maraffi
Institution	Liceo Labriola – Napoli
2nd teacher	Immacolata Ercolino
Institution	Liceo Calamandrei – Napoli
Subjects	Biology, Earth Science, Biotechnology, Forensic Science

A professor is found dead in a research lab: was it an accident, a suicide or a murder? The students must solve forensic logic problems and they will be involved in many hands-on activities with poor materials: DNA profiling, digital finger prints, hair comparison, analysis of sticky soil on the killer's shoes and luminol test on the crime scene. The students will collect all clues and bodies of evidence on the crime scene.

YOUNG SCIENTISTS JOURNAL

Stand number	**102**
Country	United Kingdom
Teacher	Christina Astin
Institution	The King's School, Canterbury
Subjects	Maths, Technology, Science

Young Scientists Journal is an online STEM journal written, reviewed and run by students across the world aged 12 to 20: the only peer review science journal for this age group. Our aims are to enhance students' science communication skills and publish school students' research, celebrating the scientific and creative thinking of young scientists around the world. The journal has produced 19 issues over 10 years with contributions from 45 countries, and we are now establishing YSJournal hubs in schools and universities, where local students come together to edit articles, write blogs or even do research. We'd like to encourage schools around Europe get involved.

YOUNG SCIENTISTS´ RESEARCH IDEAS

Stand number	**103**
Country	Slovakia
1st teacher	Lucia Mišianiková
Institution	Gymnáziu Poštová 9 Košice
2nd teacher	Brigita Balogová
Institution	Pavol Jozef Šafárik University in Košice
Subjects	Physics

Open problems in physics education can motivate students to find their own way on how to approach them. When the problem is introduced, students are expected to design, conduct and defend their chosen procedure and results. The Young Physicists tournament (IYPT) assignments are excellent examples for how students can solve problems creatively when they are motivated. The project presents examples of students' strategies to solving IYPT competition problems, e.g. vacuum bazooka, paper vice, magnetic train, rubber motor, super ball, safe egg's fall. While investigating, analysing and interpreting, students use digital technologies. This way they develop inquiry skills and digital competencies.

BEAUTY OF NATURE – LICHTENBERG FIGURES

Stand number	**221**
Country	Poland
Teacher	Jerzy Jarosz
Institution	University of Silesia in Katowice
Subjects	Physics, Science history

Using the typical school electrostatic machine as high voltage source, the Lichtenberg figures may be obtained in a very spectacular way. By interpreting their geometry and fractal-like patterns, we have the chance to see and realise the beauty of both mathematics and nature.

DISCOVERING OUR DIGESTIVE SYSTEM

Stand number	**222**
Country	Germany
1st teacher	Mira Büllesbach
Institution	Albert-Schweitzer-Grundschule in Bergheim Mitte
2nd teacher	Stephanie Cremer
Institution	Lessingschule Freiburg
Subjects	Biology, Chemistry

Digestion is a complex process. This project aims to explain it in a simple manner by simulating the stages of the digestive system. Pupils learn through acting and touching, which specifically aids the understanding for younger or developmentally-challenged children.

ENRICHING THE SCIENTIFIC LITERACY OF STUDENTS THROUGH ADDITIONAL ACTIVITIES IN AUTUMN SCHOOL NANOCHEMISTRY AND NANOTECHNOLOGY

Stand number	**223**
Country	Bulgaria
Teacher	Zlatka Garova
Institution	Secondary School Asen Zlatarov
Subjects	Physics, Chemistry

In this project, the focus is on the physical and chemical aspects of nanomaterials and nanotechnologies – the main part of the science's achievements of the XXI century. The content of the "nanochemistry curriculum" includes: a theoretical part – learning through meetings with scholars; a nanopracticum – learning through research; and school projects – developing experiential and inquiry based learning.

GRENOBLE GIANT@SCHOOL : AN INNOVATIVE ECOSYSTEM FOR EDUCATION FOSTERING COLLABORATIVE CREATIVITY

Stand number	**224**
Country	France
Teacher	Eric Martinet
Institution	Cité Scolaire Internationale Grenoble
Subjects	Maths, Technology, Science, Sustainable development, Environment

The GIANT Campus has given birth to a knowledge network where scientists, educators and students can share information about science and engage in research:

- 4 GIANT@school programs propose research workshops to high-school students;
- An international "Global Science Campus" promotes peer-reviewing of science projects between high-school students and developing "Communicating Science" skills;
- A "Sharing Science Community" is building up locally between 3 primary schools, high-school students and engineer trainees; it involves inquiry-based activities related to environmental issues and a science workshop where all young scientists will present their research.

HEALTH AND NUTRITION IN AN INDIGENOUS PERSPECTIVE

Stand number	**225**
Country	Canada
Teacher	Suzanne Nottaway
Institution	Maniwaki Woodland School
Subjects	Technology, Science

The project focused on the design of a pedagogical model centered on health and nutrition from an Indigenous perspective and aimed for the Science and Technology course as well as for special-needs students. The main objective was to develop a pedagogical model for the teaching of nutrition as part of the science and technology curriculum, which would be culturally sound, by mixing Indigenous and Western pedagogy. Teaching and learning scenarios were designed and applied using what is called a Hybrid Pedagogy (Campeau, 2016). Fishing devices were conceived and a small germinating container was used to grow indigenous plants. Students participated in discussions while learning outdoors about medicinal plants with an Elder from the Algonquin First Nation community.

LANGUAGE CARRIES KNOWLEDGE

Stand number	**226**
Country	Sweden
Teacher	Teresia Brzokoupil
Institution	Vistaskolan
Subjects	Science, Linguistics

This project is about changing the way teachers work with language to build an understanding and knowledge of concepts, and inner relations of concepts so that every student can evolve their ability to reason, argue and learn basic facts using their language. This technique can be used in all subjects, even science. It is about meeting students in their own everyday-language and follow them to a more broad and wide language. With the help of different activities a teacher can help students to understand better how to draw conclusions and to put names on the interaction between concepts. The project also helps students to act out more of their potential.

MARBLING WITH TENSION

Stand number	**227**
Country	Austria
Teacher	Hans Hofbauer
Institution	BG/BRG Waidhofen
Subjects	Maths, Physics, Biology

Marbling is a technique to create colourful paper, using acrylic paint of different colours on a surface of a water based paste. Marbling was used to design the covers of books and other surfaces, which had to be water resistant. By engaging pupils of the age of 5 to 18 years in this kind of activity you can teach basic motor skills, experimental techniques, basic mathematics up to vector calculus or trigonometry. Marbling is an ideal technique to learn about the physics of surface tension in an inclusive stetting. Handicapped children can work together with highly gifted ones. Arts teachers, science teachers and maths teachers can cooperate in a team uniting teachers of different schools.

NEMESIS VIRUS: THE PANDEMIC

Stand number	**228**
Country	Greece
Teacher	Georgios Villias
Institution	Varvakeio Model Experimental High School
Subjects	Biology

This project proposes an alternative way of teaching in which students participate in an engaging escape game activity. Based on the structure of escape room games, this educational activity stimulates students' creativity and critical thinking, favors team-working methodology and develops problem-solving skills. Learning process and understanding of the pre-mentioned concepts is achieved through a series of quizzes and problems, with a pleasant experiential manner. Students are being subjected to challenges like study and analysis of Electron Microscopy (EM) images, 3D models of viruses and real data from epidemiology studies related to some of the most dangerous and lethal viruses.

PLASMA SPEAKER: PLASMA AND IT'S UNUSUAL PROPERTIES

Stand number	**229**
Country	Poland
Teacher	Małgorzata Kramer-Wachowiak
Institution	Group of High Schools in Śrem
Subjects	Physics, Plasma physics, Experimental physics, Electronics

In this project an experimental plasma speaker set will be presented to demonstrate phenomena concerning plasma. In this show electric arc will serve us as an example of plasma to examine its unusual properties and learn about its different forms. The first element of the experiment will be plasma recreating music, later we will focus on its temperature and properties of flames, before the plasma structure and its interaction with magnets is analysed. In the end we will focus on its different forms in everyday life and plasma and normal gas similarity. Everything will be summarized by plasma applications and its future prospects.

PROJECT DAY: TECHNOLOGY OF METAL MANUFACTURING

Stand number	**230**
Country	Czech Republic
Teacher	Rita Chalupníková
Institution	Gymnázium Pardubice, ZŠ Seč
Subjects	Physics, Technology, History

The aim of the project is to get pupils familiar with the characteristics and technology of metal manufacturing. Pupils experience mechanical manufacturing and shaping of copper by making simple copper jewellery like our ancestors used to do. They also observe and experience other metal manufacturing processes like tin smelting and casting. Through that, the pupils gain knowledge in the characteristics of metals and alloys, they experience craftwork by using simple tools and old techniques and they understand how today's blast furnaces work. Pupils' own efforts and skill practices help them to arouse their interest in craftwork and respect to honest work.

SILVER FRACTALS

Stand number	**231**
Country	Poland
Teacher	Marzena Trybuszewska
Institution	1st Leszczynski Family High School in Leszno
Subjects	Chemistry

This project focuses on the clarification of the concept of fractal and on presenting examples for their relevance to everyday life. The project shows an experiment procedure on “Silver fractals”, that is electrolytic reduction of silver from ammonia salt solutions of this metal. Observations and explanation of occurring reactions are presented and the process and the mechanism of electrolysis are brought to mind. Furthermore the results of previous attempts are presented and it is demonstrated that the received structure is a fractal.

TECHNO-LAB KURSAAL

Stand number	**232**
Country	Spain
Teacher	Francisco Jesús Rivera
Institution	IES Kursaal
Subjects	Maths, Physics, Computer Science, Technology, English

These projects are carried out voluntarily at school breaks by students from different ages. They try to solve specific problems to improve the students’ life in their environment, regardless of their difficulties. Older student help the younger ones. With this methodology, the number of participants and the quality of the projects have increased. Participating students help later in class when related topics are being teached.

There are the following projects:

1) Guide Robot: helps a blind classmate to move around the school;
2) Describe your city: to show information about your city with visual and audio support (3D, AR, etc.);
3) Control of devices by voice;
4) Simple projects with sensors.

WE SPEAK SCIENCE

Stand number	**233**
Country	Switzerland
1st teacher	Tibor Gyalog
Institution	Gymnasium Münchenstein
2nd teacher	Nicole Traber
Institution	Primarschule Dreirosen, Basel
Subjects	Physics, Foreign language

We have developed a series of acoustic experiments for the primary school. The children play with their senses: they sing in a Rubens’ flame tube, produce vibrations of a guitar string or a membrane with salt or stroboscopic light. The experiments do not require prior knowledge. The results can therefore be documented in different languages, i.e. the children’s mother tongue. The result is a linguistically mixed scientific poster exhibition. The children experience the “Nature of Science”. Children who are disadvantaged because of their foreign language background play a central role through their foreign language competence.

ADAPTATIVE AND CREATIVE PROJECT-PROBLEM BASED LEARNING

Stand number	**137**
Country	Spain
Teacher	Miguel Ángel Queiruga Dios
Institution	Jesús-María School
Subjects	ICT, Science

The acPBL (Adaptative and Creative Project-Problem Based Learning) methodology suggests an attention to the diversity of the students, responding to their needs and concerns. For this, the teacher needs to take on the role as project manager and push and guide the teams in order to raise new questions. With the help of this methodology several multidisciplinary projects were developed.

ANALYSE THE BUILDING AUTOMATION SYSTEM IN THE NEW SCHOOL HOUSE

Stand number	**138**
Country	Germany
Teacher	Ulrike Englert
Institution	Willibald-Gluck-Gymnasium, Neumarkt
Subjects	Physics, Computer Science, Engineering

The new school house of the Willibald-Gluck-Gymnasium has been designed as a so-called EnergyPlusHouse. Its energy management is based on an intelligent building automation system that uses various sensors and actuators. The quality of indoor air and thermal comfort is monitored by temperature and CO2 sensors and controlled by ventilation systems. Student projects have been setup in order to analyse the effects of the ventilation system on climatic comfort and its efficiency. A project team evaluates measurements of room temperature and air humidity. Another project team simulates the building automation system by Arduino/micro controller. The project has been supported by TU Braunschweig.

CHEMISTRY TEACHING WITH APPLE CANDY

Stand number	**139**
Country	Turkey
Teacher	Nurcan Turan Candan
Institution	Atatürk Art High School
Subjects	Chemistry

Food additive colors are harmful. Children and young people tend to consume these foods constantly. Instead of maybe eating them once a week they are part of the daily diet. This is an increasing health risk.
In this project the students investigate the following questions concerning prepared foods in chemistry lessons, connecting to concepts such as cohesion and adhesion:

- What are prepared foods?
- What additives are used to make them?
- How are they prepared?
- What are their dangers?
- What is the strength of adhesion and cohesion?

In our apple sugar study, natural food coloring was made in 10th grade, natural emulsifier was investigated and in 9th grade, adhesion and cohesive forces were covered.

CHEMISTRY TO ILLUSTRATE BIOLOGY

Stand number	**140**
Country	Belgium
Teacher	Betty Guilliams
Institution	AR Fragnée, Liège
Subjects	Biology, Chemistry

In this project chemistry experiments are used to simulate and illustrate biological phenomenons such as the propagation of HIV or the diffusion through the cytoplasmic membrane.

COMPLEX 3+T METHOD – THE ROLE OF PARALLEL DEVELOPMENT OF COGNITIVE, AFFECTIVE AND SOMATIC ABILITIES IN TALENT MANAGEMENT AND LEARNING

Stand number	**141**
Country	Hungary
Teacher	Sándor Orbán
Institution	Budapest Műszaki Szakképzési Centrum Neumann János Számítástechnikai Szakközépiskolája
Subjects	Physics, Biology, ICT, Sports, Literature, Drawing

The simultaneous use of different sport techniques in one series of movement results in the desired development effect. During the accomplishment of these complex exercises, abilities of design, creativity and analysis are manifested from the cognitive sphere. Reading, handwriting and drawing and painting techniques develop thinking, the ability of focusing and logical, analytical thinking and creativity. While doing a research the students' ability of thinking in systems will develop too. Sport movements, research and the practice of arts have an impact on the students' emotions and intelligence while the emotional sphere has an impact on intellectual sphere, thus it will develop learning abilities.

DO COCKROACHES SAY HELLO? – BIOLOGY MASTERCLASS

Stand number	**142**
Country	Austria
1st teacher	Georg Knittelfelder
Institution	Akad. Gymnasium Graz
2nd teacher	Karin Hecke
Institution	University of Graz
Subjects	Biology

The "ForscherInnenwerkstatt Biologie" ("Research Workshop Biology") takes place at the "Akademisches Gymnasium Graz" and aims to enhance personal talents and interests. This extracurricular course offers students of the 6th and 7th grade the opportunity to pursue their biological interests with an individual research question, which is based on the student's curiosity. This means that no "recipes" are provided while researching. On the contrary, the students work independently and are only supported by students of the University of Graz. After intensive work, the students present their research results and receive a diploma.

DO SEEDS HAVE A MEMORY IN WEIGHTLESSNESS (ISS PROJECT)?

Stand number	**143**
Country	France
Teacher	Fadoua Mahzouli
Institution	Ecole 11 janvier
Subjects	Science Environment, Geology

The teacher and the students are taking part in the great adventure of the so called Proxima mission (https://proxima.cnes.fr/). The concept is to study the growth of seeds, such as lentils and radishes. Thomas Pesquet, a French aerospace engineer and European Space Agency astronaut, will have to water the seeds and take pictures at regular intervals to study the germination process in space. On the ground the students of the participating school will use the same type of seeds and will follow the same procedures. At the end they will compare their results with Thomas Pesquet's results. This way they will learn the effects of microgravity on plant growth.

ENTERTAINING GASES EXPERIMENTS

Stand number	**144**
Country	Czech Republic
1st teacher	Daniela Alexová
Institution	Mensa gymnázium, o.p.s.
2nd teacher	Martin Konečný
Institution	Mensa gymnázium, o.p.s.
Subjects	Physics, Chemistry

In this contribution, the characteristic properties of gasses are demonstrated in the form of effective experiments. Their preparation as well as other experiments with gasses are shown. The experiments can be therefore seen from both pespectives – chemistry and physics. This way both disciplines are connected in the form of interdisciplinary relations. Such experiments are entertaining as well as lecturing for students.

EXPERIMENTS TO IMPROVE CHEMISTRY LEARNING BY MODELING

Stand number	**145**
Country	Belgium
Teacher	Hamad Karous
Institution	University of Liège
Subjects	Chemistry

The process of modelling is widespread in teaching approaches. Facing a new situation students often ask for examples, which can be seen as a model of the associated knowledge with limitations. In context of science teaching it is observed that students misunderstand the role of models and underestimate the limitations. To overcome misconceptions a modelling approach is presented to help students becoming familiar with scientific concepts associated with chemistry (e.g. chemical kinetics). Active participation of students is promoted through activities: e.g. realizing and observing experiments dedicated to various concepts, modelling the associated results or taking part in guided discussions.

INNOVATION IN SCIENCE LESSONS BY SIX THINKING HATS METHOD

Stand number	**146**
Country	Hungary
Teacher	László Várnai
Institution	Veszprémi SZC Jendrassik-Venesz Középiskolája és Szakiskolája
Subjects	Maths, Physics, Chemistry, Psychology

I got introduced to the method of Six Thinking Hats at the Edward de Bono Institute in Malta. This approach improves thinking and discussions. In classrooms I used it to motivate the students and to collect their knowledge for achieving personal, structured and summarised lessons. With the help of Six Thinking Hats I have been empowering the kids to develop and solve their learning and understanding issues, as well as to understand and improve their environment and scientific surroundings. In my work I unify the Six Thinking Hats approach with the Provocative Method (Lateral thinking). The method supports the kids in reflective and creative thinking due to science lessons and a scientific approach.

MATH MYSTERY BOX. LEARNING MATHEMATICS BY PLAYING

Stand number	**147**
Country	Spain
1st teacher	Nerea Casas
Institution	Lauaxeta
2nd teacher	David Ballesteros
Institution	Lauaxeta
Subjects	Maths, Physics, Technology, Science

No one doubts the importance of mathematics in everyday life, however didactics may have had one of the poorest evolutions in this field. Most teachers develop this subject using a model based on a repetition of exercises, resulting in a feeling of tedium for students and causing a lack of motivation.
This project proposes a gamification based tool, integrated in a problem-solving methodology, and incorporates motivational activities that start from an attractive approach: overcoming a challenge using acquired mathematical knowledge and building new ones.

MATHTERMINDS – A GAME-BASED TOOL-KIT FOR EFFECTIVE MATHS LEARNING

Stand number	**148**
Country	Hungary
1st teacher	Ferenc Arató dr.
Institution	Pécsi Tudományegyetem
2nd teacher	Andrea Auth
Institution	inventor
Subjects	Maths

MathterMinds is a game-based tool-kit for effective maths learning. It makes maths learning simple and fun. MathterMinds offers an unique edutainment structure; meaning it combines education and entertainment simultaneously. The system of the games is built on well-known traditional family card and board games; therefore it is easy to master the basics even from a young age. From the aspect of maths learning MathterMinds games follow the basic principles of cooperative learning: therefore the mathematical development goes hand in hand with the development of interpersonal and social skills.

MATLAN – LEARNING MATH AND LANGUAGES THROUGH RESEARCH AND COOPERATION

Stand number	**149**
Country	Romania
Teacher	Ariana Vacaretu
Institution	Emil Racovita National College
Subjects	Maths, Physics, Biology, Computer Science

The aim of this project is to valorise students' creativity and innovation by inviting them to discover and research mathematics. The students have the opportunity to experience an authentic math-research process in school, with both a theoretical and an applied dimension. The research topics are launched by professional researchers. Groups of students from 2 high-schools choose one of the proposed problems and do research work to solve it. The students have to organize their work, identify the resources (strategies, knowledge, experience, equipment, software, materials); decide how the resources will be used for building and maintaining a shared understanding of the task and its solutions.

ON THE TRAIL OF THE MYSTERIOUS RADIO WAVES WORLD

Stand number	**150**
Country	Poland
Teacher	Kazimierz Paprzycki
Institution	Group of A. Mickiewicz Schools in Objezierze
Subjects	Physics, Astronomy

The presentation shows how a group of lower secondary school students built a radio telescope. With this radio telescope one can receive radio waves of the Sun and the Earth as well as the radio waves of artificial satellites of the Earth and internet radio transmitters. The radio telescope was built with inexpensive and widely available materials coming from home satellite receiving systems.

ORGANIC LIGHT EMITTING DIODES – EMBEDDING A FUTURE TECHNOLOGY IN CHEMISTRY CLASSES

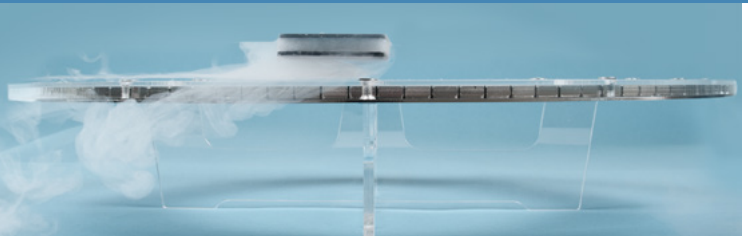
Stand number	**151**
Country	Germany
1st teacher	Daniela Schwarz
Institution	Neues Gymnasium Rüsselsheim
2nd teacher	Amitabh Banerji
Institution	Universität zu Köln
Subjects	Physics, Chemistry, Technology

Smartphones and tablet computers are products, which we use in our every day life. But what kind of technology is behind the displays of these devices? More recently, there are Organic Light Emitting Diodes, so-called OLEDs, which use conjugated polymers as semiconductors and light emitters. This innovative topic was implemented in a senior chemistry class of a secondary school. In the project, the students dealt with the construction of an OLED and analysed the structures-property-relations of the included polymeres. An important part of the project was the lab-phase, where the learners built their own OLED using low cost materials and methods, which were developed by the university.

OUR TIME-TRAVEL STORY (THE TRICKS OF THE „VITAL FORCE")

Stand number	**152**
Country	Hungary
Teacher	András Róka Dr.
Institution	ELTE TTK Kémiai Intézet
Subjects	Biology, Chemistry

„Theatre of electrons" presents the time-travel story from the embryo age inside the uterus to the development of mind and cognition after birth. All senses are being influence during the project. While the chemical and physical „scenes" (the sight of phenomena and experiments) give visual stimuli and the direct observation help to prove the theory behind, the didactic figures and interesting pictures help to follow and understand the chain of ideas. The topics are furthermore extracted by pop, rock and contemporary music. All this together helps to sense and enjoy the „scene" – our personal journey, or rather „Odyssey" in the history of our own life.



QUANTUM LEVITATION

Stand number	**153**
Country	Israel
1st teacher	Arik Gilboa
Institution	Hemda – Science Education Center
2nd teacher	Asaf Bar-Yosef
Institution	Hemda – Science Education Center
Subjects	Physics

Quantum Levitation is a complicated phenomena that can be understood and explained using quantum physics – a field not covered in high school physics. In this project we show the quantum levitation phenomena and study it by using Newtons mechanics. We explore the outstanding demonstrations with high school tools!

SCIENCE – DIFFERENT SUBJECTS OR ONE SUBJECT TAUGHT BY DIFFERENT TEACHERS?

Stand number	**154**
Country	Poland
Teacher	Teresa Wróbel
Institution	1st Z. Herbert Societal High School in Częstochowa
Subjects	Maths, Physics, Biology, Chemistry

In my project I look at a science teaching problem that already starts at primary school, when children start their experience with science, to high school, when students learn physics, chemistry, biology, geography as seperate subjects. They sometimes do not see correlations between these subjects. I give some ideas what teachers can do to help students noticing these connections.

SCIENCE IN SPACE

Stand number	**155**
Country	Netherlands
1st teacher	Claudia Callies
Institution	Stedelijk Gymnasium Leiden
2nd teacher	Christina Diehl
Institution	Gymnasium Paulinum
Subjects	Maths, Physics

Science in Space is an exchange programme for students aged 14-16 in which a Dutch and a German school collaborate. Our experience with setting up this programme is summarized in a step-by-step-plan. This general plan is illustrated with examples from the Science in Space programme.

SCIENTIFIC RESEARCH CLUB

Stand number	**156**
Country	Turkey
Teacher	Selçuk Yusuf Arslan
Institution	Ayrancı Vocational and Technical High School
Subjects	Science, Scientific Research Techniques

The impact of science in the modernization of countries has been increasing every day. Believing in the guidance of scientific research in solving problems is a main feature of modern people. Scientific research methods and techniques can be learned best by experience. This project therefore aims to teach scientific research methods and techniques, how to implement them and to report the result. This project was carried out by a working group of 60 students who have studied 244 different sources (thesis, article, report, etc.), conducted surveys with 1460 individuals and wrote scientific reports for projects.

SMELLS LIKE TEEN SHAMPOO

Stand number **157**
Country United Kingdom
Teacher Adrian Allan
Institution Dornoch Academy
Subjects Chemistry

This project involved a school collaboration with a local whisky distillery. The pupils distilled essential oils from plants using microscale distillation equipment and analysed them using chromatography. They produced an uniquely scented shampoo and tested their product in terms of pH, foam formation and the ability to clean doll and horse hair. They promoted their product, demonstrated their understanding of shampoo chemistry and presented their data at a poster session to a professional scientist. They subsequently published a peer reviewed report on their project in the Young Scientists Journal. Overall this project enthused pupils and gave them confidence in communicating science ideas.

SOLAR COKER AND DISTILLA ‚SUN'

Stand number **158**
Country France
Teacher Emmanuel Thibault
Institution Lycée Vaucanson
Subjects Physics, Chemistry, Technology

Perfumed waters obtained by steam distillation are widely used in Morocco for their culinary, cosmetic or therapeutic properties. This ancient tradition of distilling homemade waters has disappeared over the years. Our Moroccan partners asked us to build a device that distills floral waters using solar energy, therefore limiting the emission of greenhouse gases and deforestation. By optimizing the operating principle and reducing the costs we managed to create an inexpensive device. The quantity and quality of the water obtained was as good as those collected traditionally and the project was presented at the COP22 in Marocco.

TASTE THE UNIVERSE

Stand number **159**
Country Hungary
1st teacher Gyula Nyerges
Institution TIT Budapesti Planetárium
2nd teacher Lilla Kerényi
Institution TIT Budapesti Planetárium
Subjects Physics, Geography

Celestial bodies are sometimes so incomprehensible for us, it is even difficult to imagine. However, if we are not able to visualize them the study of their properties is a more difficult task. Models are made to help our imagination. It is even more inspiring and enjoyable if these models are edible after our detailed study. Let's cook edible models of some objects from our Universe!
Menu:
- Eclipsing binary eggs
- Galaxy pancake
- Expanding Universe cake
- Solar system fruit basket
-Comet ice cream

Enjoy your meal!
Within the framework of the project some experimental devices are presented as well. They will help the students to better understand several astronomical phenomena.

THE HUMBLE LITTLE WATER FLEA, ENGAGING MINDS FROM PRIMARY TO UNIVERSITY

Stand number	**160**
Country	United Kingdom
Teacher	John Dyer
Institution	Liverpool Life Sciences UTC
Subjects	Maths, Biology, Chemistry, Engineering

This Royal Society Partnership Grant project involved a successful collaboration between students and staff at Liverpool Life Sciences UTC and researchers at the University of Liverpool. The initial stages involved setting up laboratory systems for culturing populations of the water flea, Daphnia pulex at the school. This has enabled our students to use the water flea as a model organism for a range of experimental work on non-genetic inheritance, water pollution, anatomy and physiology. Furthermore, this humble water flea, Daphnia pulex, has also been used to engage visiting primary school students as young as 7 years old in experimental science.

THE PHYSICS OF ROAD SAFETY

Stand number	**161**
Country	United Kingdom
Teacher	Jennie Hargreaves
Institution	Lockerbie Academy
Subjects	Maths, Physics

Not all students will become physicists but all will be road users. By making the science relevant, more students engage with the subject, especially girls. Dynamics and kinematics is taught through the topic of Road Safety to students aged 12-18. It can bring in an awareness of health and wellbeing and safe driving techniques. The topic can lead to interdisciplinary learning sessions across maths, engineering and rationalisation. The students don't particularly think of this as physics, more having fun in a science lab and exploring things that will make a difference to thier lives.

THE RADIATION SURROUNDING US – A STUDENTS LAB

Stand number	**162**
Country	Austria
Teacher	Angelika Renz
Institution	KF Universíty Graz
Subjects	Physics

Even though radiation surrounds us constantly, students, and even adults, often know little about the electromagnetic spectrum. Various experiments regarding UV-, microwave and infrared radiation as well as the visible light should provide students with an understanding of the respective characteristics and effects on humans. The main aim of these experiments is to uncover possible misconceptions e.g. regarding the danger of mobile phone or microwave radiation and to highlight the harmfulness of UV radiation. The experiments can be rearranged and combined as desired according to topic or in form of different working stations.

THE TUSI COUPLE: PERSIAN SCIENCE, ITALIAN PROJECT

Stand number	**163**
Country	Italy
1st teacher	Vincenzo Favale
Institution	Associazione ScienzaViva – Calitri (Av)
2nd teacher	Pietro Cerreta
Institution	Associazione ScienzaViva – Calitri (Av)
Subjects	Maths, Physics, ICT

The Tusi couple is a mechanical device (two models are shown) which works according to the Theorem of Nasir al-Din al-Tusi, mathematician, astronomer, philosopher, theologian of the 1200 Islamic Persia.
This theorem states that:
If a circumference rolls internally to another, of double radius, having uniform angular speed, each point of it moves in a rectilinear harmonic motion.
Tusi developed this in the cultural period influenced by the Ptolemaic system, in order to simplify the astronomical calculations of the time.
It is sure that Copernicus has used this theorem composing his famous De revolutionibus orbium coelestium in 1543.

THE USE OF GEOMETRIC TRANSFORMATIONS IN COOK'S PROFESSION

Stand number	**164**
Country	Latvia
Teacher	Inese Siņavska
Institution	Daugavpils Secondary School Nr. 12
Subjects	Maths, Biology, Chemistry, Health education

The aim of the project is to demonstrate the relationship between theoretical material taught in mathematics and the use of this knowledge as a cook. The students who participated in the project learn in secondary school and simultaneously acquire the profession as cook in trade school. The students were given a task to prepare food – in line with the principles of healthy diet and to use geometric elements in their food presentation. A correlation was shown between the mathematical theories and the acquired profession. The knowledge of the subject, knowledge about healthy life and an introduction to the profession of the chef helped students to understand what they are learning and why.

USING ANAEROBIC DIGESTION OF SEAWEED AS A RENEWABLE ENERGY SOURCE FOR THE TIDAL LAGOON

Stand number	**165**
Country	United Kingdom
Teacher	Denise Thomas
Institution	Gower College Swansea
Subjects	Biology, Chemistry

Tidal Lagoon (Swansea Bay) needed to design a way of using their resources to produce renewable energy. This provided an opportunity for bright and innovative students who were studying A levels to work with local industry and education in the development of a sustainable energy source that could be incorporated into the development of the Tidal Lagoon (Swansea Bay) in South Wales. The outcome from months of research and development was a method of growing seaweed in the lagoon that could be digested into biogas to be used as a source of energy. The further outcome was an opportunity for students to work alongside local business and universities to develop their employability skills.

„CLOSE AIR PATROL" – A SPACE GAME WITH PHYSICS"

Stand number	**1**
Country	Denmark
Teacher	Pernille Rovsing
Institution	Østerskov Efterskole
Subjects	Maths, Physics

How can you work with Newton's laws so that it becomes tangible for the pupils? My teaching is a board game where the pupils "play" with Newton's laws while controlling spaceships fighting the enemy. In the meantime, there are various objects on the board that symbolize the universe, which they also have to consider. The first mission is a training mission where the pupils learn to control the spaceships, afterwards they have to defend the mother ship as well by attacking the enemy fleet. The pupils interact and their spaceships represent a total fleet. The teacher plays the enemy, however, using a system built on luck, by using dices.

„DO IT YOURSELF!" – EASY TO PREPARE DEMONSTRATION TOOLS AND EXPERIMENTS IN PHYSICS AND CHEMISTRY

Stand number	**2**
Country	Hungary
1st teacher	Imre Beszeda
Institution	Nyíregyházi Egyetem
2nd teacher	Lajos Sarka
Institution	Nyíregyházi Egyetem
Subjects	Physics, Chemistry

In recent years there has been considerable resistance to studying sciences in schools, with physics and chemistry being the least popular subjects. Nevertheless, all people at almost all ages like watching physics and chemistry experiments and performances. For such occasions, we present „easy to prepare" demonstration tools and present experiments, e.g. making a stroboscope at home, a vibrating jet of water illuminated by a stroboscope, automatic cleaning machine or a running bug made from nailbrush, an easy way to draw Lissajous curves, and also other demonstration tools or „toys" made from tin can, plastic bottles or other recycled materials.

3D-CELL

Stand number	**3**
Country	Netherlands
Teacher	Jolanda de Vries
Institution	Damstede Lyceum
Subjects	Biology

Students have to make a 3D-model of an animal cell or plant cell, with simple materials. They have to plan, design, work together and make use of the theory and pictures in their textbook and search for more information on the internet. They also have to define the functions of the organelles.

3-DIMENSIONAL VISION AND ITS ILLUSION IN CINEMAS

Stand number	**4**
Country	Germany
Teacher	Miriam Romberg
Institution	Helmholtz-Gymnasium Dortmund
Subjects	Physics, Biology, Computer Science

The emphasis of this sequence is on the polarisation of light and on explaining how 3D glasses in cinemas work. The students analyse linear and circular polarisation.
In preparation for that, they explore the technique of anaglyphs, which is more concrete and demonstrates the principle. The students develop the foundations by excursions to biology and computer science, which contain the functionality of 3-dimensional viewing as well as the RGB model used by computer screens explaining the human perception of colours.

BEER BREWING – A PRACTICAL APPLICATION OF SEVERAL SCIENTIFIC PRINCIPLES IN BIOLOGY, CHEMISTRY AND PHYSICS

Stand number 5
Country Belgium
Teacher Patrik Claes
Institution Spelenderwijzer vzw
Subjects Biology, Biochemistry, touch of Physics and Chemistry

A low cost set-up for brewing beer in the school lab. The brewing process requires measurement of several parameters and shows the students a practical example of processes like isomerization, fermentation or enzymatic conversion. In this interactive show we demonstrate the fire triangle with unexpected fuels like steel and sugar. Other experiments will be performed to investigate the physical and chemical effects of combustion, which will be discussed with the audience. This leads to CO2 and its properties as a solid and gas. Red cabbage is used to demonstrate why sparkling water tastes fresher than still water. This fact will then be linked to the cause of the Lake Nyos disaster.

A TOOL FOR STUDENT EXPERIMENTS FROM A DRUG STORE

Stand number 6
Country Hungary
Teacher Erzsébet Szakács
Institution Szentendrei Református Gimnázium
Subjects Chemistry, Science

I started using special test plates in my chemistry lessons which are made of plastic and are good for low-cost experiments. These special test plates have holes and are originally used for displaying and testing different nail polishes. They are highly useful for chemical reactions occurring in aqueous solutions, for reactions with colour changes and gas forming reactions. They are effective for reactions that do not need heating. The advantages of the method are that only small amounts of materials are needed and in contrast to the experiments demonstrated on tiles the materials do not flow away.

AN INNOVATIVE APPROACH TO HEALTH-PRESERVING ACTIVITIES OF THE PHYSICS TEACHER

Stand number 7
Country Ukraine
Teacher Tetiana Kravets
Institution Educational complex «Gymnasium HEART»
Subjects Physics

As pedagogical practice shows, students are facing difficulties in the learning process during physics lessons due to various reasons. One of these difficulties is a physical fatigue and mental stress during the lessons. Health-preserving activities by the physics teacher could help to overcome these conditions enabling the students to master the foundations of physics. For doing this this, the teacher should organize a short-term pause to switch students to another kind of activity increasing the vital tonus of the students. This pedagogical innovation enables to unite the physical exercises performed by the students with the learning process in basic physics during short-term pauses.

ARS LUX LASER HARP – THE MUSICALITY OF LIGHT

Stand number 8
Country Portugal
Teacher Rita Rocha
Institution Colégio Luso-Francês
Subjects Physics, Technology, Music

A laser harp is a musical instrument which works by blocking laser beams with the purpose of producing sound. Ars Lux uses eight low-power lasers and a single-board computer, thus making it easier to build and economically viable. This unique prototype combines art and light sciences. The school project allows the development of several key competences such as time management, argumentative thinking, research skills and collaborative work.

BALANCED OBJECTS IN EVERYDAY LIFE

Stand number	**9**
Country	Hungary
Teacher	László Orosz
Institution	Demecseri Oktatási Centrum Gimnáziuma
Subjects	Maths, Physics, Engineering

We use different objects in our homes day by day: cutlery for eating, brooms for cleaning or wooden rulers and hammers for smaller jobs. These objects, when not in use, are in a stable position. However, by moving them in the right way we can easily find new and surprising equilibrium positions.

BASKET FULL OF SWEETS

Stand number	**10**
Country	Slovakia
Teacher	Iveta Štefančinová
Institution	Gymnazium J.A.Raymana, Prešovó
Subjects	Physics

The project consists of experiments using sweets. The experiments are focused on different phenomena connected with mechanics, vibrations, optics and electricity. They e.g. involve finding out the speed of light using by chocolate, designing a kaleidoscope with coloured sweets, motion of a spherical sweet on an incline with different surfaces, catapult with sweet bullet, sweet pendulums with same or different length, sweet as an electric circuit element, development of crystals using sugar, equation of gas state using popcorn, etc. All these experiments are intended to be prepared by students individually or in groups and they present and explain them in front of the class.

BIOPHYSICAL INSPIRATIONS

Stand number	**11**
Country	Poland
Teacher	Aneta Mika
Institution	S. Czarniecki High School No. 6 in Szczecin/College of Education and Therapy
Subjects	Physics, Biology

Biophysics is a science which applies research methodology characteristic of physics to perform the analysis of the structures of organ systems, biological phenomena and processes. It aims at interpreting life processes by means of methodology adopted from physical sciences. In this project students are introduced to biophysical modeling – a simplified method of solving a particular research problem and as an interesting method of student motivation during lessons.

CHEMISTRY EXPERIMENTS WITH NATURAL AND SUPERMARKET PRODUCTS

Stand number	**12**
Country	Belgium
Teacher	Brigitte Nihant
Institution	University of Liège / Königliches Athenäum Eupen
Subjects	Chemistry

Scientific knowledge is based on experimental data and built on an interpretative framework. It can be challenged by new experiments and new ways of conceptualizing empirical data. In this project, the students will have the opportunity to try out several experiments starting from products which can be found in nature or supermarkets. The experiments can contribute to develop skills that are addressed in the school curriculum (e.g. the acid-base concept and the pH scale). Experiments with light sources (fluorescence) allow consolidating previously acquired knowledge on chemical bonds, acid-base and redox reactions. Addressed skills will be identified for each type of experiment.

CHEMISTRY WITH LEGO®

Stand number	**13**
Country	Itlay
1st teacher	Riccardo Bonomi
Institution	IC Siziano PAVIA
2nd teacher	Laura Forlin
Institution	IC Siziano PAVIA
Subjects	Maths, Chemistry

To teach chemistry I often referred to Lego® bricks, asking my pupils to imagine joining atoms based on their shared electrons. To use Lego® bricks I assembled a number of small kits with bricks of different shapes and colours to have a concrete experience, giving the kids the opportunity to "touch" the studied rules and therefore create a virtual chemical laboratory. An "increased" periodic table was created by adding the representation of the elements with only their valences to the chemical symbols. With the table the kids know how to build stable chemical molecules because the model itself leads them to see if the procedure was carried out correctly by giving an immediate feedback on their work.

COLORFUL SCIENCE

Stand number	**14**
Country	Georgia
1st teacher	Nino Saakashvili
Institution	Napareuli Public School
2nd teacher	Tamar Doborjginidze
Institution	Buckswood International School
Subjects	Physics, Biology

Let's make the learning process colorful. Science is around us, we just need to perceive and love it. The project is based on a research-based approach. For conducting the experiments only low cost materials are needed. The Experiments are safe and easy to conduct. The goal of the project is to help primary and elementary school students to learn these topics through interesting and funny activities like:

- Diffusion and selective intrusion of membrane
- Osmosis in living organisms
- Telephone – observing the transmission of sound waves
- Generation of sound

COLOURED CHEMISTRY

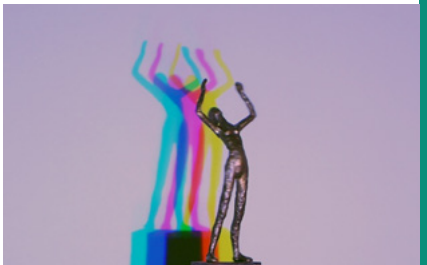
Stand number	**15**
Country	Belgium
Teacher	Viktor Gueskine
Institution	University of Mons
Subjects	Chemistry

The projects present chemical experiments dealing with the topics of electrophoresis, autocatalysis and invisible ink. A simple electrophoresis experiment illustrates an important concept, namely, the positive charge of ions responsible for the acidic property. Autocatalysis is not a usual subject on the secondary school chemistry curriculum. However, ist demonstration can be in order for advanced chemistry classes. Invisible ink is a spectacular experiment demonstrating the "magic of chemistry". In particular, the invisible ink based on gallic acid builds a bridge to history and practical origins of chemical science.

COLOURS, LIGHT AND SHADOW

Stand number	**16**
Country	Denmark
Teacher	Poul Hedegaard
Institution	Odense Katedralskole
Subjects	Physics, Biology

In this project, students plan and carry out experiments in which they investigate the rules for additive colour mixing and the position of colours on the colour circle to explain coloured shadows and complementary colours. One of the goals in the Danish curriculum is to present and use scientific methods. As part of the basic science course, hypotheses must be easy to verify or falsify using simple and cheap experimental equipment. The results from the experiments with colours are used to motivate the learning of more difficult subjects in physics and biology, e.g. colour vision, colour blindness, the Bohr model of the atom or photosynthesis.



CREATING PROJECTS IN SCIENCE CLUBS

Stand number	**17**
Country	United Kingdom
Teacher	Ann Blanking
Institution	St Mary's College
Subjects	Biology, Chemistry

This extra-curricular Chemistry Club has a present membership ranging from the ages 11 to 17 years. A range of projects is undertaken concerning everyday salient topics involving; health, environment etc., All projects follow the scientific method and all are subsequently entered for various science competitions. The projects are undertaken entirely in school and make use of the existing school resources available. The projects are undertaken by girls and involve recent topics in the news. They look at real world problems.

CSI AT SCHOOL

Stand number	**18**
Country	Netherlands
Teacher	Jarka Buijs
Institution	St. Gregorius College
Subjects	Biology

The CSI project turns students into crime scene investigators. Using their biology knowledge and skills they have to investigate the murder of one of their teachers. They have to identify who did it, why it was done, what the murder weapon was and when the murder took place. This they will do by investigating insects, blood, secret notes, finger prints, urine samples and more. The context and the mainly practical approach are appealing to the student. Their enthusiasm combined with their imagination will make this project successful every time!

DEFINING DENSITY THROUGH EXPERIMENTATION

Stand number	**19**
Country	Cyprus
Teacher	Pertos Kalamidas
Institution	Makarios C' Nicosia Technical School
Subjects	Physics, Engineering

Using this approach we will introduce the quantity of density to students that have been taught the quantities of mass and volume. In a container different liquids and solid objects are situated in relation to their density. We observe that the equilibrium depth for each material is the same irrespectively of its dimensions. The ratio of mass over volume is constant for each object and proportional to its equilibrium depth. This ratio is defined as density of a material. By defining density and by altering it, we will be able to explain everyday observed phenomena such as: the strange hourglass, Galileo's thermometer or the operation principle of submarines.

DID RITCHIE BLACKMORE KNOW PHYSICS?

Stand number	**20**
Country	Greece
Teacher	Vasilis Noussis
Institution	Laboratory Centre of Physical Sciences of Thesprotia
Subjects	Physics, Music

This project tries to combine physics and music. With the help of a "Do It Yourself" electric monochord one shall eventually be able to play a four-note melody: the introduction to the song "Smoke on the water" by the rock band "Deep Purple". At the same time the physics behind the production of sound on the electric guitar have been explored.

EASTER EXPERIMENTS

Stand number	**21**
Country	Hungary
1st teacher	Csabáné Magyar
Institution	Eötvös József Gimnázium és Kollégium
2nd teacher	Beatrix Frankel
Institution	Eötvös József Gimnázium és Kollégium
Subjects	Physics, Biology, Chemistry

The “Easter experiments” project focuses on the egg, with a number of activities demonstrating different physical, chemical and biological phenomena. A bit of art to motivate the children is used as well. Each experiment is performed by the kids following the teachers’ guidance and the safety rules. The experiments were several times and the children enjoyed it very much. One of the guiding principles is environmental protection: all kinds of common objects have been recycled and reused, packaging materials like bottles, cups, boxes, egg holders and so on have been collected. The workflow, the materials and tools are very simple so it is low cost and does not require laboratory environment.

EGGNAUT XICO LOPES

Stand number	**22**
Country	Portugal
Teacher	Emanuel Bettencourt
Institution	Agrupamento de Escolas Dr Francisco Fernandes Lopes
Subjects	Physics

Xico Lopes is an ‘eggnaut’ who starts a space mission to other planets. At this project the students have to build a rocket from a 2l soda bottle with a space capsule where a raw size L egg as ‘eggnaut’ will be put. The challenge: the egg not only needs to be rocket upwards but also to return intact to the ground! For the space mission the students are pumping air inside a bottle that already contains 200ml of water. With the help of Newton Laws the egg will reach a height of up to 20m. For their space mission the students use an evaluation grid for the construction and for the performance of the rocket plus recovery system as well as a regulation.

ELECTROCHEMISTRY IN PRACTICE

Stand number	**23**
Country	Hungary
Teacher	János Sándor Kapitány
Institution	BMSZC Wesselényi Miklós Műszaki Szakközépiskola
Subjects	Physics, Biology, Chemistry

This practice oriented teaching project is within the field of electrochemistry. Different teaching tools and materials will be presented, e.g. writing with electricity (with the use of 4,5V or 9V batteries), building an easy galvanic cell with salt-bridge, Volta-battery or simple fruit batteries. But what is inside a battery? Discover what is inside the 1,5V C-Zn batteries, 4,5V flat batteries, 9V batteries, button batteries or Li-ion batteries and explore a 55Ah car battery (without acid) and a motorcycle battery. There will also be an apparatus for electrolyzing water with colourful indicators.

ENGAGING PUPILS IN MOTION EXPERIMENTS

Stand number	**24**
Country	Latvia
Teacher	Baiba Dage
Institution	Jelgava State Gymnasuim
Subjects	Physics

It can be challangeing to raise interest in physics among high school pupils. Competitions and active engagement in experiments and exercises are some of the best tools to motivate them. This project demostrates examples of building car and boat models from reusable materials to teach subjects related to motion. Models are created by the pupils themselves and afterwards used in various exercises to measure speed, acceleration and demonstrate jet propulsion. Results have proven that pupils appreciate such activities, engage actively and develop a better understanding of various physics topics.

ENGAGING STUDENTS WITH STEM LEARNING THROUGH A MAGICAL SUBSTANCE: THE WATER!

Stand number	**25**
Country	Spain
Teacher	Gabriel Pinto
Institution	Group of Didactics of Physics and Chemistry
Subjects	Physics, Chemistry

In this project contextualized experiments and inquiries to investigate STEM topics are proposed. These topics include a variety of physicochemical properties (density, miscibility, boiling point, refractive index, heat capacity, etc.), chemical reactions, cooling by evaporation, etc. All this allows reasoning about effects such as ocean thermohaline currents or the use of condensing boilers at home. Examples of questions to solve are: where would an ice cube melt faster – in water or in water saturated with salt? What happens if you put a drop of water in hot oil? Do they have anything in common a “botijo” (water cooling pitcher) and “drinking bird” toy?

ESCAPE THE CLASSROOM

Stand number	**26**
Country	Netherlands
1st teacher	Anne de Groot
Institution	Segbroek College
2nd teacher	Joris Koot
Institution	Segbroek College
Subjects	Biology

How cool is that to be locked up by your twisted science teacher. The only way to get out is to use your scientific knowledge and skills. You have one hour and the clock is ticking.
In an escape classroom a group of students is trapped in a room with all kinds of scientific puzzles. They must find clues, combine knowledge and skills that they have learned in class. Escape classrooms can be played as preparation for an exam. The individual puzzles can be used as activating teaching method. Anne de Groot and Joris Koot have launched a website and give workshops to inspire teachers and to help them set up and play their own escape classroom for any age group or subject.

EXPERIMENTS ON LIGHT WITH THE USE OF SMARTPHONE

Stand number	**27**
Country	Hungary
Teacher	Zsanett Finta
Institution	Szombathelyi Nagy Lajos Gimnázium
Subjects	Physics, ICT

The examination of light waves has always been a difficult topic in secondary schools. In this project students carry out a qualitative examination of light phenomena with the help of smartphones. With the self-made box they compare the illumination and the capacity of the light sources depending on the position of different light sources. Furthermore, they also examine the traditional light wave phenomena, such as absorption, reflection and refraction. The students compare the new measurement methods and results with the traditional ones.

FLUORESCENT SPECTROSCOPY USING NOTHING ELSE THAN TWO CELLPHONES AND AN OVERHEAD PROJECTOR

Stand number	**28**
Country	Sweden
Teacher	Anders Florén
Institution	Enskilda Gymnasiet
Subjects	Maths, Physics, Biology, Chemistry, Technology

A team of students have constructed a zero-budget fluorometer using only two smartphones and the lenses from an over-head projector. No other equipment is required and the setup is sensitive, detecting down to picomolar concentrations of a single fluorophore. This project easily divides into several subprojects suitable for graduation projects. One group e.g. made a biology project to monitor Green Fluorescent Protein (GFP) and mCherry (RFP) expression in e-coli. Another group interested in geometry focused on elliptical surfaces. The project spans from programming, math, chemistry, physics and biology, but each individual subproject can be done within the comfort-zone of the student’s ability and interest.

FORENSIC SCIENCE IN SCHOOL

Stand number	**29**
Country	Sweden
Teacher	Marie-Louise Raväng
Institution	Pauliskolan
Subjects	Science

Together with two collegues I have written the text book „Kriminalteknik i skolan“ (forensic science in school) which can be used for teaching. The students are about 18 years old but the subject „forensic science“ can easily be adjusted to the youngest. By using low-cost materials every pupil from the age of 5 and above can become very excited to use science for solving the detective mystery. The pupils have the chance to work together and learn how maths, physics, biology and chemistry are involved in solving a crime.

HAND ON HEART

Stand number	**30**
Country	Czech Republic
1st teacher	Dana Hladká
Institution	VIDA! science centre
2nd teacher	Barbora Bútorová
Institution	VIDA! science centre
Subjects	Biology, Anatomy

What is it like inside your heart? What does your heart sound like? Which obstacles does blood have to overcome during its journey? A pig's heart is anatomically very similar to the human's heart. It will help us discover the structure of one of the most fascinating organs of our body. We will find out about the different parts and how they function, listen to our own hearts and hear what they have to say.

HANDS-ON EXPERIMENTS FOR SECONDARY SCHOOL STUDENTS

Stand number	**31**
Country	Ukraine
1st teacher	Uliana Nyemchenko
Institution	Karazin Kharkiv National University
2nd teacher	Nataliya Kazachkova
Institution	Karazin Kharkiv National University
Subjects	Physics, Science

Dozens of experiments have been united in a single online database. Detailed descriptions, illustrations, photo and video material and a number of additional sources were designed to help teachers, parents and students to carry out exciting hands-on experiments with the help of household objects. To help the teachers, these experiments have been structured according to the topics of physics classes at school. Some of these experiments are a teabag rocket, a fire tornado in a trashcan, a hot air plastic bag balloon or a Cartesian diver from a pen cap. The experiments were tested in workshops on ECYGDA center, showing successful results on competitions for young researches.

HAVE YOU SEEN MY SOUND

Stand number	**32**
Country	France
1st teacher	Maxime Biet
Institution	College Hippolyte Rémy
2nd teacher	Loic Grange
Institution	College Hippolyte Rémy
Subjects	Physics, Music

Children are not only young scientists but also singers and musicians. Therefore, this project deals with the field of acoustics. After researching what a sound actually is, different ways of displaying a sound wave are being develop; there is e.g. mechanical waves, standing waves and sound waves. By doing a standing wave, one could sometimes “see” a sound. The project puts this into practice.

HOMEMADE ELECTROSCOPES

Stand number	**33**
Country	Ireland
1st teacher	Máire Duffy
Institution	Clonkeen College
2nd teacher	Sean Fogarty
Institution	St. Mary's Seconday School
Subjects	Physics

Static electricity experiments can be lots of fun but often due to budget constraints in a school teachers may have to demonstrate a lot of their experiments. This project involves two very simple homemade electroscopes that students can make themselves. Younger students can very easily make an aluminum pie pan electroscope and then test different materials for their ability to build up static charge. The second electroscope is much more sensitive and comprises of a very simple circuit that can be made in a single class using a MPF102 transistor. It will encourage new skills in older students such as soldering and understanding the structure of semiconductors.

HOW TO SEE INVISIBLE AND MOVE THINGS WITH SOUND?

Stand number	**34**
Country	Poland
Teacher	Beata Świder
Institution	1st Eugeniusz Romer High School in Rabka-Zdrój
Subjects	Physics

My greatest dream as a teacher of physics is to inspire my students to learn. I am often looking for new, more attractive experiments for students, which can arouse their interest. I would like to share my experiences related to the experiments that my students built and presented. "Seeing the invisible" using Schlieren optics and "Moving things with sound" using Helmholtz resonance.

I. A QUAKE TABLE THAT POSSESSES THREE DEGREES OF FREEDOM. II. A WIND GENERATOR THAT EXPLOITS THE MAGNUS EFFECT

Stand number	**35**
Country	Greece
Teacher	Astrinos Tsoutsoudakis
Institution	Senior High School of Gazi
Subjects	Physics, Geology

I. A quake table that can move along three independent axes (x,y,z) thus possessing three degrees of freedom. Various models are used to demonstrate the impact of quakes on buildings while some minimizing consequences are also discussed. The so called QCN sensor records acceleration data and plots it on screen in real time.
II. A wind turbine that uses four Flettner rotors instead of blades. The rotors are belt-driven and spinned around their axes by four separate DC motors to exploit the Magnus effect. The use of rotors provides better functional control over the power producing unit especially during rough weather conditions.

INTERFERENCE IN THE WORLD OF SOUNDS

Stand number	**36**
Country	Hungary
Teacher	Fanni Vitkóczi
Institution	ELTE Trefort Ágoston Gyakorló Gimnázium
Subjects	Physics

Some easy, short and modern experiments for high-school students with sound and waves. The experiments are innovative because they involve the students by making them take part in the measurement with their own common used tools, like smartphones, headset, or other electronic devices.

KITCHEN CHEMISTRY TO ENHANCE STUDENTS INTEREST

Stand number **37**
Country Iceland
Teacher Ásdís Ingólfsdóttir
Institution Kvennaskólinn í Reykjavík
Subjects Chemistry

"Back to basics" – the aim is to show how it is possible to teach secondary students basic chemistry with a low-cost textbook, simple exercises and laboratory equipment. A vivid teaching method enhances the students' study out-come and positive attitude towards science learning.
The project deals e.g. with the following:

1. Elements and substances in the classroom/kitchen.
2. Solubility – why does it matter in every day life and for the environment?
3. On the block – storytelling about the Periodic Table.

MAGNETIC FORCES

Stand number **38**
Country Poland
Teacher Zenona Stojecka
Institution Tadeusz Kosciuszko High School in Wieluń
Subjects Physics, Engineering

This project presents a couple of experiments that introduce magnetic interaction, focusing on Lorenz's force. It is suitable for everyday classes and adapts to a well-known methodology: inquiry based learning. After seeing the experiments students will definitely ask themselves: how does it work? For example the students learn about the magnetohydrodynamic effect where liquid moves into two ways simultaneously. With a magnetic train they learn about the rule how the linear homoplar motor works. They make a magnetic vehicle move and they construct a magnetic piston engine.

MAGNETIC PHENOMENA WITH AVAILABLE MATERIALS

Stand number **39**
Country Bulgaria
Teacher Nikola Karavasilev
Institution Sofia Mathematical School
Subjects Physics, Chemistry

This project will present different experiments, illustrating different phenomena related to the field of magnetism. The main purpose is to demonstrate that science is interesting, amazing and accessible for everyone. The materials used for the experiments are cheap and accessible by everyone. A brief brochure where each experiment is explained will be prepared. The following magnetic phenomena will e.g. be demonstrated: the magnetic field on iron shavings, the Gaussian cannon, an electric lamp and the Levitron.

MAKING ELECTRICITY LABS ACCESSIBLE & AFFORDABLE: INTELLIGENTLY REPLACE SENSORS & VOLTAGE SOURCES BY ICT

Stand number **40**
Country Belgium
Teacher Stijn Lichtert
Institution KA Ekeren
Subjects Physics, Chemistry, Electricity, STEM

Student labs about electricity are typically perceived as stressful and inefficient by science teachers. The teacher should have access to a dedicated lab with enough student equipment (especially voltage sources & multimeters). Students must get trained using this equipment prior to the actual experiment. Furthermore, these apparatuses are quite expensive.
In this project, we perform several classic labs about electromagnetism (Ohm's law, circuits of resistors, magnetic field of a solenoid) in a quick and easy USB setup. A USB port acts as a constant DC voltage source. Cheap USB power meters deliver quantitative measurements of voltage and current.

MATHEMATICAL TOURISM

Stand number	**41**
Country	Portugal
Teacher	Paulo Gil
Institution	Escola Básica e Secundária de Pinheiro
Subjects	Maths, Physics, ICT, History, Arts, Music

This project intends to promote the learning of culture and history of a country from a mathematical perspective. For this, tourist itineraries are defined inspired by maths. In selecting the various tourist itineraries not only the relevance of cultural heritage is taken into account, but also the relevance of mathematical content presented in that same choice. The set of tourist itineraries is intended to suggest a wide range of locations in order to disseminate as widely as possible culture, history and heritage; at the same time the mathematical approach needs to be significant and, thus, could be integrated into the curriculum context of the discipline itself.

METHODS OF STUDENTS RESEARCH SKILLS DEVELOPMENT BY SPECIALLY CREATED TEXTBOOKS

Stand number	**42**
Country	Ukraine
Teacher	Faina Bozhynova
Institution	Gymnasium 46
Subjects	Maths, Physics

The main goal of this project is to organize the physics lessons in the experimental approach. It is well known that demonstrations of exciting physics experiments at the lessons make physics more understandable and visual for students. So effective organization of the experimental activities such as laboratory works, demonstrations in the lessons is a key to successful teaching methods.

MILK

Stand number	**43**
Country	Slovakia
Teacher	Alžbeta Slavkovská
Institution	Basic School, Poprad
Subjects	Physics, Biology, Chemistry

The project involves a series of easy to use experimental and theoretical problems connected with milk and milk products and their role in nutrition with focus on lower secondary students. The experiments use milk and milk products and other commonly available materials. They represent examples of production of food used in everyday life in which students are encouraged to solve problems in the fields of chemistry, biology and physics that are connected with water, lipids, carbohydrates, protein, filtering, mass fraction, volume fraction, microorganisms, temperature, etc. The experiments are quite time consuming and therefore appropriate for students´ independent investigation and experimentation.

MODELING MECHANICS WITH LOW-COST MATERIALS

Stand number	**44**
Country	Egypt
Teacher	James Carter
Institution	Modern English School
Subjects	Physics

We will be presenting a low-cost physics toolkit of material that can be sourced locally in almost any country and a few items that we have found essential to teaching concepts in high school mechanics that must be sourced through online retailers. The low-cost physics toolkit also incorporates two mobile apps, ‘Physics Toolbox Suite’ and ‘Science Journal’ in order to supplement the existing sensors that a teacher might already find in their laboratory. Potentially the most useful aspect of the project will be series of introductory activities, problem solving strategies and laboratory introductions that serve to guide both students and instructor through the first set up open-inquiry activities to investigate motion and conservation of energy concepts.

MORE THAN MATHEMATICS

Stand number	**45**
Country	Hungary
1 st teacher	János Márki-Zay
Institution	retired scondary school teacher
2nd teacher	Szaniszló Dr. Bérczi
Institution	Eötvös Loránd Tudományegyetem
Subjects	Maths, Physics, Biology, Chemistry

In our programme we deny rigid, static and boring visualisation in teaching. Instead we use tools made from everyday materials which are colourful, spectacularly variable and interactive. These new tools are expressive and act on the senses (touch, movement coordination, etc.), and they give dynamism to the illustration of the lectures. Our students learn mathematics in a playful, enjoyable way. While playing, they discover the inner relationships and it also develops their spatial visualisation ability. We emphasize the relations between physics and geometry.

MUSICAL PHYSICS

Stand number	**46**
Country	Hungary
Teacher	Miklós Jendrék
Institution	Váci Szakképzési Centrum Boronkay György Műszaki Szakközépiskolája és Gimnáziuma
Subjects	Physics

Detecting and converting audio-frequency vibrations of electromagnetic and light signals can show a vast amount of physical effects in an unconventional and spectacular way. For detecting the electromagnetic fields we should use a coil and for detecting light signals a light sensor (phototransistor, photodiode). After amplification, the signals can be converted into sounds again. During the signal converting process there is the opportunity to view and examine optical, acoustical and electromagnetic phenomena.

NATURAL CLEAR

Stand number	**47**
Country	Hungary
1 st teacher	Szilvia Tóth
Institution	Bessenyei György Gimnázium és Kollégium
2nd teacher	Zsuzsanna Napsugár Tóth-Gál
Institution	Kisvárdai Bessenyei György Gimnázium és Kollégium
Subjects	Physics, Biology, Chemistry, Technology, Geography, History, Literature, Linguistics, Arts

Our hypothesis is that using tales in teaching natural sciences makes it easier for students to understand the basic principles of the world surrounding them. It is important because teachers must pay attention not only to the students' spiritual development but their physical and mental upbringing too. Based on a self-written framework the students' task is to plan experiments connected to salt in biology, chemistry and geography lessons using everyday materials and common and ICT tools. This project shows that natural sciences can not only be funny but also interesting and easily understandable. What's more, we hid the salt (sodium chloride) in the title of the project. Let's find it!

NUMERACY WITH KNITTING

Stand number	**48**
Country	Ireland
Teacher	Nicola Sheehan
Institution	Donabate Community College
Subjects	Physics, Computer Science

In this project students are taught to knit and when their confidence has been built up, they work out their speed and area of the material that they have produced. Students learn how to read a basic chart, which can be likened to computer coding, and follow the chart in order to make a pattern in their knitted piece. They are taught how to increase and decrease stitches in order to shape their piece, introducing symmetry to what they are making. The completed knitted items will be donated to charity.

PHYSI-CHEMISTRY

Stand number	**49**
Country	Hungary
1 st teacher	László Csatáry
Institution	Szent József Gimnázium, Szakközépiskola és Kollégium
2nd teacher	István Kozsup
Institution	Szent József Gimnázium, Szakközépiskola és Kollégium
Subjects	Physics, Chemistry

Students gather a lot of information about their environment, but they have difficulty in comprehending this knowledge systematically. Easily performed experiments can support this comprehension and illustrate various topics such as density, conservation of energy, colour separation and chemical reactions in a spectacular way and help the students understand these concepts. Another part of the project is an Arduino-based measuring system which consists of a set of experimentation devices. They can be made using cheap sensors often dismantled from discarded instruments and can be used for experiments and measurements in physics, biology, chemistry or geography lessons.

PHYSICS DECATHLON: THE UTILIZATION OF EXPERIMENT AS A FORMATIVE ASSESSMENT TOOL

Stand number	**50**
Country	Cyprus
Teacher	Georgios Tsalakos
Institution	Vergina Lyceum
Subjects	Physics

Physics Decathlon (PD) is a didactic proposal, which aims to help the teacher to collect data for formative assessments of students, both in relation to the concepts that have been taught and the experimental skills they have developed. PD includes ten “events”, running during the school year. Each “event” consists of the practical part (an experiment related to the lesson’s concepts) and the theoretical part, which contains questions related to these concepts. The class carries out these experiments in groups (“teams”) of 4-5 students. For each “event” the teams get points, depending on the successful realization of the practical part and the accuracy of the answers in the theoretical part.

PHYSICS EXPERIMENTS WITH ULTRASONIC AMPLITUDE MODULATED TRANSCEIVER SET USING LOW-COST 40KHZ TECHNIQUES

Stand number	**51**
Country	Hungary
Teacher	Károly Piláth dr.
Institution	ELTE Trefort Ágoston Gyakorló Gimnázium
Subjects	Physics, ICT

I developed an amplitude-modulated ultrasonic transceiver system that uses a low-cost distance measuring sensor pair. These sensors operate at a frequency of 40 kHz. The carrier signal (40 kHz) is modulated with a audible tone (400 Hz) signal. The device produces 0.85 cm wavelength sound wave in the air. This method helps to demonstrate the Lloyd’s mirror experiment, or Young’s double slit experiment in ultra sound range. But it also helps to demonstrate a Michelson-interferometer or an A4-sized paper engraved Fresnel-zone plates which will allow the focusing of ultrasounds. The results of these ultrasonic experiments can be made hearable with small active speakers.

PHYSICS FOR EVERYONE

Stand number	**52**
Country	Spain
1 st teacher	Antxon Anta
Institution	Deutsche Schule San Alberto Magno
2nd teacher	Elizabeth Goiri
Institution	Deutsche Schule San Alberto Magno
Subjects	Physics

Experiments and demonstrations are an excellent way to increase the students’ interest in physics. They need to be simple yet thought-provoking, inciting curiosity and interest in the physical phenomena behind them. This collection of experiments and demonstrations are especially attractive because they use everyday and readily available materials everyone is familiar with. How can one e.g. build a loudspeaker by using two CDs? Or how can one simulate the Photoelectric Effect?

PICNICS AND FESTIVALS -ATTRACTIVE WAY TO BRING SCIENCE CLOSER TO YOUNG AUDIENCES

Stand number	**53**
Country	Poland
1 st teacher	Maria Dobkowska
Institution	Group of Integrated Schools No 62 in Warsaw
2nd teacher	Wojciech Nawrocik
Institution	Adam Mickiewicz University in Poznań
Subjects	Maths, Physics, Biology

Our idea was to make science interesting for children while visiting science events. Since 8 years our school has a stand at the National Science Picnic and since 7 years at the Little Man Science Festival in Warsaw.
Our students are very eager to present interesting and different experiments and become teachers and guides to science for younger colleagues at these events. Many of the exhibits and experiments are personally invented and made by students of cheap or recycled materials. Our students are kind and friendly to kids, they like to play with young visitors at our school stands. I will present posters and photographic documentation of our presence at these science events.

PLAYFUL LEARNING SCIENCE

Stand number	**54**
Country	Romania
Teacher	Marta Popa
Institution	“Janos Zsigmond” Unitarian High school
Subjects	Physics, Biology, Chemistry

This project has as main purpose to increase the primary and low secondary school pupils’ interest and motivation for learning sciences by means of hands-on activities, such as realizing functioning devices and experiments using reusable materials. These devices are the main part of longer inquiry based learning activities that facilitate for the pupils to find out and explore the “functioning“ of the world surrounding and also, to identify and explain natural phenomena from a complex point of view involving physics, chemistry and biology.

POCKET EXPERIMENTS

Stand number	**55**
Country	Hungary
1 st teacher	Zsuzsanna Farkas dr.
Institution	SZTE Juhász Gyula Pedagógusképző Kar
2nd teacher	Eszter Kiss
Institution	Szegedi Egyetem
Subjects	Physics, Chemistry

Not all teachers have access to well-quipped science laboratories or don’t have science facilities at all. On the other hand there are also teachers who teach at more than one school and lack time to prepare experiments. So the aim of the project is to collect simple, low-cost and mobile experiments that can fit in the pockets of teacher’s lab coat and can be easily performed. They can also assist youg teachers or teachers in training as they are easy to perform.

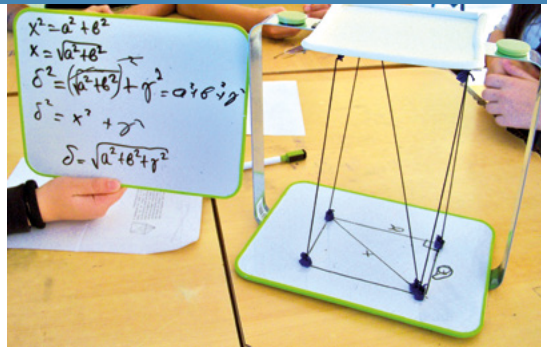
PUPILS’ NIGHT OF APPLIED SCIENCES

Stand number	**56**
Country	Latvia
1 st teacher	Daiga Krievina
Institution	Marupes Elementary school
2nd teacher	Mara Rabante
Institution	Marupes Elementary school
Subjects	Physics, Biology, Chemistry

The aim of the project is to motivate students to learn natural sciences, give them an opportunity to discover practical science and master experiments, develop public speaking skills, as well as to observe regularities. The objective is for the students to explain and demonstrate simple natural sciences experiments which later will be used to explain naturalscience theory. The project consists of three separate modules that are carried out during the school year and can be included into any school subject. As a result students will be motivated to learn science and will observe the interrelation with real life situations.

RECONSTRUCTING STREOMETRY

Stand number	**57**
Country	Cyprus
Teacher	Antonis Ktoris
Institution	Archangelos Gymnasium
Subjects	Maths



For students it is difficult to mentally understand and process 3-D space and figures. The way 3-D figures are presented in textbooks – as 2-D representations – creates a gap between textbook representations and reality. This instructional tool was constructed in order to enable students visualize these figures and work effectively with them. It is a simple construction made from cheap materials. Its main concept is to represent the segments using strings that have magnets attached on them. Almost all figures can be constructed using these strings. As an intermediate step students may use the architectural program "Sketchup" to construct their 3-D figures on the computer.

SHOCKING EXPERIMENTS

Stand number	**58**
Country	Hungary
1 st teacher	Zoltán Sebestyén
Institution	Csodák Pécsi Palotája Alapítvány
2nd teacher	Imre Sánta
Institution	Csodák Pécsi Palotája Alapítvány
Subjects	Physics, Biology, Electricity, Magnetism

Presentation of spectacular and playful electric and magnetic basic experiments with cheap materials: Illustration of step voltage with model, aluminium-handled knives, human power supply, LED lightening, repelling broomsticks, magnet repelling soft iron, experiments with multipole magnet rods, simple electric motor solutions with neodymium magnet and electromagnet, Jedlik's "lightning-magnetic self-rotor" presentation (The first electric motor), electroscope from sour cream cup, electrostatic levitation, electrostatic motor and pendulum made from plastic bottles.

SMALL IS BEAUTIFUL

Stand number	**59**
Country	Hungary
Teacher	Éva Dobóné Tarai Dr.
Institution	Berzsenyi Dániel Gimnázium
Subjects	Chemistry

In these experiments precipitation reactions are presented in hydrogel balls instead of test tubes. By using the tiniest possible amount of matter these experiments are cheap, environmentally friendly and only a small amount of by-product is being produced. Partially "second hand" materials can also be used (empty chewing gum boxes, medicine boxes, paper handkerchief as the scene of the chemical reactions).
The chemistry or science teacher could show these experiments during the lessons, the student might perform the experiments individually or in smaller groups as well.

SMOKE ON THE WATER

Stand number	**60**
Country	Denmark
Teacher	Søren Oht
Institution	EUC Nord
Subjects	Maths, Physics, Science, Music

All children (and adults) are listening to music – on a subjective level. Many children are dreaming of playing some kind of instrument or at least be able to create music by themselves. Playing music on instruments is not what the students combine with mathematics and physics but the students will discover that everyday things can be broken down to tiny pieces, which implement laws of physics and math. This project enables the students to learn about tones and play their own guitar made by themselves.

SOUND AROUND US

Stand number **61**
Country Slovakia
Teacher Klára Velmovská
Institution Faculty of Mathematics, Physics and Informatics, Comenius University
Subjects Physics

The project involves several experiments about the concept of sound using mostly simple materials. The experiments are focused on how to make sound visible, how sound is made, what the frequency and amplitude of sound depends on and how fast sound travels. The experiments are designed for independent students´ investigation when students explore sound properties or make their own instrument, producing sound (straw) or even music (plastic pipe or bicycle spoke). Students can be involved in research and design projects connected with sound and music and the project outputs can even result in musical performances using own home-made musical instruments to present at school events.

SPACE CAMP UK – A LOW COST, IN-SCHOOL SPACE SCIENCE RESIDENTIAL PROGRAMME

Stand number **62**
Country United Kingdom
Teacher Samantha Croston
Institution Shrubland Street Primary School
Subjects Physics, Science

A low cost, sustainable project of residential Space Camps where children participate in a range of hands on Space Science learning activities including practical astronomy developing their scientific knowledge and enhancing their skills in working scientifically. Providing opportunities for children to work with positive STEM role models from Astronomical and Aerospace backgrounds. Children from Year 1-6 experience an annual 2 day Space Camp with an in-school sleepover, where they participate in scientific and creative workshops, stargazing, Astro cinema and astronaut training thus engaging them with the wonders of the universe and current developments in Space Exploration.

STUDY OF GAS EVOLVING REACTIONS USING A CLOSED VOLUMETRIC APPARATUS IN A SCHOOL LABORATORY

Stand number **63**
Country Greece
Teacher Evangelia Parisopoulou
Institution Private School Fryganiotis
Subjects Physics, Biology, Chemistry

Direct measurement of gas volume produced by a simple reaction may be done by using the gas to displace a liquid into a container such as a graduated cylinder. The displaced liquid's volume is then measured by a suitable volumetric method; the liquid volume is assumed to be the same as the gas volume. A simple, cheap and very accurate setup for preparing and measuring the gaseous product is presented. This setup can be used as instructional equipment in secondary education and university chemistry laboratories.

THE BEST WAY FOR COUNTING SNAIL

Stand number **64**
Country Turkey
Teacher Abdulmüttalip Akkaya
Institution BTSO Kamil Tolon Science & Arts Centre
Subjects Maths

Most of the scientists use the "mark-recapture" method for determining animal population. But like other methods, it takes a long time to determine wildlife populations and works by a formula. We have developed a model for this method: we used a cardboard as study area, beads as animal species and then put some pit traps on the cardboard. Thus, a hard ecological study could be adapted to a secondary school classroom. Through that, animal populations can be determined in 40 minutes by only using a shoe box, some beads and a small computation.

THE HIDDEN SECRETS OF THE VISIBLE LIGHT

Stand number	**65**
Country	Hungary
Teacher	Venczel Borbély dr.
Institution	Ferences Gimnázium
Subjects	Physics

The significant part of the information from our environment is obtained through visible light. However, the wave behaviour of light remains hidden from us. In the project experiments are presented, which prove the wave behaviour of light using simple tools, accessible for everybody. Light interference, diffraction and polarization are shown in unique ways using mobile phones, cheap electronic devices and other means which are used every day and are available almost for free. This encourages the students to learn science.

THE WONDERFUL WORLD OF WOODLICE

Stand number	**66**
Country	Ireland
Teacher	Declan Cathcart
Institution	Temple Carrig School
Subjects	Biology, Environmental Science

An inquiry programme has been developed comprising a series of activities in which woodlice are the centre of students' focus. Students carry out investigations on the living conditions of woodlice examining the effect of several factors, e.g. light, humidity, temperature, food preferences. Students develop inquiry skills such as forming hypotheses, planning and design experiments, and evaluating data. Respirometer experiments provide further data for students looking at environmental factors affecting respiration rates. Setting up a woodlice colony/breeding chamber provides the opportunity for extended, more advanced investigations. The ethics of working with animals was also explored.

TRASH LAB – RADON DETECTOR FROM TIN CAN

Stand number	**67**
Country	Hungary
1st teacher	Zsolt Zsigó
Institution	Nyíregyházi Szakképzési Centrum Bánki Donát Műszaki Középiskolája és Kollégiuma
2nd teacher	Ervin Hábel
Institution	Nyíregyházi Szakképzési Centrum Bánki Donát Műszaki Középiskolája és Kollégiuma
Subjects	Physics

High school teachers have to face a lot of difficulties when introducing modern physics experiments. Many of the Hungarian high school experiments in nuclear physics are still as Prof Öveges, a famous Hungarian physics teacher in the 1940s, created them. Öveges approach values experiments, phenomena and description more important than calculations. This approach inspired the project, which looks for ways of supplementing high school physics labs with equipment to foster experiment-based learning processes. Also in the future it is planned to extend this experiment and create a grid of radon detectors. In this way other high schools in the country could participate too.

UNDERWATER HUMAN VISION AND THE VISUAL SYSTEM OF FISH

Stand number	**68**
Country	Greece
1st teacher	Antonis Margaritis
Institution	Experimental General Lyceum of Heraklion
2nd teacher	George Marakis
Institution	Experimental General Lyceum of Heraklion
Subjects	Physics, Biology, Chemistry

The eye is perhaps the most important sensory organ with which most organisms interact with the environment. The anatomy of the eye has evolved in such a way that both organisms which live on land and those which live in aquatic environment have a clear view in order to survive. In this work transverse slices of two eyes – a human and a fish eye – were constructed with simple materials and then presented. With these exhibits one can see how the optical system of each eye works when it is located in its respective environment, i.e. the man on land and the fish in water, and also the malfunctions that occur when a human dives in an aquatic environment and how one could deal with that.

WATER-DROP PROJECTOR

Stand number	**69**
Country	Slovenia
Teacher	Ambrož Demšar
Institution	Zavod sv. Stanislava, OS Alojzija Sustarja
Subjects	Maths, Optics

The droplet of water at the end of the syringe can be treated as a small spherical lens. The laser beam that falls on the drop refracts both times as it passes through the water-air interface. The image on the screen can magnify animals in the drop up to 2000 times.

WE ARE PLAYING WITH THE HEAT – TURNING HEAT INTO WORK

Stand number	**70**
Country	Czech Republic
Teacher	Zdeněk Polák
Institution	Jiráskovo gymnázium v Náchodě
Subjects	Physics, Computer Science, Thermodynamics

This project presents a simple and straightforward experiment about converting heat into mechanical work. The basic principle of all heat engines is that heat is transferred from warmer parts of the machine to colder ones. Only a part of the thermal energy can be converted into mechanical work. All demonstrations are done with simple tools and models of heat engines. The tools are easily available and low cost, but physical principles of heat conversions to work are very diverse.

WHO MURDERED SIR ERNEST?

Stand number	**71**
Country	Germany
1st teacher	Johannes Almer
Institution	Ludwig-Thoma-Gymnasium, Prien am Chiemsee
2nd teacher	Ernst Hollweck
Institution	Ludwig-Thoma-Gymnasium, Prien am Chiemsee
Subjects	Maths, Physics, Chemistry, Computer Science

Sir Ernest was murdered at his house ball! It's now up to the students to find the murderer. The only clue is the audio tape of the video surveillance camera. The young detectives have to use frequency analysis of the tapes and skills from other school subjects to succeed. Additionally, they solve a detective story about flame colours of metals and explore the relation between colour and energy by the use of LEDs. In the end, they realise that a glass and ist distinct sound act like a fingerprint the same way atoms and their colours do. Thus, the students experience the power of spectral analysis with their ears and eyes.

WHY DOES THE ELECTRIC CURRENT FLOW?

Stand number	**72**
Country	Hungary
1st teacher	Borbála Herendi
Institution	Debreceni Deák Ferenc Tehetségfejlesztő Középiskolai Szakkollégium
2nd teacher	János Tomán
Institution	Debreceni Deák Ferenc Tehetségfejlesztő Középiskolai Szakkollégium
Subjects	Physics

While studying electricity, students need to accept the fact that certain things happen (or do not happen) in the electric circuit, because there is a flow of electric charges, a potential between the two ends of a wire etc. In our project, we seek to model electric circuits in order to help students in the beginning of their studies to understand the field of electricity better and to connect it to their previous knowledge. Also, they might relate to phenomena happening in their everyday life. The other advantage of this model is that it is cheap and easily accessible to anyone.

WIRELESS ENERGY TRANSFER. TESLA COIL PAST OR FUTURE?

Stand number	**73**
Country	Greece
Teacher	Christos Petousis
Institution	6o Gymnasioum of Katerini
Subjects	Physics

Tesla coils can be constructed using simple, inexpensive and recycled materials. Four experimental setups demonstrate how this is done:

a. The wireless transmission of information, with the emission of electromagnetic waves modulated in amplitude with a low electric current frequency of a Tesla coil
b. The energy transfer between two Tesla coils with the phenomenon of resonance
c. Taking the energy of electromagnetic waves emitted from a Tesla coil, without coordination
d. The high voltage output with Tesla coil,
These ideas have been originally worked on and envisioned by Nikola Tesla (1856-1943).

ZIPPIE CHEMISTRY

Stand number	**74**
Country	Ireland
1st teacher	Enda Carr
Institution	St. Marys Secondary School Glasnevin
2nd teacher	David O'Connell
Institution	Christian Brothers College, Cork
Subjects	Chemistry

This work is directed towards enhancing student understanding of what it means to be a chemist in the laboratory in terms of displaying the dexterous capacity to carry out a laboratory investigation, working in a group, recording results, presenting results and interpreting the same results to develop a hypothesis. Students are free to select from available combinations of chemicals, mix and match them in zip-loc bags and observe the results in an 80 minute lesson. The household chemicals involved in all of the experiment are available in supermarkets. The chemistry involved includes acid-base, energy changes and iodiometric detection of starch.

GOAL STOCK EXCHANGE – SHOOT TO THRILL (THEMES FROM iSTAGE3)

Stand number	**166**
Country	Slovenia + Germany
1st teacher	Damjan Štrus
Institution	Gimnazija Litija
2nd teacher	Stephen Kimbrough
Institution	Dürer-Gymnasium Nürnberg
Subjects	Maths, Physics, ICT, Computer Science

Do you know your numbers? Statistics in soccer is a big thing. Betting and predictions about future games are very common. While analyzing large amounts of data together with the students we found an approach to teach kids the basic principles of statistics and computer science. The students will learn how to use spreadsheets, write their own program and be able to transfer a real life situation into a mathematical one.

MODELING OF UNUSUAL NATURAL PHENOMENA – ANOTHER WAY OF LEARNING SCIENCES

Stand number	**167**
Country	Romania + Greece
1st teacher	László Papp
Institution	Școala Gimnazială "Ioan Bob" Cluj-Napoca
2nd teacher	Panagiotis Lazos
Institution	26th High School of Athens
Subjects	Physics, Biology, Chemistry, Geography, Geology

The main aim of this project is to create functioning models of unusual natural phenomena in order to raise the pupils' awareness for science in general and for physics in particular. The pupils' curiosity is being challenged by selecting rare natural phenomena, which apparently do not have a logical explanation like intermittent springs and mud volcanoes. Throughout the project the model-based inquiry strategy is adopted. In a scientific approach students formulate work hypotheses, collect data from various resources and finally design and construct the functioning models.

MOM – MATTERS OF MATTER: FUTURE MATERIALS IN SCIENCE EDUCATION

Stand number	**168**
Country	Italy + Portugal
1st teacher	Annamaria Lisotti
Institution	IIS Cavazzi
2nd teacher	Rui Baptista
Institution	Escola Secundaria de Barcelinhos
Subjects	Physics, Chemistry, Technology

Materials revolution is at full swing and the students are already immersed in it: fascinated by IoT (Internet of Things) and smart materials interacting with the environment, challenged by the urgency of a sustaineable future. To fully exploit the huge potential of new materials and promote innovation it is however necessary to acquire a deep knowledge of their components and properties. The MoM project, a joint Erasmus + KA2 only schools partnership (IT, PT, DE, IR) offers a set of resources to teachers willing to involve their pupils (14-19) in inquiry based science addressing current issues while bringing in a touch of creativity and design.

PHANTOMS OR PHYSICS?

Stand number	**169**
Country	Spain + Netherlands
1st teacher	Nuria Muñoz Molina
Institution	La Inmaculada School
2nd teacher	Silvio Rademaker
Institution	Amadeus Lyceum Vleuten
Subjects	Physics, Technology, Literature

This project focuses on ghosts, spirits and everything that has to do with the supernatural world. Humanity has always been fascinated by spooky and paranormal happenings. For example, already Pliny the Younger (61-112 AC) wrote about a haunted house. We have been inspired by the writers of the Romantic period from the 19th century, where the delight for mystery and suspense in live shows was very pronounced. Although, all of our investigation comes directly from the field of physics which is why we have adapted it to the academic syllabus and reproduced scientific inventions which have been developed throughout history such as the Pepper's Ghost effect, the bodyless talking head and many more.

SIMULATION MEETS REAL NATURE

Stand number	**170**
Country	Germany + Netherlands
1st teacher	Christian Karus
Institution	Andreas Vesalius Gymnasium
2nd teacher	Tom Toebes
Institution	Fontys Hogeschool Tilburg
Subjects	Biology, Geography

In the gravel pit project, students at the age of 13-16 years old are looking at a nature restoration project in a former gravel pit alongside the river Rhine. A combination of field visits and literature studies, the students are writing a project on how the gravel pit is best restored and what kind of nature can be expected to develop when the nature restoration project is finished. In the project, students learn about land use, river ecosystems and nature conservation and restoration. With the software Ecosim the studens can first adapt the software to their scenery and then compare it with their written plannings.

SLIME MOULDS – PHYSARUM POLYCEPHALUM

Stand number	**171**
Country	Netherlands + United Kingdom
1st teacher	Hans Mulder
Institution	Jan Tinbergen College
2nd teacher	David Teasdale
Institution	Bolton School Boys Division
Subjects	Biology, Microbiology, Microscopy

In this project students try to grow slime molds (Physarum polycephalum) on basic agar plates. Physarum is a bright yellow giant single celled organism. It shows some intelligence when food particles like oat flakes are provided. The enormous speed of this organism makes it attractive for students: it moves 10 to 20 cm during one night. Students need to learn how to make agar plates, how to work sterile, formulate good (and realistic) research questions, interpret results, cope with disappointments and adjust their investigations. Slime molds are relatively unknown and not a very common subject of investigation in classroom situations.

SOCIAL EVENTS

MEETING POINT: Kölcsey Convention Centre, registration desk
MEETING TIME: Friday, 30 June, 18:45

AGORA SCIENCE CENTRE

www. agoradebrecen.hu/en

Have you ever made music with lightning? Or rode a bike 2 meters high up in the air? Have you ever fired a magnetic gun or raised mountains with your own hands?
Agora is the latest science attraction in Eastern Hungary; it offers exciting adventures and a unique experience for kids and adults alike. Agora offers a playful and entertaining experience, where learning is not a burden anymore. Everyone can get their hands on educational toys and tools, discover scientific curiosities and participate in spectacular experiments. In the laboratories of the three-storey futuristic building visitors can gain insight to the miracles of physics, chemistry, medical biology, hydrobiology, botany and robotics. Visitors can actually see the rotation of the Earth and discover the hidden phenomena of the sky in the observatory.
The Centre offers a vast collection of exciting science shows and other colourful programmes, thus visiting Agora is always a brand new experience. Agora also encourages gifted children to deepen their scientific knowledge and provides after school clubs to conduct their own experiments.

VISIT OF MTA ATOMKI

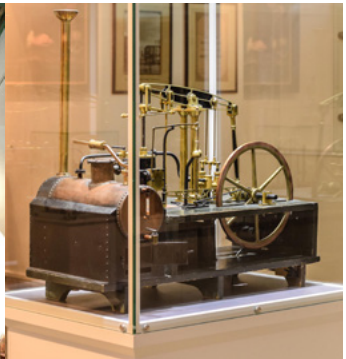
(Institute for Nuclear Research, Hungarian Academy of Sciences)
www.atomki.mta.hu

Atomki is an academic institute where researchers deal with various fields of physics and other sciences. In addition to its main profile i.e. research, it is involved in higher education and is open to the public. We show our visitors a wide spectrum of sciences and accept a wide spectrum of ages from primary school students to pensioners.
During your visit, you can see two of the particle accelerators of Atomki, can touch them and look into them to feel the amount of stainless steel and the science behind. Tandetron accelerates protons and shoots them to a target like a gun causing changes in the nuclei. Radiocarbon AMS (Accelerator Mass Spectrometer) is dedicated to carbon-14 measurements.
You will be introduced to their operation and will get an idea how they contribute to scientific progress and help in our everyday life. Most of subjects taught in schools are touched and you can utilize this information even if you are not a physics teacher.
Look around (choose English version): virtualisseta.atomki.hu

MUSEUM OF THE REFORMED COLLEGE

muzeum.drk.hu

Visit the Reformed College of Debrecen – a place of significant national heritage for Hungary. It is a memorial to the legacy of the 16th century reformation, the values of the 17th century Puritanism and the intellectual quickening of the 18th century. It also stands to the memory of sacrifices of the 1848/49 revolution and was of independence, and not least to the remembrance of its life-saving and talent-saving mission amidst the adversities of the 20th century. The College is a distinguished and valuable repository of Hungarian education. Through its affiliated schools, the College communicated to numerous other institutions teaching principles and methods, textbooks and research initiatives inspired by the intellectual tendencies of the west. The Reformed College is the legal predecessor of the University of Debrecen. As opposed to the English tradition a college comprised three levels of education in Hungary: elementary, secondary and higher education. Gifted students from all over the country were sent to study in Debrecen, and many of them went into peregrination to European universities before becoming professors of the College.



- The library of the College is portrayed in the volume of „The most beautiful libraries of the world". Today as the largest ecclesiastical library holds more than 600 hundred volumes among which 146 incunabula, 1600 old Hungarian books, a collection of 2500 of rare books, etc.
- The exhibitions of the Museum initiate the visitor in the history of education: display the first Hungarian herbarium; an invention of the predecessor of the steam-engine, many experimental devices. Zoltán Bay, renowned pioneer of space research, atomic physicist, radar astronomer, academician emphasized the intellectual climate of the College as one that inspired creativity and service.
- Still in liturgical use, the Oratory is also a memorial of the 1848/49 revolution and war of independence.
- The collection of ecclesiastical art presents the beautiful plant ornaments of church interiors of the region and 16-17th century handicrafts of local guilds.

„TOGETHER WE'RE CHANGING THE WORLD." – THIS IS NI'S CONFESSION.

hungary.ni.com/debrecen

National Instruments is an American corporate, which is a market leader in measurement and control automatization. It's first overseas production site was opened in 2001, in Debrecen. In the past 15 years we have grown from a company with 200 people into an employer with more than 1100 colleagues. Besides our continuous improvement we are proud of our corporate culture and our devotion to provide systems to engineers and scientist by which enables them to change the world.

Among our customers you can find such names like Airbus, Subaru and Hyundai, and our products have been used even in NASA experiments. Thanks to our dedication to innovation, besides manufacturing, today NI Hungary has 12 departments.

Our branch in Debrecen is the main location of regional and global centers. The list of our departments includes Engineering, IT, Research and Development, as well as Finance, Legal and Service Centers. Our colleagues are welcomed in a modern and inspirational work environment every day where they can improve their skills and knowledge through professional challenges and internal trainings.
www.facebook.com/nihdeb

UNIVERSITY OF DEBRECEN

www.unideb.hu

The University of Debrecen, the oldest institution of higher education in the country operated continuously in the same city, is one of the research universities of national excellence in Hungary offering the widest spectrum of educational programs in 14 faculties and 24 doctoral schools. The student community of 30,000 can study in institutions of excellent scholarly standard.

The University of Debrecen has outstanding educational, research, and innovation capacities in international comparison as well. It is also one of the top 500 universities in the world. As a leading university it is known in Hungary as an intellectual center providing the widest spectrum of educational programs while also closely cooperating with the private sector, the business sphere, and the local government.

The University of Debrecen has 7 campuses in the city, the central one located at the edge of the Nagyerdő with the Main Building which is known to be East-Central Europe's most beautiful public building.

The programme gives a guided tour through the Main Building and the campus around with highlights of the rich history of the university.

VENUE

THE CITY OF DEBRECEN

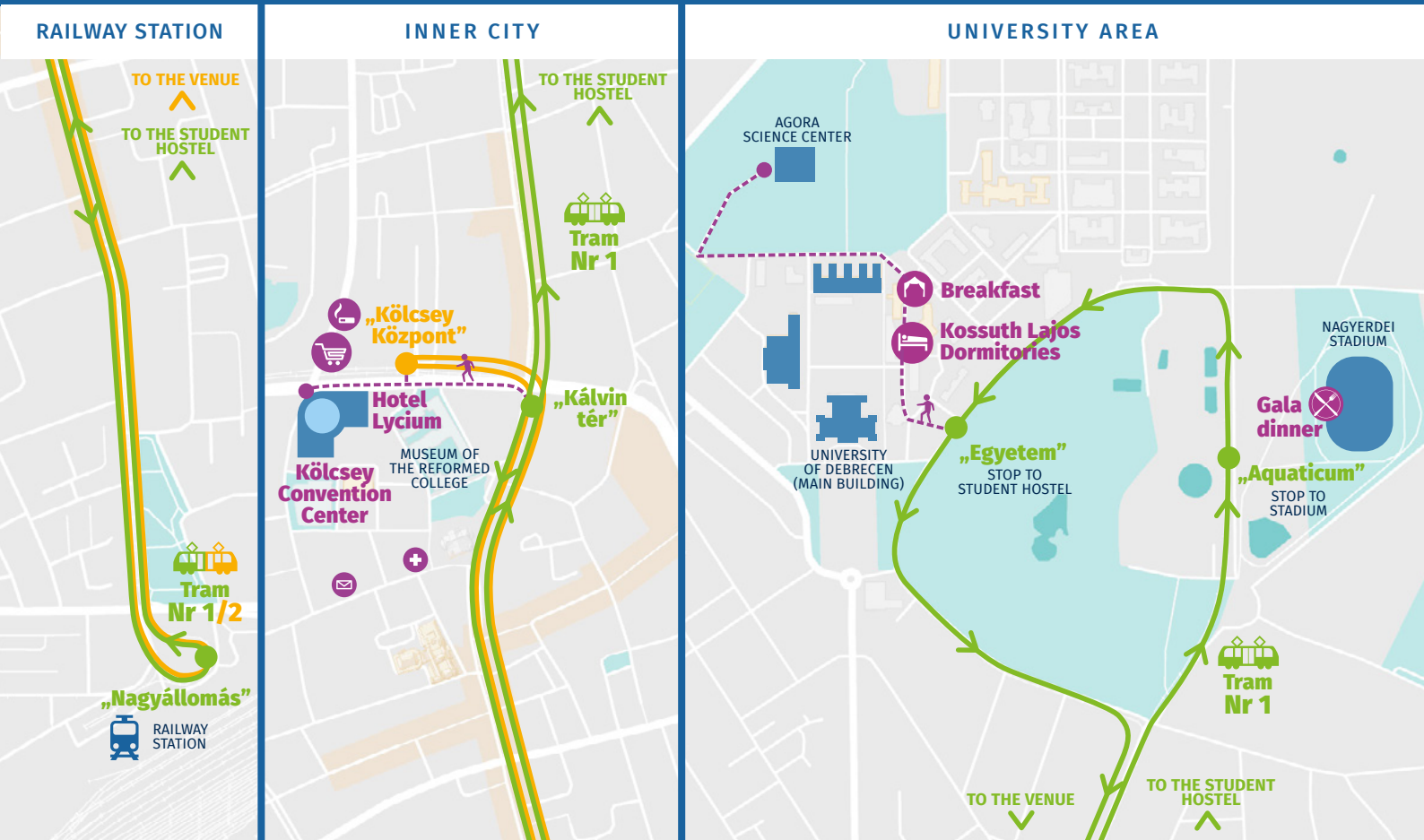
This beautiful jewel in the heart of the Carpathian Basin is a cultural, economic and scientific centre which enchants all visitors, either seeking refreshing peace and relaxing comfort or social vitality and cultural dynamism. As the centre of the region Debrecen is both a cosy and modern metropolis sensitive to its environment and a traditional city conscious of its outstanding cultural and historic heritage. Thus, Debrecen is a distinctive mixture of old and new, traditional and unique, comfortable and exciting.

Find more information about the city: **www.debrecen.hu**

KÖLCSEY CONVENTION CENTRE

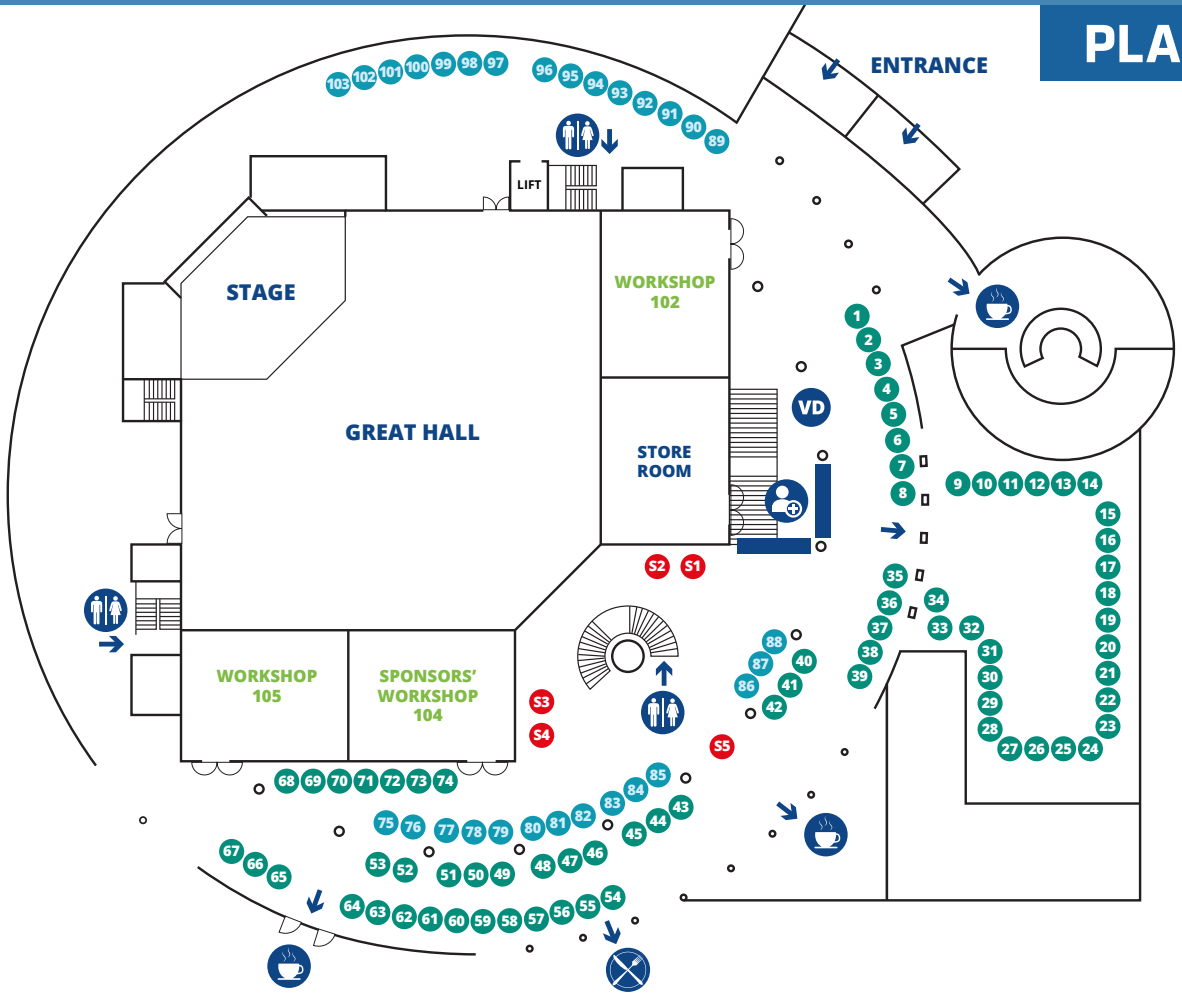
Kölcsey Centre with its 13000m^2 has no peers in Eastern Hungary concerning its size and quality. The designer's dream was to create a "multifunctional" house, which can worthily host professional conferences as well as cultural events, where spaces can be joined or separated as preferred while the halls meet the highest technological demands.
The dream came true in February 2006: Kölcsey Centre was completed in the vicinity of the long ago demolished house of the poet of the Hungarian National Anthem: Ferenc Kölcsey.
Entering the building you are touched by the Scandinavian atmosphere created by the plentiful glass, wood and stone.
Light pours in through the enormous windows. The coverings of wood – birch, maple and okume –, reflect cleanness, warmth and friendliness.

LOCAL AREA


RAILWAY STATION
INNER CITY
UNIVERSITY AREA
TO THE VENUE
TO THE STUDENT HOSTEL
Tram Nr 1/2
„Nagyállomás”
RAILWAY STATION
TO THE STUDENT HOSTEL
Tram Nr 1
„Kölcsey Központ”
Hotel Lycium
„Kálvin tér”
Kölcsey Convention Center
MUSEUM OF THE REFORMED COLLEGE
AGORA SCIENCE CENTER
Breakfast
Kossuth Lajos Dormitories
UNIVERSITY OF DEBRECEN (MAIN BUILDING)
„Egyetem”
STOP TO STUDENT HOSTEL
NAGYERDEI STADIUM
Gala dinner
„Aquaticum”
STOP TO STADIUM
Tram Nr 1
TO THE VENUE
TO THE STUDENT HOSTEL


KÖLCSEY

PLAN OF VENUE

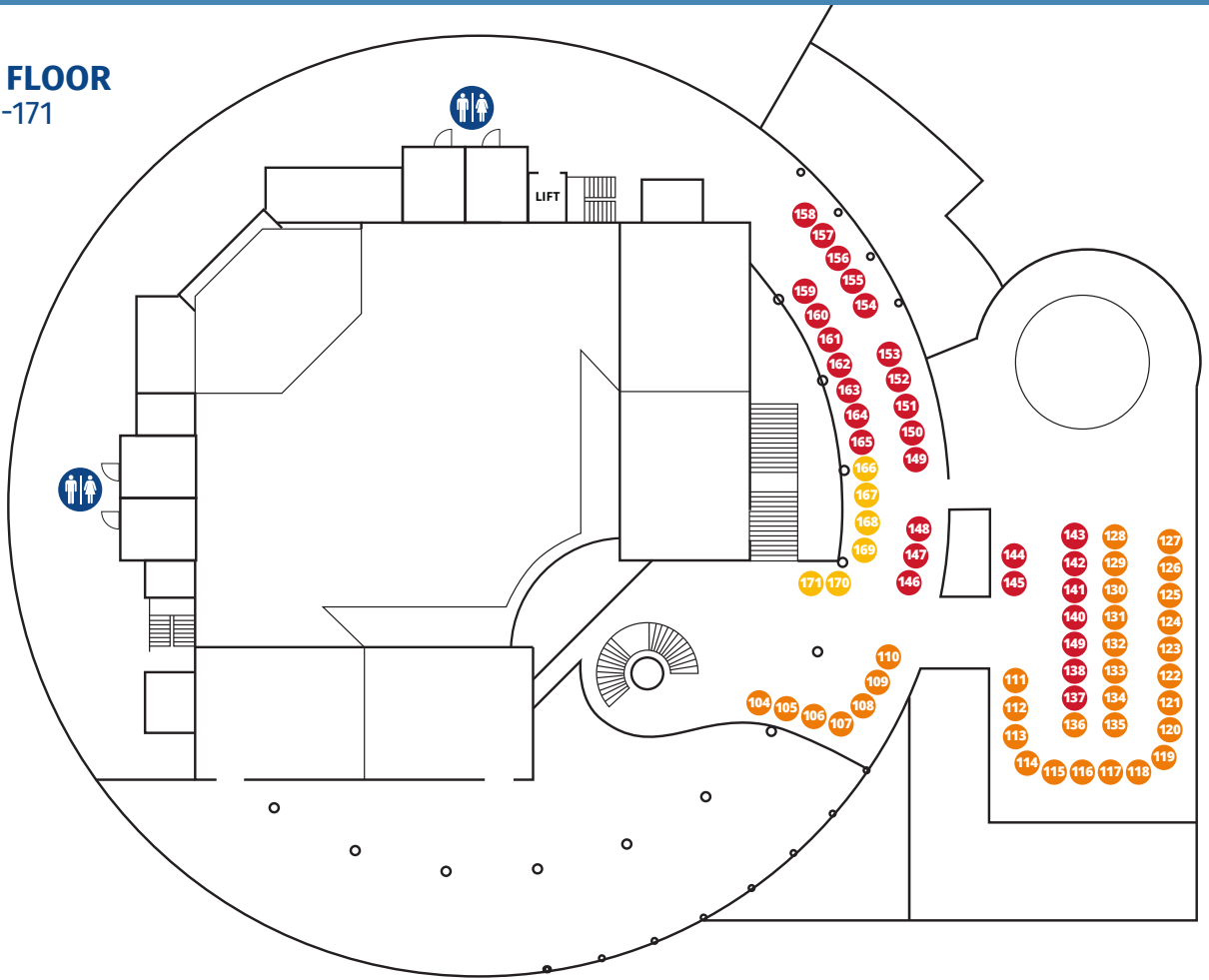


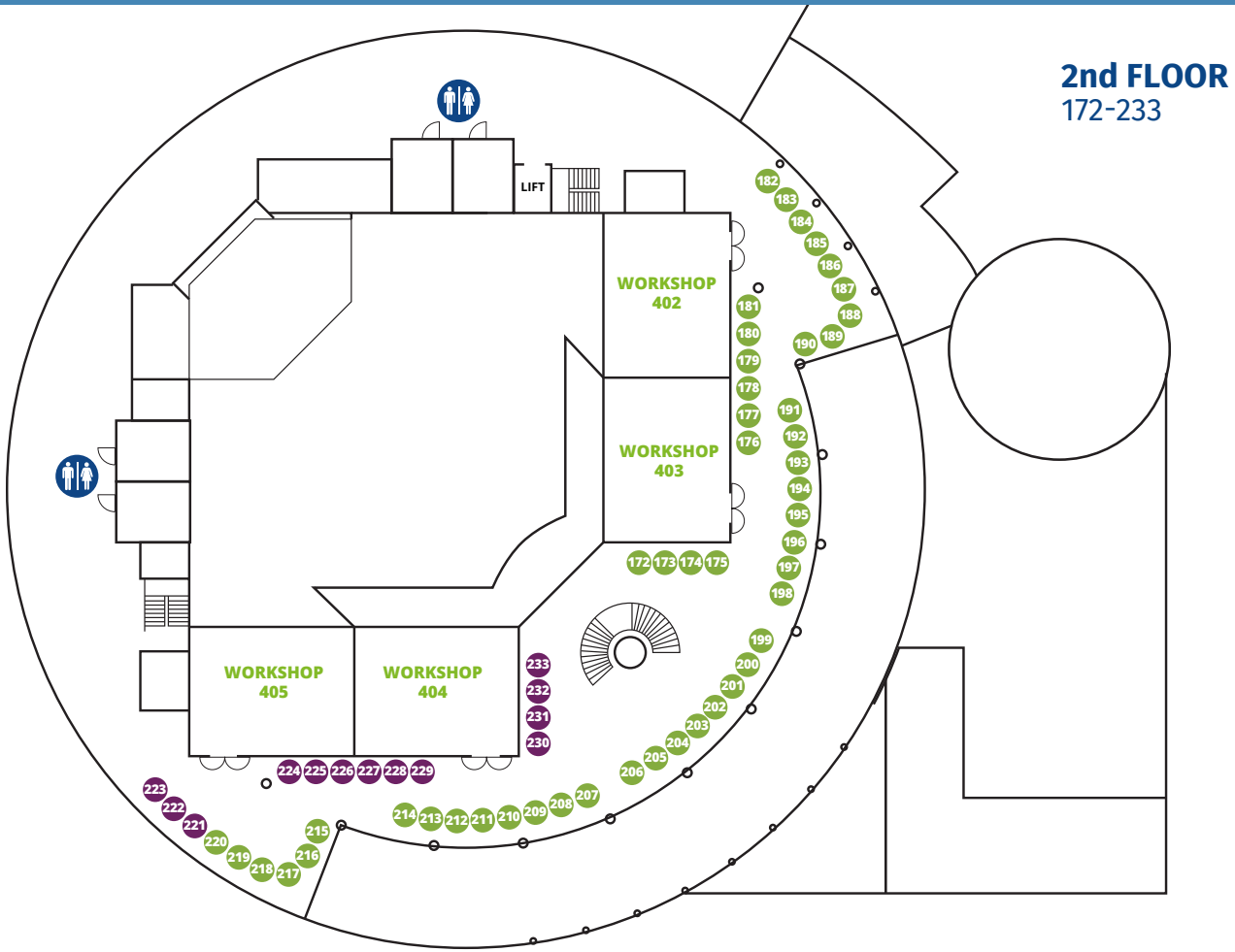
GROUND FLOOR
1-103

Registration
Restaurant
Coffee
Restroom
VD Visit Debrecen

S1 Science on Stage Europe
S2 Faculty of Science and Technology, University of Debrecen
S3 MIAZMA
S4 Automotive Proving Ground Zala Ltd.
S5 National Instruments

1st FLOOR
104-171




2nd FLOOR
172-233
LIFT
WORKSHOP 402
WORKSHOP 403
WORKSHOP 405
WORKSHOP 404
172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233

SCIENCE ON STAGE EUROPE

SCIENCE ON STAGE – THE EUROPEAN SCIENCE TEACHERS' NETWORK

Science on Stage Europe brings together science teachers from across Europe to exchange best practice and teaching ideas and concepts with passionate colleagues from 30 countries. Science on Stage Europe believes that the best way to improve science teaching and to encourage more schoolchildren to consider a career in science or engineering is to motivate and inform their teachers. The non-profit organisation was founded in 2000 and reaches 100,000 teachers Europe-wide.

ACTIVITIES

Science on Stage Festival
Every two years Science on Stage Europe organises Europe's biggest science teaching festival. Teachers from all over Europe exchange their ideas, projects and methods at stands, in workshops and on stage. These ideas are afterwards spread throughout Europe via follow-up activities:

Teacher Trainings
The Science on Stage countries organise teacher training events involving an international project and a national festival project.

Travel Scholarships
Teachers from different countries who participated in the festival can meet again to continue their work and to develop joint projects.

International Projects
Working groups of international teachers develop materials for their colleagues in Europe. Science on Stage publishes these concepts, which can be ordered or downloaded for free.

Teaching Materials
Science on Stage publishes teaching materials developed from teachers for teachers in different languages and spreads them across Europe. Science on Stage Europe is mainly supported by the Federation of German Employers' Associations in the Metal and Electrical Engineering Industries (GESAMTMETALL) with its initiative think ING.

Stay in touch for future opportunities to get involved.

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PHONE +49 30 400067-40
EMAIL info@science-on-stage.eu

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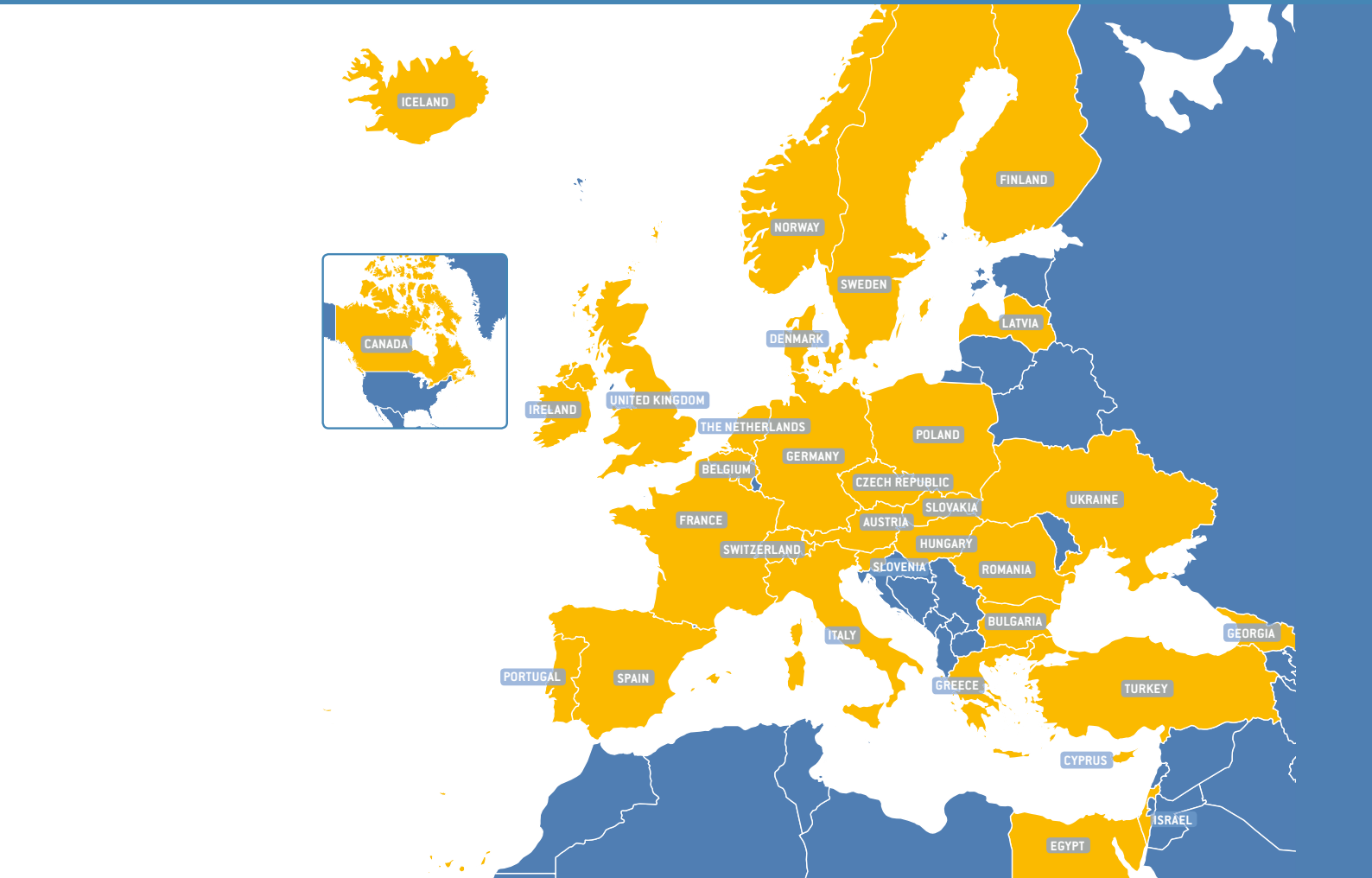
ICELAND
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SWEDEN
LATVIA
DENMARK
IRELAND
UNITED KINGDOM
THE NETHERLANDS
POLAND
GERMANY
BELGIUM
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SLOVENIA
ROMANIA
BULGARIA
GEORGIA
ITALY
PORTUGAL
SPAIN
GREECE
TURKEY
CYPRUS
ISRAEL
EGYPT

MIAZMA

OR THE DEVIL'S STONE

YOU CAN FIND YOUR COPY OF THE GAME ON THE USB DRIVE IN THE OFFICIAL CONFERENCE BAG.

An interactive film and adventure game to promote interest in physics

MIAZMA or the Devil's Stone was created by award-winning Hungarian game developer *Private Moon Studios* in the framework of the project *Distribution of Atomki's scientific results – understandable-available physics.*

MIAZMA is a *Jonathan Hunt Adventure:* a sequel to *Yoomurjak's Ring* – the first computer adventure game ever released as a tourism marketing tool.

THE PLOT

Jonathan Hunt is an American journalist working in Hungary as a local correspondent of a major newspaper. He arrives in *Debrecen* for a long weekend, not suspecting that his planned leisure trip will become an investigation for a missing boy and a most peculiar meteorite. It is for him to discover what the devilish "thunderbolt" hides: a huge diamond, an elixir of immortality or an unknown, destructive substance.

LEARN WITH PUZZLES

MIAZMA features a great story and dozens of puzzles to solve, most of them related to the science of physics.

The game, being an edutainment product, offers learning while playing. Controlling the main character, you rely on the virtual help of Atomki's scientists and instruments, and put into action your basic knowledge in physics.

GAMEPLAY

The game takes you to real locations with live-action cinematic approach. It lets you explore some of the main attractions in Debrecen and the laboratories of Atomki, getting a glimpse of the work going on in a nuclear research institute.

THE PROJECT

The work on MIAZMA was accomplished with the support and guidance of *Atomki, the Institute for Nuclear Research of the Hungarian Academy of Sciences.* The fully-localized English version was supported by:

EPS

NuPECC
Nuclear Physics European Collaboration Committee

ENSAR2

NATIONAL INSTRUMENTS
SPORTTECH DAY

Come and enjoy the **21st century Tech Games** at the Baltazár Dezső square Debrecen! The future sports are not in the science movies anymore those are here and you can try them during our special day.

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- → **City Board**
- → **Kinect**
- → **Radio Controlled Boats**
- → **Agora Science Center**
  New Sporttech Games

Come and enjoy the 21st century Tech Games and spend a fun day with **National Instruments**!

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