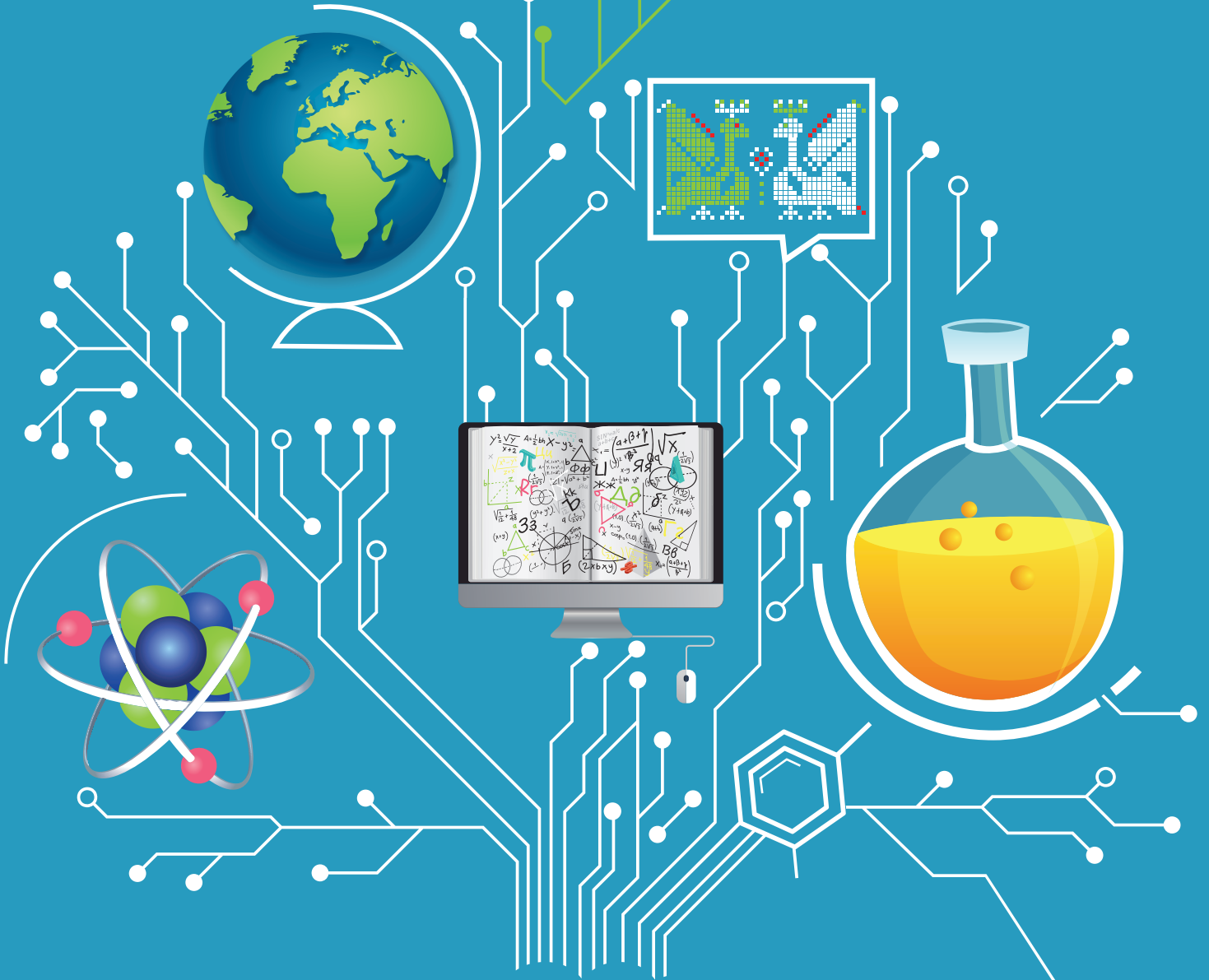




31<sup>st</sup>

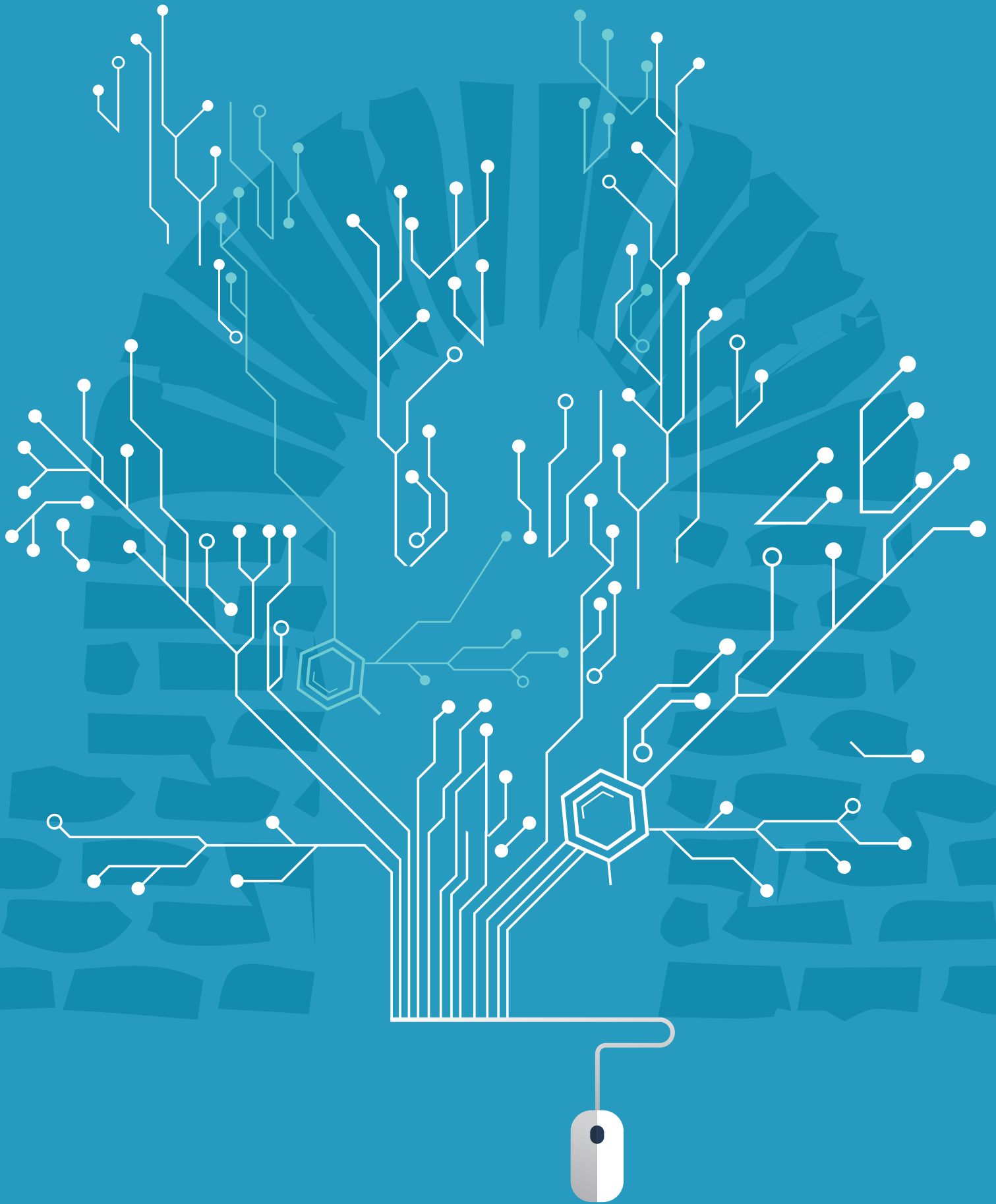
EUROPEAN  
UNION CONTEST  
FOR YOUNG  
SCIENTISTS 2019



EUCYS 2019

SOFIA







[WWW.EUCYS.EU](http://WWW.EUCYS.EU)



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INSTITUTE OF MATHEMATICS  
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# CONTENTS

<b>WELCOME TO EUROPEAN UNION CONTEST FOR YOUNG SCIENTISTS 2019</b>	<b>5</b>
<b>EUCYS IN SOFIA</b>	<b>10</b>
<b>EUCYS 2019 PROGRAMME</b>	<b>13</b>
• <b>OPEN DAY PROGRAMME ON 14, 16 &amp; 17 SEPTEMBER</b>	<b>16</b>
<b>BULGARIA</b>	<b>19</b>
• <b>SOFIA</b>	<b>21</b>
<b>VENUES</b>	<b>23</b>
<b>PROJECTS</b>	<b>24</b>
• <b>PROJECTS BY FIELD</b>	<b>25</b>
• <b>PROJECTS BY COUNTRY</b>	<b>30</b>
<b>THE JURY</b>	<b>81</b>
<b>THE PRIZES</b>	<b>94</b>
<b>NATIONAL ORGANISERS</b>	<b>104</b>
<b>WINNERS 2018 - 1989</b>	<b>110</b>
<b>EUROPEAN UNION INITIATIVES FOR RESEARCH AND YOUTH</b>	<b>130</b>
<b>EUCYS 2020</b>	<b>133</b>
<b>VENUE MAP</b>	<b>134</b>



# WELCOME

TO THE EUROPEAN  
UNION CONTEST  
FOR YOUNG  
SCIENTISTS 2019



# WELCOME



Carlos Moedas

European Commissioner for  
Research, Science and Innovation

**Dear Young Scientists,**

First of all, congratulations! You are here at the 31<sup>st</sup> European Union Contest for Young Scientists because you won first prize in your national science competitions and are now representing your countries at this prestigious competition. This is a fantastic achievement and you should be very proud!

The European Union Contest for Young Scientists moves to a different European city every year. This year the contest is taking place in Sofia and we are delighted to be here. Did you know that Bulgaria is the oldest country in Europe that has not changed its name since being established in 681 AD? Sofia was founded 7000 years ago making it one of the oldest cities in the world.

Every year when I prepare the foreword for the EUCYS contest book I look back over the previous year for inspiration: people who have made headlines, and new technologies that have taken the world by storm. I also ponder the great challenges. This year these worlds collided in the form of a very brave young Swedish girl, Greta Thunberg, who almost single-handedly brought climate justice and the need for action centre stage. She is an inspiration to us all especially when climate change is one of the great challenges of the world today.

I recently launched work on five major European research and innovation missions that will be part of Horizon Europe, the next research budget. Inspired by the Apollo 11 mission to put a man on the moon, the European R&I missions aim to deliver solutions to some of the greatest challenges facing our world, including climate change as well as cancer, healthy oceans, climate-neutral cities and healthy soil and food.

EUCYS is about growing your talents. It is about helping you pursue careers in science, research and innovation. Incredible things happen when great minds meet and think together. To solve the great challenges of our time we need more scientists and innovators in Europe. You are our future scientists and innovators and you are the reason why the European Commission invests millions of euros on science education every year through its research and innovation programmes and the ever-popular ERASMUS programme.

When this contest began in 1989 the internet and smart phones did not yet exist, and PCs were only just becoming widely available. The contestants in 1989 relied on paper and telephones to talk to their friends and families. They had no Skype, Snapchat or WhatsApp! Jury member Lina Tomasella was one of the first winners of the contest in 1989 and she can tell you all about the contest in those early days.

Have a great time in Sofia! I wish you well in your pursuit of science, and I hope that participating in the contest will encourage you to go on to even greater things!

Добре дошли в София!  
Dobre doshli v Sofiya!

“EUCYS is about  
growing your talents.”

# WELCOME



**Krasimir Valchev**

Minister of Education and Science  
of the Republic of Bulgaria

As a host of the 31st European Union Contest for Young Scientists, it is my honor and pleasure to welcome you to Bulgaria. I hope you will have good time in Sofia, make lifelong friendships and gain valuable experience in competing with some of Europe's brightest and most capable young people.

The Contest for Young Scientists will announce the winners for 2019 and present the future leaders of European science to the world. I believe that many of the projects that will be presented within the competition program will be implemented soon. I am convinced that in the next few days, here in Sofia, you will lay the foundations for future European partnerships in the world of science, innovation and technology and that you will be the ones who will find the answers to the many unanswered questions of today's world.

Science is a calling. It leads us to undiscovered and unknown worlds. Science is the path to the future, along which people and ideas come together to expand the boundaries of human knowledge and find solutions to global societal challenges.

The opportunity to welcome you to Sofia and to meet you gives us optimism that more and more young people will devote themselves to science and enrich our society with new ideas, develop new projects, create new technologies and build the future of Europe.

“Science is a calling. It leads us to undiscovered and unknown worlds.”



# WELCOME



**Acad. Julian Revalski**

President of the  
Bulgarian Academy of Sciences

## Dear Young Scientists

I am very pleased to welcome you to the most prestigious European competition for young scientists EUCYS! My pleasure is even greater because you are guests of our country in a very significant year for Bulgarian science – in 2019 the Bulgarian Academy of Sciences celebrates its 150<sup>th</sup> anniversary.

The Bulgarian Academy of Sciences is the largest scientific institution in Bulgaria with a proven international reputation. It embodies both the traditions of the past and the challenge of the country on the path of its European integration. Inextricably linked to statehood, the Bulgarian Academy of Sciences is both scientific and public organization – an organic part of the spiritual development of the Bulgarian nation.

Bulgaria is known for its young talents and their outstanding achievements in mathematics, computer science, chemistry, physics, astronomy and more. Each year the Bulgarian teams bring to our country dozens of gold, silver and bronze medals from international Olympiads. That is why I believe that Bulgaria is the most appropriate place to meet so many young people who have come to show us their passion for science.

Our mission as scientists is to help the full growth of a new generation of highly qualified young people who also develop their research potential in the field of science. This is essential to guarantee the knowledge and growth of our society, as well as to foster the sustainable competitiveness and well-being of the entire region and of Europe as a whole.

I hope that you, the best young researchers competing at EUCYS 2019, will spend your time in Sofia in the best and most rewarding way. I wish you to make wonderful friendships, to exchange interesting ideas and to lay the foundations for professional partnerships that will continue in the years to come!

I wish you success, inspiration and courage to show the best you are capable of – not only here and today, but also in your future appearances! I am convinced that thanks to young people like you, the future of humanity is in good and secure hands!

“...thanks to young people like you, the future of humanity is in good and secure hands!”



# WELCOME



**Acad. Vesselin Drensky**

Director  
of the Institute of Mathematics and Informatics  
at the Bulgarian Academy of Sciences

## Dear Young Scientists

Participants at the 31<sup>st</sup> Annual European Union Contest for Young Scientists,

For our Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences it is a great honour and pleasure to be one of the main organizers of the event.

Our Institute was created by the effort and high professionalism of a generation of Bulgarian mathematicians whom we now thankfully style the pivots of Bulgarian mathematics. The official birth date of the IMI is October 27, 1947 when the Executive Council of the Bulgarian Academy of Sciences confirmed the plan of the scientific activity in 1947/1948. The section devoted to the mathematical sciences included the work of three commissions: for Demographic Studies, for Mathematical Studies of the Representative Method in Statistics, and for financial mathematical research of state bonds and external bonds guaranteed by the state. From the very beginning of its existence and up till now, the activity of the Institute combine the research with applications of our sciences. In 1961 the Mathematical Institute (the then name of IMI) established the first Bulgarian computing center. In the period 1962-1964 the first Bulgarian digital computerized machine Vitosha was created. In 1965 the first electronic calculator Elka 6521 was created.

A major part of the IMI's policy is the participation in Bulgarian educational programs on all levels, so that the stable development of the scientific potential in the areas of mathematics and computer science can be guaranteed. A special attention is paid for the work with outstanding school students. This activity involves not only coaching of the national Olympic teams in mathematics, informatics and mathematical linguistics, and re-qualification of school teachers. Our Institute was one of the co-founders of the High School Institute of Mathematics and Informatics which goal is to involve in research gifted high school students under the supervision of professional mathematicians.

The purpose of EUCYS2019 is not only to determine the best projects presented in the competition. During your stay in Sofia you will have the opportunity to exchange new ideas, to have new contacts and friendships, and to make new steps in your way as future leaders in Science and Technology.

“exchange new ideas, ... have new contacts and friendships... make new steps ... as future leaders in Science...”

# EUCYS IN SOFIA



# THE EUROPEAN UNION CONTEST FOR YOUNG SCIENTISTS IN SOFIA

The European Union Contest for Young Scientists, better known as “EUCYS”, rewards and celebrates Europe's best young scientific talent. Every year, the event gathers promising young scientists from all over Europe and beyond, to present their projects to a panel of international judges. Over the years some astonishing inventions and creative ways of using science in everyday life have been presented. Be prepared to be amazed! The Contest is a good example of an activity that serves not only to encourage interest in science but also to promote the exchange of ideas among Past participants have often expressed the positive impact of this aspect of the Contest. They believe that it has opened up the gateway to Europe and further afield for their careers, and has also fostered a strong interest in learning other European languages. The Contest is also a useful tool in the development of a pan-European scientific community. It has contributed significantly to popularizing science among young people. This year marks the 31<sup>st</sup> edition of the Contest.

The Contest is co-funded under Horizon 2020: The EU Framework Programme for Research and Technological Development and is part of a broader initiative to reinforce the links between science and society, responsible research and innovation, and to further the emergence of a European Research Area and the Innovation Union.

Only projects that have won a first prize at a national science competition are invited to participate at EUCYS. Thus, the Contest represents an additional scientific challenge for many young scientists who compete annually in their national contests.

The Contest is more than just a competition. The young people meet others with similar abilities and interests, as well as some of the most prominent scientists in Europe. In this way, the Commission seeks to strengthen the efforts already made in each participating country to attract young people to careers in science and technology.

The first Contest Finals took place in Brussels in 1989. Since then, the event has been hosted in Copenhagen, Zurich, Seville, Berlin, Luxembourg, Newcastle upon Tyne, Helsinki, Milan, Porto, Thessaloniki, Amsterdam, Bergen, Vienna, Budapest, Dublin, Moscow, Stockholm, Valencia, and Copenhagen again for the 20th anniversary of the Contest, Paris, Lisbon, Helsinki, Bratislava, Prague, Warsaw, Brussels again in 2016, Tallinn in 2017 and Dublin again in 2018. Next year, the contest will take place in Salamanca.

This year the European Union Contest for Young Scientists is taking place in Sofia and we are pleased to be in Bulgaria for the first time.

**The European Commission is very grateful to the organisers for their professionalism and support.**

For more information on the EU Contest please visit the following web sites:

[https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/eucys\\_en](https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/eucys_en)  
<https://eucys.eu/>

## THE CONTESTANTS

All contestants at the European Union Contest for Young Scientists have previously won a first prize at the national young scientist competition in their own country. They are put forward by the “National Organiser”, who is the contact person for their respective national contest. The contestants compete either as individuals or as part of a team. There are strict rules on the age of the contestants, the size of the teams, and the number of contestants and projects that each participating country can send. The Contest accepts projects in all fields of scientific endeavour that have been carried out before the contestants enter university. Competing in the contest in 2019 are 155 contestants with 100 projects representing 39 countries and the European Schools.

## THE JURY

This year, the Jury is composed of 19 highly qualified scientists and engineers with worldwide reputations in their chosen field. Members of the Jury carry out their duties at the contest as independent scientific experts and not as representatives of any institution, organisation or country. The EC appoints the Jury annually basing its selection on the scientific needs of the contest. Jury members are drawn both from academia and industry. The Jury bases its work at the contest on the Guidelines established by the EC.

## THE SELECTION AND EVALUATION PROCESS

The European Union Contest for Young Scientists takes place in three stages following national competitions, which are held across Europe from October of the preceding year to May of the current year.

### SELECTION:

Winners of the national competitions are selected by their respective national contest jury and nominated to represent their country at the Contest. The National Organisers submit their projects to the EC in June.

## PREVIEW:

During the summer, the contest jury members review the written descriptions of the projects that they will assess during the exhibition in September.

## CONTEST:

The Contestants display their projects at exhibition stands, and are interviewed by members of the Jury.

The Jury use the following criteria to make their final assessment:

- originality and creativity in the identification of and approach to the basic problem;
- skill, care and thoroughness in designing and carrying out the study;
- follow through of the study from conception to conclusion;
- reasoning and clarity in the interpretation of the results;
- quality of written presentation;
- ability to discuss the project with the Jury members.

In applying all these criteria, allowance shall be made for the age and education level of the contestants, the quality of the resources available to them and their linguistic ability to speak a non-mother tongue language if required.

The decision of the jury is final.

## THE PRIZES

The contestants compete for a number of prizes on the basis of their projects.

The core EU monetary Prizes are the main prizes awarded. These include:

- Four First Prizes worth € 7.000 each
- Four Second Prizes worth € 5.000 each
- Four Third Prizes worth € 3.500 each

The Jury select up to five first prize winning contestants for an Honorary Award, which is the opportunity to represent the Contest at either the London International Youth Science Forum or the Stockholm International Youth Science Seminar.

The jury also select the best and most appropriate contestants for several Special Donated Prizes of study visits or similar to leading scientific European organisations as follows:

- a one-week stay at one of the eight EIROforum organisations: CERN, EUROfusion (JET), EMBL, ESA, ESO, ESRF, ILL, European XFEL;
- a two day stay at the Joint Research Centre at Ispra in Italy;
- visits organised by the Bioeconomy BBI undertaking and Food industries;
- visit organized by PRACE at a supercomputing with all costs covered.

These prizes are offered to contestants who, according to the Jury, would benefit from the specific experience that these prizes offer. At the discretion of the Jury, a prize winner can receive both a core Prize and a Special Donated Prize.

## THE PARTICIPATING COUNTRIES IN 2019

The following countries will participate at EUCYS on a competitive basis: Austria, Belarus, Belgium, Bulgaria, Canada, China, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Norway, Poland, Portugal, Romania, Russia, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, United States of America, Ukraine and United Kingdom. The European Schools are also represented.

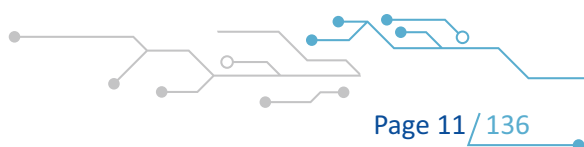
Serbia and Malta have not sent a team this year. The EC is negotiating with Croatia, Macedonia and Moldova to welcome them at future contests.

## CONTACT

For more information on the European Union Contest for Young Scientists please contact:

### Karen Slavin

European Commission  
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Directorate for the Innovation Union and European Research Area  
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[rtd-eu-young-scientists-contest@ec.europa.eu](mailto:rtd-eu-young-scientists-contest@ec.europa.eu)



# EUCYS 2019 PROGRAMME



# EUCYS 2019 PROGRAMME

## FRIDAY, SEPTEMBER 13<sup>TH</sup>

TIME	CONTESTANTS	ADULTS IN CHARGE/ GUESTS	JURY
<b>All Day</b>	Arrival	Arrival	Arrival
8:00 - 16:00	Kiosk at the airport. Transfers airport-hotel and hotel-venue. Registration at venue.  Setting up stands.	Kiosk at the airport. Transfers airport-hotel and hotel-venue. Registration at venue.  Setting up stands.	Kiosk at the airport. Transfers airport-hotel and hotel-venue. Registration at venue.
10:00 - 17:00	Free museum access	Free museum access	Free museum access
17:45 - 18:30	Transfer to the dinner venue	Transfer to the dinner venue	Transfer to the dinner venue
18:00 - 21:00	Welcome dinner at Metropolitan Hotel Sofia	Welcome dinner at Metropolitan Hotel Sofia	Welcome dinner
21:00 - 22:00	Transfer to hotels	Transfer to hotels	Transfer to hotels

## SATURDAY, SEPTEMBER 14<sup>TH</sup>

TIME	CONTESTANTS	ADULTS IN CHARGE/ GUESTS	JURY
8:00 - 11:30	Registration at venue. Setting up stands.	Registration at venue. Setting up stands.	
12:00 - 13:30	Opening ceremony at Inter Expo Center (IEC)	Opening ceremony at Inter Expo Center (IEC)	Opening ceremony at Inter Expo Center (IEC)
13:30 - 16:00	First Jury session	First Jury session	First Jury session
16:00 - 16:45	Lecture of Dr. Claire Lee (CERN) at Comic Con	Lecture of Dr. Claire Lee (CERN) at Comic Con	
16:45 - 21:00	Cultural programme, options for visiting Comic Con	Cultural programme, options for visiting Comic Con	Cultural programme, options for visiting Comic Con
21:00 - 22:00	Transfer to hotels Dinner at the hotels	Transfer to hotels Dinner at the hotels	Transfer to hotels Dinner at the hotels

## SUNDAY, SEPTEMBER 15<sup>TH</sup>

### TIME

9:30 - 12:30

#### CONTESTANTS

Second Jury session

#### ADULTS IN CHARGE/ GUESTS

Second Jury session

#### JURY

Second Jury session

10:30 - 12:00

Lunch at the venue

National organisers meeting

Lunch at the venue

Lunch at the venue

12:30 - 14:00

Third Jury session

Third Jury session

Third Jury session

14:00 - 17:00

Coffee break

Networking and alumni meeting

Coffee break

Coffee break

17:00 - 20:30

Cultural programme,  
options for visiting Comic Con

Cultural programme,  
options for visiting Comic Con

Cultural programme,  
options for visiting Comic Con

20:30 - 22:00

Transfer to hotels  
Dinner at the hotels

Transfer to hotels  
Dinner at the hotels

Transfer to hotels  
Dinner at the hotels

## MONDAY, SEPTEMBER 16<sup>TH</sup>

### TIME

9:30 - 12:30

#### CONTESTANTS

Fourth Jury session

#### ADULTS IN CHARGE/ GUESTS

Fourth Jury session

#### JURY

Fourth Jury session

12:30 - 14:00

Lunch at the venue

Presentation of educational initiatives to the national organisers

Lunch at the venue

Lunch at the venue

14:00 - 17:00

Fifth Jury session

Fifth Jury session

Fifth Jury session

Coffee break

Networking and alumni meeting

Coffee break

Coffee break

17:30 - 19:30

High-profile lectures and panel discussions

High-profile lectures and panel discussions

19:30 - 21:30

Cocktail with the lecturers and alumni of the contest

Cocktail with the lecturers and alumni of the contest

Cocktail with the lecturers and alumni of the contest

21:30 - 22:30

Transfer to hotels  
Dinner at the hotels

Transfer to hotels  
Dinner at the hotels

Transfer to hotels  
Dinner at the hotels



## TUESDAY, SEPTEMBER 17<sup>TH</sup>

### TIME

8:00 - 10:00

#### CONTESTANTS

Dismantling stands.  
Free time

#### ADULTS IN CHARGE/ GUESTS

Dismantling stands.  
Free time

#### JURY

10:00 - 10:30

Transfer to  
award ceremony

Transfer to  
award ceremony

Transfer to  
award ceremony

10:30 - 12:30

Award ceremony  
at Bulgaria Hall

Award ceremony  
at Bulgaria Hall

Award ceremony  
at Bulgaria Hall

12:30 - 14:30

Cocktail and winners  
press-conference

Cocktail and winners  
press-conference

Cocktail and winners  
press-conference

14:30 - 18:00

Walk tour around Sofia  
(optional),  
stands dismantling

Walk tour around Sofia  
(optional),  
stands dismantling

Walk tour around Sofia  
(optional)

19:00 - 24:00

Farewell party  
at Grand Hotel Sofia

Farewell party  
at Grand Hotel Sofia

Farewell party  
at Grand Hotel Sofia

22:00 - 01:00

Transfer to hotels  
every 30 minutes

Transfer to hotels  
every 30 minutes

Transfer to hotels  
every 30 minutes

## WEDNESDAY, SEPTEMBER 18<sup>TH</sup>

### TIME

8:00 - ...

#### CONTESTANTS

#### ADULTS IN CHARGE/ GUESTS

#### JURY

Departure. Transportation available to the airport

*Please note that all timings are subject to change!*

# OPEN DAY PROGRAMME

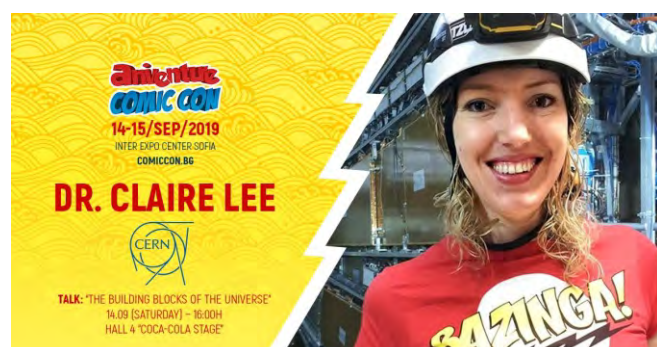
## 14, 16 & 17 SEPTEMBER

EUCYS 2019 is open to all visitors to visit the stands of the participants and discuss topics of interest with them during the judging sessions, provided that they do not interrupt the judging process. The public is also welcome to the following events:

- “Building blocks of the universe”, Dr Claire Lee – September 14th (Saturday) 16:00, Hall 4 (Coca-Cola stage), Inter Expo Center
- Café scientifique with Diana Mishkova, Grigori Kabatyanski, Peter Littlewood and Claire Lee – September 16th (Monday) 17:30 – 19:30, Hall 11 (Lumiere Hall), National Palace of Culture
- “140 BPM” audio-visual spectacle celebrating the Day of Sofia – September 17th (Tuesday) 20:30 – 22:00, in front of the National Art Gallery

### BUILDING BLOCKS OF THE UNIVERSE

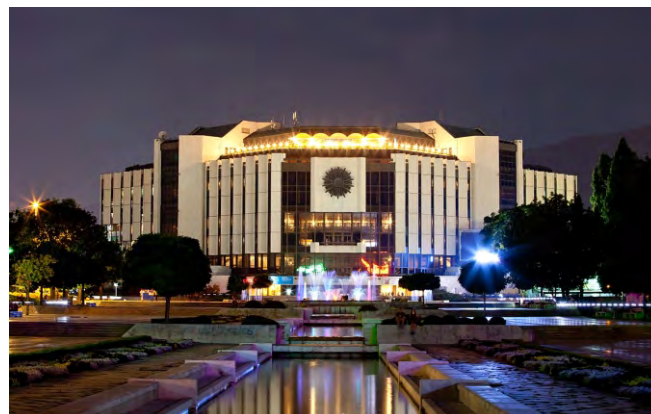
Dr. Claire Lee



On 14th-15th September, Comic-Con is going to be held in Inter Expo Center in proximity to the location of the EUCYS 2019 judging rounds. As a partner with this year's Comic Con, EUCYS grants the opportunity to all participants to visit and watch the performance of comics, gaming and cosplay artists. On the other hand, Comic-Con has invited their participants to visit the stands and engage with the scientific work. Learn more about Comic-Con 2019 on their website: <https://www.comiccon.bg/>

Furthermore, one of the panellist at the Café scientifique, Claire Lee, is giving a scientific talk on the topic of “Building blocks of the universe” as a part of the Comic-Con programme. Dr. Claire Lee is a particle physicist and one of the most influential science communicators in Europe. Come and hear her lecture about what we know and what we have yet to discover about the “Building blocks of the universe”.

### CAFÉ SCIENTIFIQUE



The venue for the Café Scientifique – National Palace of Culture, HALL 11 - LUMIERE CINEMA

This year, EUCYS is reviving an old tradition of holding a panel discussion in which high-profile scientists discuss the topic “Europe in 2050”. The guests will answer questions from the audience about the role of science and technology in building the future of Europe. The panel discussion is going to be held on 16th September from 17:30 in Hall 11 (Lumiere Cinema) of the National Palace of Culture. The public will have the opportunity to ask the panellists questions about and beyond the topic and the guests will collectively discuss the answers according to their own scientific expertise. Seats are limited!

The panel will include Grigory Kabatyanski, Peter Littlewood, Diana Mishkova and Claire Lee.

- Prof. Grigory Kabatyanski works for the Skolkovo Institute of Science and Technology, Moscow. He has forty years of scientific and engineering experience in Coding Theory (construction of error-correcting codes, decoding algorithms and bounds), Cryptography (unconditional authentication, secret sharing schemes, digital fingerprinting and steganography) and Discrete Mathematics (bounds for packings in different spaces - Kabatyanski-Levenshtein bound).
- Prof. Peter Littlewood is a British physicist and a Professor of Physics at the University of Chicago with expertise on Condensed Matter Physics. Littlewood holds six patents, has published more than 200 articles in scientific journals and has given more than 200 invited talks at international conferences, universities, and laboratories.
- Prof. Diana Mishkova is a Professor of History and a Director of the Center for Advanced Study in Sofia. Her research on modern history of Eastern Europe and the Balkans is a significant contribution to the modernization of the nations in the region.

- Dr. Claire Lee is a South African particle physicist and postdoctoral research associate at the U.S. Department of Energy's Brookhaven National Laboratory, currently at CERN. She is also a popular science communicator, engaging in speeches, talks, lectures, and even stand-up comedy routines about science.

## “Sofia City Vibrations – 140 Beats per Minute” – an audio-visual spectacle celebrating the Day of Sofia

The end of EUCYS2019 coincides with the Day of Sofia which annually celebrates the history of the Bulgarian capital.

On the 17th September starting at 20:30 in front of the National Art Gallery, all EUCYS participants and visitors are invited to see a spectacular audio-visual show “Sofia City Vibrations – 140 BPM”, celebrating 140 years since Sofia was chosen to be the Bulgarian capital. The multimedia performance will include a DJ show with music ranging from folklore music through jazz to classical and a 3D mapping of important landmarks, historic figures, poetry and literature of importance to the city. The programme showcases the past, present, and future of Sofia in a variety of cultural aspects and finishes at 22:00 with celebratory fireworks.

“Sofia City Vibrations - 140 beats per minute” fits into the actions and commitment of Sofia Municipality and its partner Cultural Perspectives Foundation to support the personal development of children and students in the Sofia Municipality and to support young talents in the sciences and arts.

As a city of technology and a center of education and science, Sofia is developing its greatest potential today - young people - by targeting talent development and creative skills. In this regard, Sofia Municipality realizes its strategic goals for developing the potential of young people through initiatives and partnerships with educational institutions and the non-governmental sector.



## REGIONAL HISTORY MUSEUM – SOFIA

Regional History Museum – Sofia is located in one of the most beautiful and emblematic buildings of the capital city – the former Central Mineral Bathhouse, built in 1912. It is known among the residents of the city as the “Museum of Sofia”. The permanent exhibition is displayed in eight halls with a total area of 2300 m<sup>2</sup>. It consists of exhibits, covering over 8000 years of local history – from the Neolithic age to the 1940s. The accent is on some of the most important moments of the history of the city – being chosen as the new capital of Bulgaria in 1879 and the decades afterwards,

prior to the wars in 1912-1918. During this time, we can see Sofia's transformation from a small oriental city into a



modern European capital.

On the 17th of September, Bulgaria's capital celebrates St. Sofia Day as the official holiday of the city. The Regional History Museum and all of its sites will be open to visitors free of charge and will have a special program\* during the celebrations:

10:00 – 22:00 Info-point

10:00 – 11:30 The Sofia trams in the palm of your hand (activities for all ages) – tram models and modeling + interesting facts and trivia

11:00 – 12:00 Guided tour (The Triangular tower of Serdica and “West gate of Serdica” archaeological park)

11:30 – 12:00 Award ceremony for the participants in the “A look into the past: The St. Sophia basilica archaeological level through the lens of a child” photo contest

13:00 – 13:30 Official opening of the archeological exhibition of Serdica Ancient Cultural and Communication Complex

13:30 – 14:00 Guided tour of the archeological exhibition of Serdica Ancient Cultural and Communication Complex

14:30 – 15:30 Guided tour (the permanent exhibition of Regional History Museum – Sofia)

15:30 – 17:30 Lectures in the Museum (“Retro cafe” hall)

17:30 – 18:30 Piano concert

18:00 – 19:00 Guided tour (Serdica Ancient Cultural and Communication Complex, East gate of Serdica, Church of St. George rotunda)

18:30 – 20:00 “Sculpture” exhibition opening

*\* All lectures and guided tours will be in Bulgarian. Special guided tours in English will be provided for the participants of the forum.*

# EUCYS 2019 BULGARIA



# BULGARIA



Bulgaria is located in Southeast Europe, in the northeast part of the Balkan Peninsula. It falls within the southern part of the temperate climate zone with subtropical influence. Its location on the transition line between two climate zones influences the climate, soils, vegetation and animal species. All of them are characterized by great diversity.

The country's geographic position also determines the relatively wide angle of sunlight that falls on the country, making the country predominantly sunny. The Black and the Aegean Sea also influence the country's climate.

The average winter temperatures are around -2/-3 degrees C and the average summer temperatures are around +24/+25 degrees C.

Bulgaria is proud of its pristine nature and amazing biodiversity, which is preserved in the mountains, parks and nature reserves. The country occupies only 2% of Europe's territory but with more than 40 000 cultural monuments and artefacts, it is in third place in Europe. Seven of them are included in the UNESCO List of World Cultural Heritage Sites. This includes prehistoric artefacts, Thracian and Roman heritage, historical monuments from the First and the Second Bulgarian Kingdoms, and architectural landmarks from the Age of Bulgarian Renaissance. As a recognition of its ancient cultural heritage, Plovdiv was selected as 2019 European Capital of Culture.

Traditionally known for its sun, sand and sea, the Bulgarian seaside also offers hiking, biking, golf, yachting and visits to natural, cultural and archaeological sites. The country is one of the most popular skiing destinations in the Balkans with its major ski resorts Bansko, Borovets and Pamporovo.

The healing power of mineral springs has been used since the time of the Thracians and the Romans. With more than 600 healing mineral thermal spas, healing climate and curative mud, Bulgaria is a competitive and medical spa destination. Mineral springs located in the southern part of the country are influenced by the Mediterranean climate, other springs are also found in mountain regions and along the Black Sea coast.

**YOU ARE WELCOME TO DISCOVER AND SHARE BULGARIA AS A FOUR-SEASON TOURIST DESTINATION.**

[www.tourism.government.bg](http://www.tourism.government.bg)

<http://bulgariatravel.org>

<https://ilovebulgaria.eu>

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## PRACTICAL INFORMATION

### IMPORTANT NUMBERS

- Emergency calls 112

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### TIME ZONE

- GMT/UTC + 02:00 hour (March-October)
- GMT/UTC + 03:00 hour (October-March)

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### CURRENCY

- The currency in Bulgaria is the Lev (1 Euro = 1.95583 BGN)

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### COUNTRY CODE

- In order to make an outgoing international call to Bulgaria, the country code is +359.

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### LANGUAGE

- Bulgarian is the official language in the Republic of Bulgaria.

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## USING MONEY IN BULGARIA

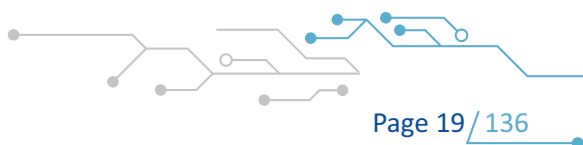
Money can be exchanged in banks and change bureaus. Ask your student helper or at the hotel reception to recommend a bank or bureau nearby. Visa, Mastercard, American Express and Diner's Club cards are accepted at almost every establishment that accepts payment by credit card. If any of the following logos appear on your card: MasterCard, VISA, AMEX, Diners Club or Discover you will be able to withdraw money from the ATMs in Sofia. It is important to check whether your home bank has authorized your card for international use if you plan on using a debit card.

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### POWER SUPPLY

- 220V ±10% electrical supply. Supply frequency is 50Hz.

Plug socket in use is the two-pinned Type F, also known as "Schuko".





## ANTIQUE THEATER IN PLOVDIV

The Antique Theater in Plovdiv was built in the beginning of the 2nd century AD during the ruling of Emperor Trajan (98 – 117 AD). It is one of the best preserved antique theaters in the world.



A two-storey construction called skene (a dressing-hall for the actors) with side wings that rise from the side of the stage. Inscriptions and exquisite statues which are now included in the building architecture were found.

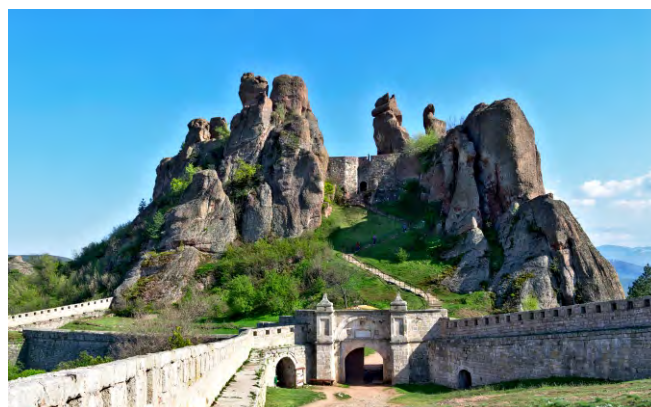
Nowadays the antique theater is adapted to the contemporary cultural life of Plovdiv and accommodates about five hundred viewers. It is the most emblematic monument of the constant cultural and historical continuity conducted in the city over the centuries.



## THE BELOGRADCHIK CLIFFS

a unique natural phenomenon, are roughly 30 km long and 6-7 km wide. The Belogradchik Cliffs were sculpted by natural forces over a period of more than 200 million years. Their iron ore content gives them their reddish coloration. They vary in form, and are more than 100 meters high.

The first group of cliffs are situated near the city of Belogradchik. The most famous of these are called The Rider, Madonna, The Dervish, Adam and Eve, The Mushrooms, The Lion, The Monks, The Bear, The Castle, and The Shepherd Boy.



## CAPE KALIAKRA

is an oblong, narrowing rocky peninsula that juts out about 2 km into the sea. The rich history, the well-preserved landscape, and the beautiful panoramic views make Cape Kaliakra one of the most attractive tourist spots on the Black Sea Coast.

The slopes of the cape take a 60 – 70 m plunge straight into the sea. The waves have carved caves and arches at its foot that can be approached only by the sea.

The name Kaliakra, which means “beautiful cape”, was first mentioned in the 13th – 14th centuries.



# SOFIA

With its rich history, Sofia is one of the oldest cities in Europe. In 1879. After a disputed vote, Sofia was chosen as the capital of newly independent Bulgaria.

Sofia is the largest city, the center of the administrative, judicial and executive power in the country (National Assembly, Presidency, Council of Ministers and all ministries), as well as the financial, educational, cultural, business and largest economic center of Bulgaria.

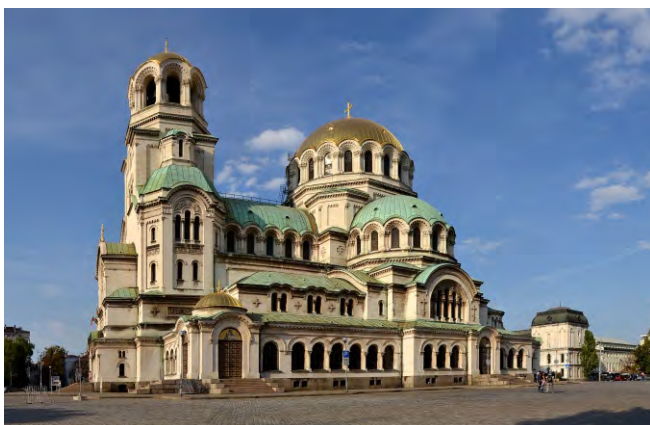
Sofia's population exceeds 1.3 million people in an area of 492 km<sup>2</sup>, which ranks the city 15th largest in the European Union. Sofia's economy is growing at a rapid pace. The city occupies 10th place in the ranking of best performing European cities for 2017\*.

Sofia produces 40% of Bulgaria's gross domestic product and 1/3 of the country's exports. Fourteen percent of exports are a product of the city's IT sector.

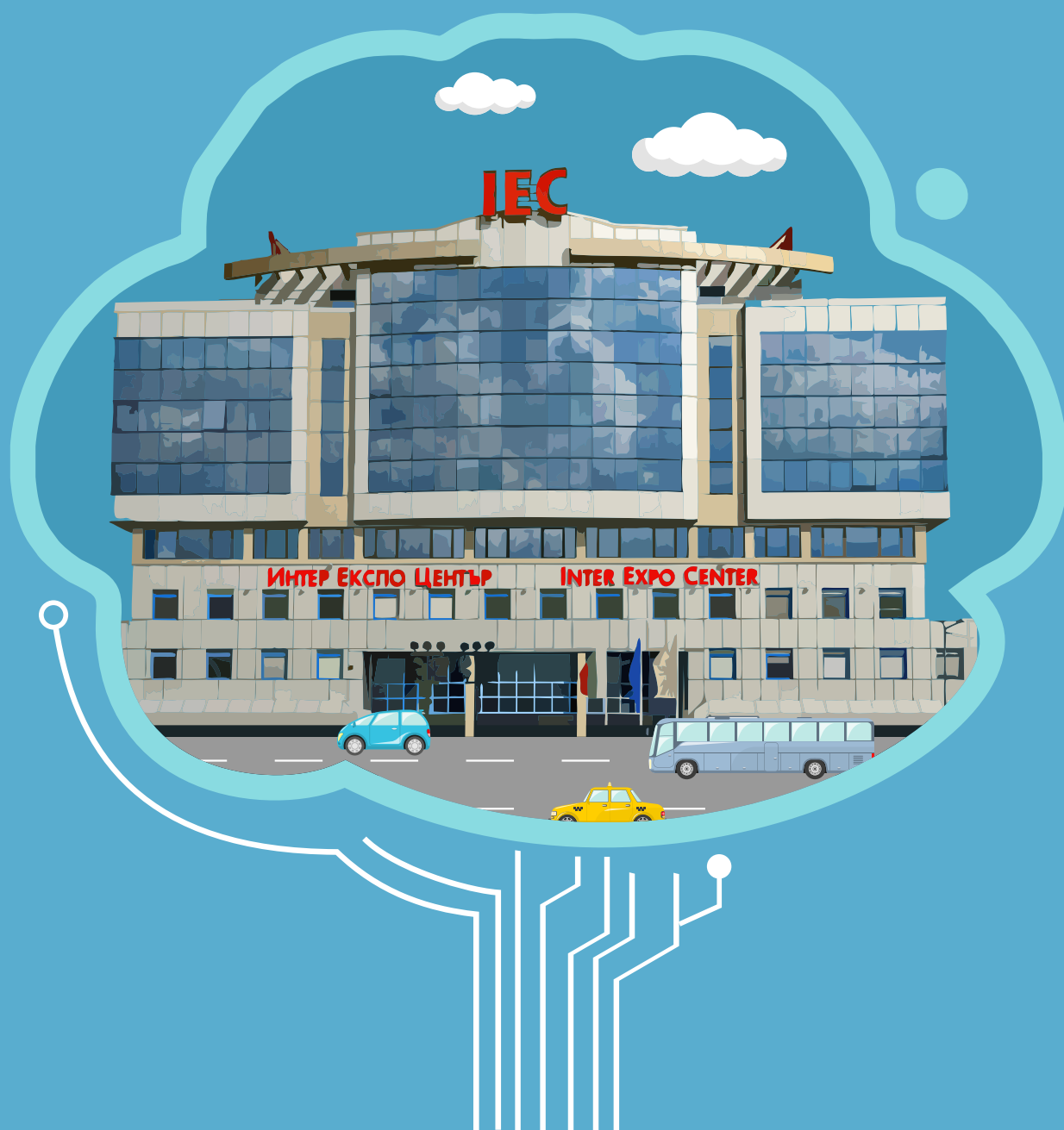
Sofia attracts talent. Twenty-three of the 51 Bulgarian universities are located in Sofia. The city has over 100,000 students. Sofia has one of the most dynamic start-ups and entrepreneurial ecosystems in Central and Eastern Europe due to its abundance of technical talents. Employment in the creative industries is also increasing.

Sofia is a developing tourist destination. In 2017 the city is in the top 3 cities in Europe with the highest growth of international visitors - 15.2%.

*\*Best-performing Cities, Europe 2017, Milken Institute*



# EUCYS 2019 VENUE





# VENUE



## THE CONTEST VENUE INTER EXPO AND CONGRESS CENTER

Inter Expo and Congress Center is the only exhibition centre in Sofia – a symbol of modern and successful business practices – and hosts many exhibitions and events dedicated to different fields of economics. The exhibition centre offers its partners many opportunities to communicate and develop their ideas, as well as to present their projects in the best way.

### CAPACITY OF INTER EXPO AND CONGRESS CENTER:

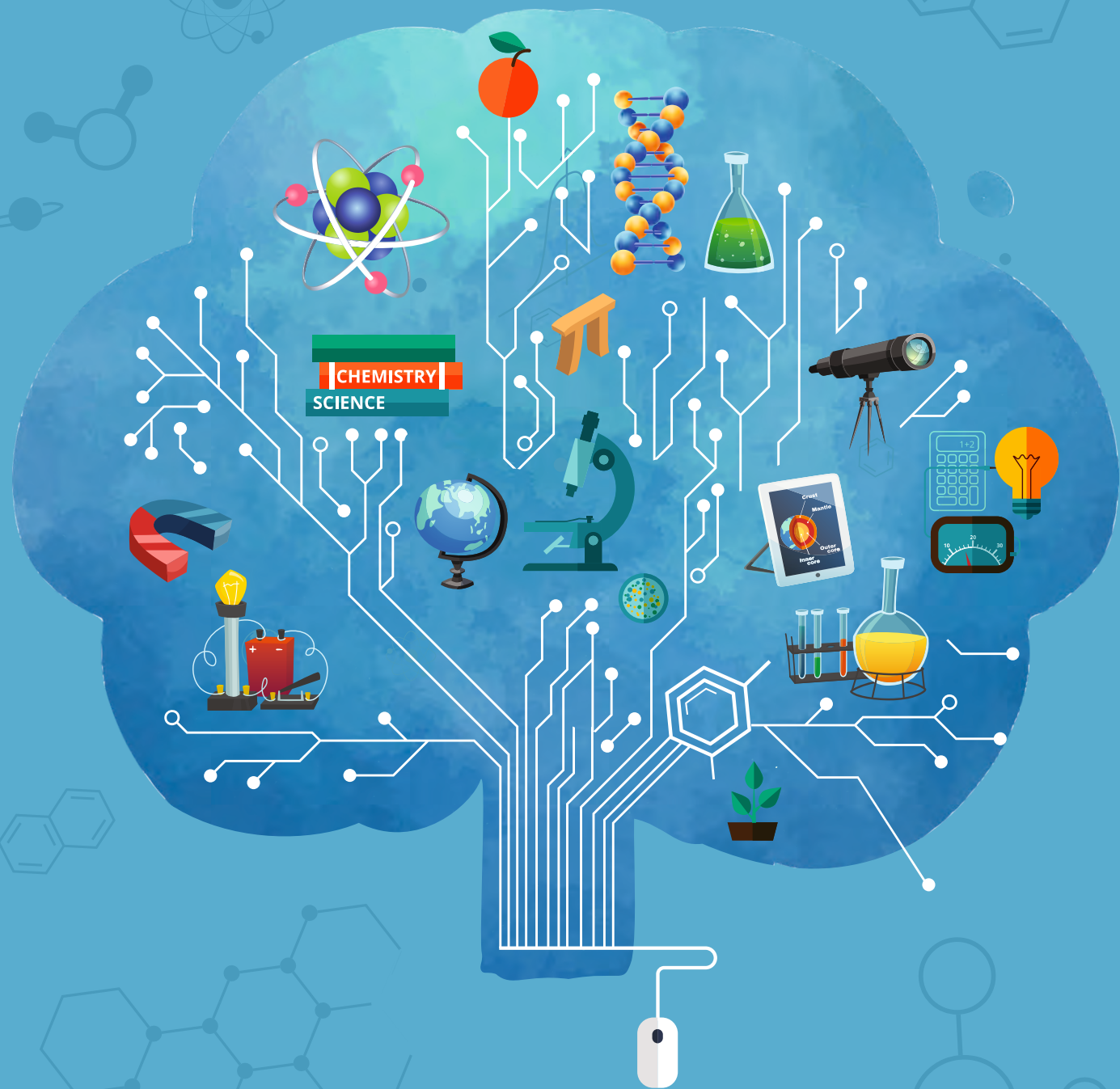
- Total area of 42,000 sq. m
- 6 exhibition halls and outdoor exhibition area
- 8 congress and seminar halls
- Offices
- Restaurants, cafés, a bank branch

### THE FOLLOWING FACILITIES ARE IN CLOSE PROXIMITY:

- Metro station
- Two underground parking lots with an overall capacity of 1,600 parking spots
- Four-star hotel



# EUCYS 2019 PROJECTS



# PROJECTS BY FIELD

## BIOLOGY

### STAND: 1 | BIOLOGY-01 LITHUANIA

**Augustas Skaudickas (19M)**  
**Gabija Skaudickaitė (17F)**

The link between body thermal expression and the trauma presence: quick, cheap, easy, and safe diagnostic approach

### STAND: 2 | BIOLOGY-02 NORWAY

**Whydah Uwampa Kwizera (19F)**

An investigation of genomic alterations for the survival of high-grade astrocytic tumours

### STAND: 3 | BIOLOGY-03 SPAIN

**María Bouso Posada (18F)**  
**Xiana Rego Fernández (17F)**  
**Ana Rubal Sánchez (18F)**

O da la miúda. Distribution, ethology and phenology of the Iberian wolf

### STAND: 4 | BIOLOGY-04 ESTONIA

**Hana Geara (19F)**

The Inheritance of the Silver Gene in the Gene Pool of the Estonian Horse and the Expression of the PMEL17 Gene in the Silver Dapple Phenotype

### STAND: 5 | BIOLOGY-05 SWEDEN

**Nathalie Anna Kristina Winther (18F)**

The bean beetle's ovoposition over four generations / Bönbaggens ovopositionering över fyra generationer (Swedish title)

### STAND: 6 | BIOLOGY-06 BULGARIA

**Nikolaj Asenov Pashov (18M)**

Brain Cells Phenotyping Via Unsupervised Machine Learning With Autoencoder and Clustering

### STAND: 7 | BIOLOGY-07 SWITZERLAND

**Jannik Lukas Wyss (19M)**

Gene regulation during development: The roles of the genes xbp1, creb3l1 and creb3l2 in axial mesoderm differentiation

### STAND: 8 | BIOLOGY-08 USA

**Leo Li Takemaru (17M)**  
**Poojan Pandya (17M)**

Investigating the Role of the Novel ESCRT-III Recruiter CCDC11 in HIV Budding: Identifying a Potential Target for Antiviral Therapy

## CHEMISTRY

### STAND: 9 | CHEMISTRY-01 GEORGIA

**Saba Gogichaishvili (18M)**  
**Nia Gogokhia (18F)**

Novel Biodegradable Polymer for Pharmaceutical Applications

### STAND: 10 | CHEMISTRY-02 RUSSIA

**Yana Olegovna Kachenyuk (17F)**

Synthesis of catalyst for aldol condensation of propionaldehyde

### STAND: 11 | CHEMISTRY-03 POLAND

**Antoni Ignacy Lis (19M)**

Nanoparticles in antitumor therapy

### STAND: 12 | CHEMISTRY-04 SOUTH KOREA

**Minseok Kim (16M)**  
**Hajin Kim (17M)**  
**Jihun Ha (17M)**

A Study of Transition Metal Substituted Prussian Blue Analogues

### STAND: 13 | CHEMISTRY-05 ITALY

**Gabriele Merlo (18M)**  
**Cristina Caprioglio (18F)**  
**Andrea Zeppa (18M)**

Prunosom from Leaves to Anti-age creams: the Magic of Liposomes and Vegetable Antioxidants

### STAND: 14 | CHEMISTRY-06 GERMANY

**Paul Kunisch (17M)**  
**Thomas Alexander Derra (17M)**

ASA treatment for oil spills

### STAND: 15 | CHEMISTRY-07 PORTUGAL

**Berke Duarte dos Santos (18M)**  
**Pedro Manuel Martins Cortez (17M)**  
**Tomás de Lucena Teixeira dos Reis Carneiro (18M)**

Mycotoxins: a major issue

### STAND: 16 | CHEMISTRY-08 UNITED KINGDOM

**Maeve Jessie Stillman (16F)**

Investigating the Effect of Activated Charcoal on the Absorption of Medicines

### STAND: 17 | CHEMISTRY-09 SWEDEN

**Mattias Sven Anders Akke (19M)**  
**Elsa Maja Greta Axby (19F)**

Catching the Bad Guys: Capturing Oligomers of the Amyloid-beta Peptides / Metod för framställning av amyloidogena oligomerer (Swedish title)

### STAND: 18 | CHEMISTRY-10 ROMANIA

**Iuliana-Paula Huțanu (14F)**

The action of prednisone, sodium chloride and microwaves on living organisms

### STAND: 19 | CHEMISTRY-11 EGYPT

**Zeyad Bady (16M)**

High particulate matter filtration efficiency Nano-fibrous membrane

**STAND: 20 | CHEMISTRY-12  
LATVIA**

**Roberts Reikmanis (18M)**  
**Miķelis Putnieks (18M)**

Synthesis of Novel Betulin-Triazole  
Conjugates

**STAND: 21 | CHEMISTRY-13  
SLOVAKIA**

**Laura Nižníková (18F)**

Development and application of analytical  
method for determining iodine anion in  
highly mineralized water matrices

**STAND: 22 | CHEMISTRY-14  
BELGIUM**

**Noa Somville (17F)**  
**Clara Allegro (17F)**  
**Marion Hindryckx (16F)**

How to clean up the oceans?

**COMPUTING**

**STAND: 23 | COMPUTING-01  
EUROPEAN SCHOOLS**

**Armin Alfredo KRULL (16M)**  
UVI Wristwatch (UVW)

**STAND: 24 | COMPUTING-02  
IRELAND**

**Adam Kelly (17M)**  
Optimised Simulation of General Quantum  
Circuits

**STAND: 25 | COMPUTING-03  
EGYPT**

**Abdallah Ali Bekhit (18M)**  
**Alaa Mohamed Mohamed (17F)**  
PlantPlanet

**STAND: 26 | COMPUTING-04  
TURKEY**

**Abdullah İşik (18M)**  
**Umut Şenol (17M)**  
Artificial Intelligence System Object and  
Place Recognizer for Blind People and  
Development of Data Set

**STAND: 27 | COMPUTING-05  
UNITED KINGDOM**

**Aalia Sellar (15F)**  
**Brendan Michael Miralles (14M)**  
**Grace Hannah Patricia Lord (15F)**  
Music Splash

**STAND: 28 | COMPUTING-06  
BULGARIA**

**Zvezdin Besarabov (18M)**  
Distributed creation of Machine learning  
agents for Blockchain analysis

**STAND: 29 | COMPUTING-07  
SWITZERLAND**

**Georgette Kim Weingärtner (19F)**  
Blockchain Decrypted

**STAND: 30 | COMPUTING-08  
CHINA**

**Jiaqi Niu (15F)**  
Monitoring the tooth brushing quality for  
teenagers with smart watch

**STAND: 31 | COMPUTING-09  
LATVIA**

**Artūrs Maļenkovs (19M)**  
**Vladimirs Ščigoļevs (19M)**  
**Roberts Gordins (19M)**  
Algorithms for independent operations of a  
robot in a lava tube on the Moon

**STAND: 32 | COMPUTING-10  
SLOVAKIA**

**Ján Varga (19M)**  
Prevention of Cheating in eSports

**ENGINEERING**

**STAND: 33 | ENGINEERING-01  
HUNGARY**

**Miklós Zsigó (17M)**  
Moth.NET

**STAND: 34 | ENGINEERING-02  
RUSSIA**

**Alexander Alexandrovich Sokko  
(17M)**  
Next generation of solid-fuel rocket engines

**STAND: 35 | ENGINEERING-03  
GEORGIA**

**Mariam Gurjievi (18F)**  
**Davit Berulava (16M)**  
Triboelectric Curtain

**STAND: 36 | ENGINEERING-04  
FRANCE**

**Émilie Dalens (18F)**  
**Lou Goubin (17F)**  
**Mathieu Duret (18M)**  
BoneSound

**STAND: 37 | ENGINEERING-05  
CZECHIA**

**Martina Hanusova (15F)**  
Affordable 3D-printed Equipment for  
Innovative Robotics Education

**STAND: 38 | ENGINEERING-06  
POLAND**

**Mateusz Leon Mazurkiewicz (18M)**  
**Łukasz Bartłomiej Gałecki (19M)**  
**Jan Marcin Struziński (19M)**  
High Altitude Micro Air Vehicle

**STAND: 39 | ENGINEERING-07  
CANADA**

**Manning Harrison Whitby (18M)**  
An Interpretation of Life Through Vibration  
Motors

**STAND: 40 | ENGINEERING-08  
ITALY**

**Fabio Rinaldini (19M)**  
Motorised Platform for Inverted  
Microscopes Olympus IX 50 and IX 70

**STAND: 41 | ENGINEERING-09  
GERMANY**

**Alex Korocencev (18M)**  
**Felix Christian Sewing (18M)**  
Hoverboard - a Magnetically Levitated  
Vehicle

**STAND: 42 | ENGINEERING-10  
TURKEY**

**Sude Aksaray (17F)**  
**Serenay Akgün (18F)**  
Design Of A Self-Learning Prosthetic Hand  
Using Wireless Data Transmission and Flex  
Sensor

**STAND: 43 | ENGINEERING-11  
TUNISIA**

Mohamed Khalil Mattar (17M)  
Khalil Selmane (16M)  
Selim Makni (17M)

The Invisible Pollution of Sea Water

**STAND: 44 | ENGINEERING-12  
AUSTRIA**

Noah Scheiring (19M)  
Andreas Ladner (19M)  
Tobias Schauer (19M)

Diffrec PRO

**STAND: 45 | ENGINEERING-13  
SWEDEN**

Jonatan Carl Persson (19M)

Evaporative desalination with industrial waste heat / Avsaltning för industriell tillämpning mha högtempererad restvärme (Swedish title)

**STAND: 46 | ENGINEERING-14  
SWITZERLAND**

Océane Zofia Adrienne Patiny (19F)

Remote Controlled Cylinder

**STAND: 47 | ENGINEERING-15  
CHINA**

Junyang Tang (17M)

An Intelligent Directional Following Device Based on Ultrasonic Positioning and Robust PI Controller

**STAND: 48 | ENGINEERING-16  
ISRAEL**

Omry Benjamin (19M)  
Tal Tumpovsky (19F)

Improving recovery time of patients with an Ilizarov external fixator around the ankle

**STAND: 49 | ENGINEERING-17  
DENMARK**

Magnus Quaade Oddershede (19M)

The wingtip's influence on the efficiency of airplane wings

**ENVIRONMENT**

**STAND: 50 | ENVIRONMENT-01  
LUXEMBOURG**

Marie Morgane Anaïs Croquet (15F)  
Dylan Avinase Ramsurrun (17M)  
Anaïs Marjorie Nicole Croquet (17F)

Analysis of glyphosate residues in honey

**STAND: 51 | ENVIRONMENT-02  
SLOVENIA**

Ožbej Ivan Zorko (20M)

Microorganisms and Proper Nutrients as Natural Protection from Frost

**STAND: 52 | ENVIRONMENT-03  
CYPRUS**

Thalia Koumi (17F)  
Anna Koumi (17F)  
Eirini Iskandar (17F)

Investigating detection of floating plastic litter from Space

**STAND: 53 | ENVIRONMENT-04  
ESTONIA**

Merilin Radvilavičius (18F)

The Influence of the Content of Nutrients and Soil pH on the Needle Measurements of the Scots Pine (*Pinus sylvestris* L.) on Puhatu Cutaway Peatland

**STAND: 54 | ENVIRONMENT-05  
PORTUGAL**

João Pedro Gama Silva Gomes (18M)  
Patrícia Maria da Silva Cruz (18F)  
Maria Miguel Lopes de Castro (18F)

From Waste to Bioplastic

**STAND: 55 | ENVIRONMENT-06  
TUNISIA**

Omar Besbes (16M)

An intelligent system to monitor air pollution and prevent its health effects

**STAND: 56 | ENVIRONMENT-07  
AUSTRIA**

Hannah Viktoria Schatz (19F)  
Yasemin Hatice Gedik (19F)

Microplastic on our doorstep

**STAND: 57 | ENVIRONMENT-08  
ROMANIA**

Cristiana Savuca (17F)  
Iulia Mihaela Dragan (17F)

Environmental magnetism on the Black Sea Coast, in situ versus laboratory measurements

**STAND: 58 | ENVIRONMENT-09  
DENMARK**

Emma Weiss Nielsen (15F)

MOOSIC: a mean for productivity optimisation

**MATERIALS**

**STAND: 59 | MATERIALS-01  
FINLAND**

Ronja Holopainen (19F)

EcoMe: a reusable, ecological and affordable menstrual hygiene product for developing regions

**STAND: 60 | MATERIALS-02  
CYPRUS**

Rafaella Ermogenous (17F)  
Sofi Menelaou (16F)  
Panagiota Tooulia (16F)

A novel advanced treatment process for the removal of antibiotics from wastewater

**MATHEMATICS**

**STAND: 61 | MATHEMATICS-01  
HUNGARY**

Botond Mészáros (19M)

Reduction and visualization of high-dimensional systems

**STAND: 62 | MATHEMATICS-02  
BELARUS**

Aliaksandr Piachonkin (17M)

On the number of points on an algebraic curve in a ring of residues

**STAND: 63 | MATHEMATICS-03  
FINLAND**

**Olli Järvinemi (18M)**

On the Common Prime Divisors of Polynomials

**STAND: 64 | MATHEMATICS-04  
POLAND**

**Paweł Andrzej Sawicki (20M)**

Elongated hexapawn

**STAND: 65 | MATHEMATICS-05  
SLOVENIA**

**Patrik Mikuž (20M)**

**Rok Jurinčič (20M)**

Pythagorean Quintuples

**STAND: 66 | MATHEMATICS-06  
GERMANY**

**Constantin Tilman Schott (16M)**

Neural Network application to key-point-detection in radiographs

**STAND: 67 | MATHEMATICS-07  
UKRAINE**

**Oleksandr Dziuniak (16M)**

Orthodiagonal quadrilaterals

**MEDICINE**

**STAND: 68 | MEDICINE-01  
GEORGIA**

**Nino Bulbulashvili (17F)**

**Mariami Bariashvili (17F)**

Distant Monitoring

**STAND: 69 | MEDICINE-02  
RUSSIA**

**Olga Antonovna Yarotskaya (16F)**

Electronic hardware and software system for posture correction and platypodia diagnosis among adolescence and middle school students

**STAND: 70 | MEDICINE-03  
LITHUANIA**

**Emilė Gudaitė (18F)**

Individualised footwear to correct children's feet

**STAND: 71 | MEDICINE-04  
CZECHIA**

**Alexandr Zarivnij (20M)**

Inhibition of glutamate excitotoxicity in glaucoma by liposomes

**STAND: 72 | MEDICINE-05  
CANADA**

**Bhavya Anand Mohan (16M)**

Taking ABiTE out of Cancer: A Novel Aptamer based BiTE for Cancer Immunotherapy

**STAND: 73 | MEDICINE-06  
SLOVENIA**

**Patrik Pečavar Nežmah (20M)**

Synthesis Of A Water-soluble Fluorescent Dye For Labelling Normal And Cancerous Urothelial Cells Of The Urinary Bladder In vitro

**STAND: 75 | MEDICINE-08  
TUNISIA**

**Mohamed Ihsen Bouallegue (19M)**

Life Shirt

**STAND: 76 | MEDICINE-09  
BULGARIA**

**Andrey Evgeniev Gizdov (19M)**

A novel method for skeletal age estimation based on cranial suture analysis

**STAND: 77 | MEDICINE-10  
ISRAEL**

**Elias Elias (18M)**

The effect of the E12 antibody on multiple sclerosis

**STAND: 78 | MEDICINE-11  
EGYPT**

**Hagar Sallam (17F)**

**Laila Elshrkawey (17F)**

Save kidney , Save life

**STAND: 79 | MEDICINE-12  
LATVIA**

**Maksims Podskočijs (17M)**

Calcium Phosphate Bone Cements: from  $\alpha$ -Tricalcium Phosphate Synthesis to Production of Bone Cement

**STAND: 80 | MEDICINE-13  
SLOVAKIA**

**Dominika Pánska (18F)**

E250 - The Silent Killer

**STAND: 81 | MEDICINE-14  
BELGIUM**

**Emilie Greco (17F)**

**Maya Dubois (17F)**

The dream of the sound

**PHYSICS**

**STAND: 82 | PHYSICS-01  
HUNGARY**

**Péter Pósa (18M)**

**Flórián Balázs Vámosi (18M)**

Automation and Remote Control of Astronomical Telescopes for a Global Asteroid Survey

**STAND: 83 | PHYSICS-02  
BELARUS**

**Roman Rouba (17M)**

Investigation of the Prince Rupert's drop properties

**STAND: 84 | PHYSICS-03  
FRANCE**

**Ségolène Mosser (17F)**

**Louise Richard (18F)**

**Hugo Montan (18M)**

Advanced ARAGO, a "gravitational wave" detector

**STAND: 85 | PHYSICS-04  
NORWAY**

**Erica Magnhild Maria Frostegård (19F)**

Wave-particle duality: an experimental test of Compton's theory

**STAND: 86 | PHYSICS-05  
SPAIN**

**Nadia Weronika Brzostowicz (18F)**

Acoustic levitation. Building and analyzing two different acoustic levitators based on piezoelectric transducers, and exploring its current and possible future applications using simple physical and chemical experiments.

**STAND: 87 | PHYSICS-06  
SOUTH KOREA**

**Jaehyun Lee (17M)**

Introduction of a Novel Diodicity Evaluation Criteria and 1-D Approximate Model for Multistaged NMP (No-Moving-Parts) Check Valves and Methods for Valve Stage Optimization

.....

**STAND: 88 | PHYSICS-07  
ESTONIA**

**Richard Luhtaru (19M)**

Fabrication of binary amplitude holograms using a film camera

.....

**STAND: 89 | PHYSICS-08  
GREECE**

**Georgios - Kalpaxis (19M)**

**Andreas Vatistas (18M)**

**Athanasios Vasilainas (19M)**

PLANet B-Exoplanet Pursuit

.....

**STAND: 90 | PHYSICS-09  
TURKEY**

**Ali Tunahan Işik (16M)**

**Enis Kerem Çakmak (16M)**

The Design of Computer Controlled Refractometer

.....

**STAND: 91 | PHYSICS-10  
UKRAINE**

**Ihor Tarkhan (16M)**

Extension of the application range and parameters of the Airy pendulum for obtaining Lissajous curves

.....

**STAND: 92 | PHYSICS-11  
CHINA**

**Yichen Liu (18M)**

Narrow-band Photometry of Emission Nebula Using Small-Caliber Optical Telescope

.....

**STAND: 93 | PHYSICS-12  
DENMARK**

**Nikolai Tiedemann (18M)**

The Perfect Europe Dinghy Sailor

.....

**STAND: 94 | PHYSICS-13  
BELGIUM**

**Zofia Syrczyńska (16F)**

Schlieren imaging

**SOCIAL SCIENCES**

**STAND: 95 | SOCIAL SCIENCES-01  
NORWAY**

**Ane Grieg Riisnaes (19F)**

The Church of Stalin

.....

**STAND: 96 | SOCIAL SCIENCES-02  
SPAIN**

**Claudia Lidia Pubill Quintillà (17F)**

With Death at His Heels. Chronicle of an Escape and Two Wars.

.....

**STAND: 97 | SOCIAL SCIENCES-03  
LUXEMBOURG**

**Marina Yakubova (16F)**

Putin's Russia and how do young people react to it

.....

**STAND: 98 | SOCIAL SCIENCES-04  
ITALY**

**Elisa Seghetti (19F)**

OnMind: an IoT wearable biofeedback system for the treatment of psychosomatic disorders

.....

**STAND: 99 | SOCIAL SCIENCES-05  
ISRAEL**

**Guy Shapira (18M)**

Maat in old Kingdom Egypt

.....

**STAND: 100 | SOCIAL SCIENCES-06  
ROMANIA**

**Ioana Ruxandra Greculeac (17F)**

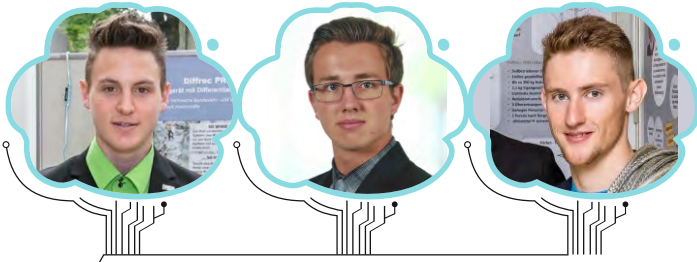
**Tudor Petracovici (17M)**

The Glasses of Happiness

.....



# PROJECTS BY COUNTRY



**AUSTRIA**

Stand: 044

Project: Engineering-12



## Diffrec PRO

### Noah Scheiring

Male | 19 years  
noah.scheiring79@gmail.com

### Andreas Ladner

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### Tobias Schauer

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The team developed a so-called differential pulley block for alpine lightweight synthetic fibre ropes, which will be easy and simple to handle. They calculated and compared different concepts and found a serrated differential roller with three differently sized grooves. The axle of the pulley is suspended from two side plates, which also provide a suspension point for a carabiner. A mechanism presses the rope into the serrations so that it doesn't just let go. They found a very smart solution for the improvement of pulley blocks for alpine applications.



**AUSTRIA**

Stand: 056

Project: Environment-07



## Microplastic on our doorstep

### Hannah Viktoria Schatz

Female | 19 years  
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### Yasemin Hatice Gedik

Female | 19 years  
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The team analyzed the degradation of microplastic in their home river. They found out, that even after 30 days of treatment through contact with the microorganisms in the sewage sludge, the small plastic particles do not degrade completely. Even plastic polylactate, which is labelled as biodegradable, is particularly resistant to sewage sludge. Polyethylene terephthalate (PET for short) is the only material in which the sewage treatment promotes significant chain degradation. The outstanding team addressed a serious problem and worked on a scientifically advanced level.



# PROJECTS BY COUNTRY



**BELARUS**

Stand: 062

Project: Mathematics-02



**BELARUS**

Stand: 083

Project: Physics-02

## On the number of points on an algebraic curve in a ring of residues

### Aliaksandr Piachonkin

Male | 17 years  
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In our paper we obtained the following results:

1. We introduce a new function  $R_{(f)}(n)$ , which is the number of all possible combinations of giving coordinates of the solutions of the congruence  $f(x_1, \dots, x_k) \equiv 0 \pmod{n}$ , and proved that this function is multiplicative.
2. We obtain the exact number of points on a curve  $x^m - y^k \equiv 0 \pmod{n}$ .
3. We introduce a new definition  $m/k$ -power residue modulo  $n$  and found an exact formula for their number modulo  $n$ . From this formula as a corollary we obtained the full results about  $m$ -power residues.
4. We calculated the number of points on a curve  $ax^2 + bxy + cy^2 \equiv 0 \pmod{p}$  modulo a prime number.
5. We found an exact formula for the number of all possible values of quadratic polynomial mod  $n$ . These results can be useful algebraic geometry and asymmetric cryptography.

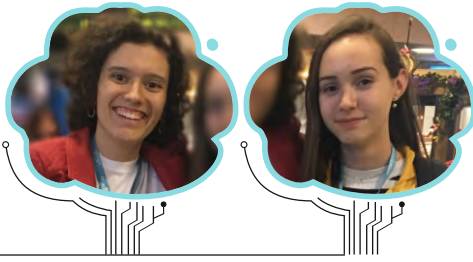
## Investigation of the Prince Rupert's drop properties

### Roman Rouba

Male | 17 years  
Rarn2001@gmail.com

Prince Rupert's drops (PRDs) are very interesting from both scientific and commercial points of view. The main achievements of my theoretical and experimental research are studying the way of PRDs obtainment, defining how much shape and optic-mechanical properties of a drop can vary and achieving very accurate data of how much pressure can PRDs stand. The most important commercial aspects are creation of PRD-based drilling bits, which are much cheaper than nowadays' diamond ones but still as good as them, composite body armor prototypes and experiments with PRD + concrete composites.

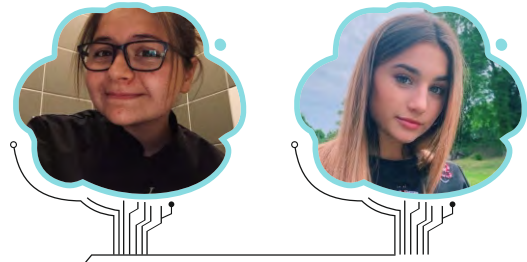
# PROJECTS BY COUNTRY



**BELGIUM**

Stand: 022

Project: Chemistry-14



**BELGIUM**

Stand: 081

Project: Medicine-14



## How to clean up the oceans?

### Noa Somville

Female | 17 years

### Clara Allegro

Female | 17 years

### Marion Hindryckx

Female | 16 years

marion.hindryckx@hotmail.fr

When our teachers asked us to find out a project, we immediately thought about environmental problems which is a great challenge. Further we thought about the pollution of our oceans and how could we struggle against it. We know that there are a lot of polluting substances in the water and that those have a devastating impact on the marine wildlife. We're thinking here about plastics bottles, bags or oil and many more. We decided to set our research on oil. So, we created a boat filled with active carbon. This one can adsorb the oil floating on the surface of the water and, therefore, can help to reduce the pollution of the oceans. One more interesting thing is that active carbon is made from natural stuff and it can be reactivated several times, so it is reusable.

## The dream of the sound

### Emilie Greco

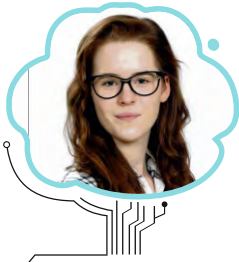
Female | 17 years

### Maya Dubois

Female | 17 years

The invention of a device for deaf people. Why did we choose to do this project and how did we do it? Firstly, my friend's grandfather is deaf so this cause was very involved to her because she wanted to make him smile again. First of all, we have researched the subject because « sound » is a very vast environment. Then, we found some informations about what sound was and we made a lots of experiments on this subject. Finally, we moved on the practical part, we welded and assembled everything so that the project worked. To conclude, our project is to make the deaf people feel music trough vibrations.

# PROJECTS BY COUNTRY



**BELGIUM**

Stand: 094

Project: Physics-13



**BULGARIA**

Stand: 006

Project: Biology-06

## Schlieren imaging

**Zofia Syrczyńska**

Female | 16 years

Have you ever wondered what it is like to see something invisible? The aim of my project was to create a homemade experimental stand (following Foucault's idea) and to show that physics can be breath taking. My project allows seeing different gases, air currents and movements, a breath or even sound waves. With the use of a special apparatus consisting of a mirror, a video camera, an LED light, and a razor blade, it is possible to see something that a bare eye cannot, such as warmth coming from a hand. All thanks to the occurring physical phenomenon like refraction, the fact that the razor blade lets only some of the reflected light rays back into the camera lens, the "invisible" image can be created. It is magical when you can see physics, and schlieren imaging makes it possible.

## Brain Cells Phenotyping Via Unsupervised Machine Learning With Autoencoder and Clustering

**Nikolaj Asenov Pashov**

Male | 18 years

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We work with an image database of brain cells and aim to develop an unsupervised neural network, consisting of autoencoder and clustering layers, to classify whether the input image contains a cell or not. The cell types which we have tested the algorithm on, are microglia and inhibitory neurons. We feed image patches to an autoencoder with a small latent space and perform clustering on the compressed data representation from the latent space. We expect that the encodings of "positive" and "negative" samples would differ from each other and thus form clusters in space. The achieved results show a good separation of the two data classes, with an F1 score reaching 0.997.

# PROJECTS BY COUNTRY




**BULGARIA**  
Stand: 028  
Project: Computing-06

## Distributed creation of Machine learning agents for Blockchain analysis

### Zvezdin Besarabov

Male | 18 years  
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Creating efficient deep neural networks involves repetitive manual optimization of the topology and the hyperparameters. This human intervention significantly inhibits the process. Neural Architecture Search (NAS) algorithms can effectively automate this work and achieve results that surpass the best human-designed models. This research proposes a novel blockchain network protocol that incentivises independent computing nodes to run NAS algorithms and compete in finding better neural network models for a particular task. If implemented, such network can be an autonomous and self-improving source of machine learning models, significantly lowering the cost and access to accurate Machine Learning solutions.



**BULGARIA**  
Stand: 076  
Project: Medicine-09

## A novel method for skeletal age estimation based on cranial suture analysis

### Andrey Evgeniev Gizdov

Male | 19 years  
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Due to the cranial suture ossification in conjunction with age, the degree of fusion between the neighboring skull plates has been used as a predictor for estimating age, based on skeletonized human remains. So far, this involved the use of subjective ranking techniques, which rely entirely on the human opinion for assessing the degree of fusion. Such methods have shown to require a lot of human resources and not produce sufficiently accurate results in comparison with other age estimation methods. This project manages to entirely automate the process of age estimation based on cranial suture analysis and based on the available sample, suggests a significant improvement in the error of produced age estimates. This is achieved with the help of computer algorithms and deep learning.

# PROJECTS BY COUNTRY



**CANADA**

Stand: 039

Project: Engineering-07



**CANADA**

Stand: 072

Project: Medicine-05

## An Interpretation of Life Through Vibration Motors

### Manning Harrison Whitby

Male | 18 years

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Independent travel and the ability to interact with the world are two of the greatest challenges facing blind/visually impaired (BVI) persons. Traditional tools, such as the white cane and guide dog, are limited and do not provide users with the information they need to navigate effectively and gracefully. I worked to develop an advanced electronic travel aid that uses ultrasonic sensors and LIDAR to provide BVI users with enhanced spatial perception through vibro-tactile feedback. The device was developed to equip users with a tool to overcome their social and navigational challenges and give users the confidence and comfort to explore independently.

## Taking ABiTE out of Cancer: A Novel Aptamer based BiTE for Cancer Immunotherapy

### Bhavya Anand Mohan

Male | 16 years

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Immunotherapy is a treatment in which the body's own immune system is stimulated to fight diseases such as cancer. One treatment, called Bi-specific T Cell Engagers (BiTE), consists of two antibodies linked together. One antibody binds to a T cell, while the other binds to a cancer cell, helping T cells recognize and kill the tumor. Unfortunately, BiTEs have several limitations. In a previous project I used aptamers – short single strands of DNA or RNA – to create a disease diagnostic tool. I wondered whether aptamers could make BiTEs more effective and reduce their side-effects. I designed three different ABiTES (Aptamer based BiTEs) and then tested them on two types of breast cancer cells as well as healthy cells. Results show that ABiTES are safer, cheaper and more effective than BiTEs.

# PROJECTS BY COUNTRY



**CHINA**  
Stand: 030  
Project: Computing-08



**CHINA**  
Stand: 047  
Project: Engineering-15

## Monitoring the tooth brushing quality for teenagers with smart watch

### Jiaqi Niu

Female | 15 years  
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The oral problems of young children are particularly serious because they are at a critical moment in developing good oral hygiene habits. How to help them maintain oral cleaning through sensors and artificial intelligence technology has become a research point of intelligent Internet of Things. We present an easy accessible monitoring system for evaluating the tooth brushing with smart devices. The system captures the users' brushing behaviors (e.g., the motion of hands and the acoustic signals during tooth brushing) through the two build-in sensors. Then the collected data is transmitted to the smartphones and evaluated through a designed machine learning-based model. Finally, a DNN model is adopted to significantly improve the accuracy of detecting tooth brush tasks by up to 97.7%.

## An Intelligent Directional Following Device Based on Ultrasonic Positioning and Robust PI Controller

### Junyang Tang

Male | 17 years  
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The project designs an intelligent directional following device based on ultrasonic positioning and strong robust PI controller. It locates and follows directly under the beacon's guidance, which brings fast calculation, high positioning accuracy and sensitivity, low energy consumption, and easy control. New algorithm based on four receiving sensors also makes positioning more accurate. Using robust PI controller let it move much steadier and more adaptable to complex environments, with strong anti-interference ability. Its warning system ensures safety and no touching obstacles. Moreover, 3 highly reliable Omni-Wheels, 120° apart, make it move instantaneously in any direction. The device can be widely used indoors and has been granted two patents and won the National Gold Medal.

# PROJECTS BY COUNTRY



**CHINA**

Stand: 092

Project: Physics-11



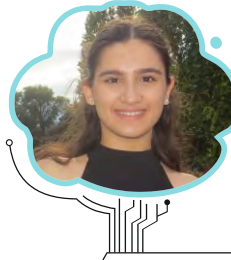
## Narrow-band Photometry of Emission Nebula Using Small-Caliber Optical Telescope

**Yichen Liu**

Male | 18 years

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The emission nebula is very common in interstellar matter, and its continuum has several obvious emission lines. In order to study the chemical elements in the emission nebula, this paper uses a small optical telescope with H $\alpha$ , [SII], [OIII] narrow-band filters to select four emission nebulae for observation. A lot of results can be obtained by analyzing the experimental data. For example, in most of the emission nebulae, the content of H $\alpha$  is much larger than [SII] and [OIII], and in the supernova remnants, the content of H $\alpha$  is less. This study proposes a new method of extended source photometry, and estimates the brightness of the selected emission nebula in each band. This method also helps to plan the exposure time for large telescopes, thus can improve observation efficiency.



**CYPRUS**

Stand: 052

Project: Environment-03



## Investigating detection of floating plastic litter from Space

**Thalia Koumi**

Female | 17 years

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**Anna Koumi**

Female | 17 years

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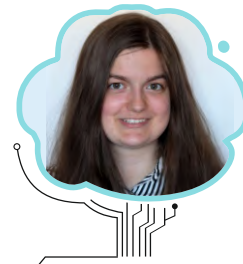
**Eirini Iskandar**

Female | 17 years

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The idea was to create a “plastic target”, in order to investigate if plastic floating in the sea can be detected, depending on its Spectral Signature using satellite or drone. Firstly, we took in situ and laboratory measurements on plastic to create a representative database and discovered its special characteristics which were used as guidelines to spot it. After creating and taking measurements on the target we analyzed the data and created a Prototype Code. Finally, by testing the Prototype Code of plastic bottle, we confirmed that accumulated plastic rubbish can be successfully detected using satellite or drone. Thus, a new, effective way of tracking plastic rubbish is introduced which can contribute in the protection of the marine environment.

# PROJECTS BY COUNTRY



**CYPRUS**

Stand: 060

Project: Materials-02



**CZECHIA**

Stand: 037

Project: Engineering-05

## A novel advanced treatment process for the removal of antibiotics from wastewater

### Rafaella Ermogenous

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### Sofi Menelaou

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### Panagiota Tooulia

Female | 16 years  
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Antibiotics are emerging pollutants due to their continuous input in the ecosystem, resulting in antibiotic-resistant bacteria, which cause immunity to antibiotics. To prevent this contamination the use of sorbents seems promising. Biochar can be characterized as low-cost sorbent from agriculture, that can deliver solutions to a wide spectrum of challenges related to the release of antibiotics. This study aims to examine the sorption of seven antibiotic compounds, by two biochars produced, sludge and manure. Adsorption kinetic experiments were performed. UPLC-MS-MS measured residual antibiotics in solutions with the % removal being calculated. The research took place between July 2018 and Feb 2019 by high school students in Cyprus under surveillance of the Nireas-IWRC, University of Cyprus.

## Affordable 3D-printed Equipment for Innovative Robotics Education

### Martina Hanusova

Female | 15 years  
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This project deals with the development of 3D-printed models, electronics and software for innovative education in robotics, sufficiently cheap to allow the schools (technical or vocational, as well as re-qualification courses or hobby clubs) to afford them for all their students in the class. Each and every student might make/repair/improve his/her own robots from a scratch and naturally “learn-by-making” multiple subjects from CAD modeling and 3D printing to electronics assembly to coding on multiple platforms. The models developed so far include the universal control system for a wide range of 3D-printed robotic manipulators, and a robotic model of a human hand, controlled wireless via a sensory glove and expandable with future advanced modules (muscle control, computer vision etc).



# PROJECTS BY COUNTRY



**CZECHIA**

Stand: 071

Project: Medicine-04



**DENMARK**

Stand: 049

Project: Engineering-17

## Inhibition of glutamate excitotoxicity in glaucoma by liposomes

### Alexandr Zarivnij

Male | 20 years

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This project proposes a novel treatment of glutamate excitotoxicity which affects all neurodegenerative diseases. In case of glaucoma, it causes vision loss of 64.3 million people worldwide. This work suggests application of liposomes as detoxifying agents capable of glutamate absorption via incorporated membrane EAAT2 transporters. It is supposed that absorption of excessive glutamate by liposomes should prevent receptor overstimulation and protect the neuron cells. Liposomes suitable for such purpose were synthesized. Their characteristics were assessed by fluorescent microscopy and Raman spectroscopy with Raman imaging.

## The wingtip's influence on the efficiency of airplane wings

### Magnus Quaade Oddershede

Male | 19 years

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Aviation is one of the most important ways of transportation. However, it is highly energy consuming and has a substantial climate impact. In this project, I have designed and tested a new type of wingtip device called a New Raked Wingtip. The New Raked wingtip optimizes the three-dimensional flow around the wingtip in order to maximise the lift and minimise the drag on the wing. That is, maximising the wing's efficiency defined as the ratio between the lift and the drag. Experiments that I have designed and carried out show that the New Raked Wingtip not only increases the efficiency of the wing, but also increases the efficiency more significantly than currently used wingtip devices. Implementation of New Raked Wingtips has the potential of dramatically reducing aviation's climate impact.

# PROJECTS BY COUNTRY



**DENMARK**

Stand: 058

Project: Environment-09

## MOOSIC: a mean for productivity optimisation

### Emma Weiss Nielsen

Female | 15 years

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This project is an investigation of the phenomenon of MOOSIC – the proportionality between music and the productivity of the dairy cows. Accordingly, I have surveyed, how the compositional parameters of the accompaniment (including both consonance versus dissonance, the level of activity and the tempo) affect the oxytocin release, that is essential to the milking production. Through verifying this on 433 dairy cows, I found a productivity optimisation of 2.4%, by which Denmark could reduce its dairy herd with 15,000 cows. Thereby, this MOOSIC will not only be a mean for productivity optimisation, but as well for minimising the climate changes.



**DENMARK**

Stand: 093

Project: Physics-12

## The Perfect Europe Dinghy Sailor

### Nikolai Tiedemann

Male | 18 years

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The project explores how to become The Perfect Europe Dinghy Sailor. Therefore, the project presents the physics of sailing with a primary focus on the aerodynamics. A model of the Europe Dinghy is designed, and an experiment analyzing the force generated by the sail is performed in a wind tunnel. At last, a complex model is developed to quantify the subjective decisions made while sailing. In the light of the theories, the project finds that the physics of sailing can be described with Bernoulli's principle. Furthermore, the project reveals that Europe Dinghy sailing is primarily influenced by an isometric muscle contraction in the quadriceps. Finally, the force analysis makes it possible to create optimal movement patterns for the athlete and enabling direct comparison between athletes.

# PROJECTS BY COUNTRY



EGYPT

Stand: 019

Project: Chemistry-11



## High particulate matter filtration efficiency Nano-fibrous membrane

### Zeyad Bady

Male | 16 years

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Particulate pollution has led to catastrophic health and environmental consequences. As a result, new approaches have been done to increase the efficiency of the air filtration equipment. Here a novel nanofibrous air filter made via electrospinning process is demonstrated, which has attractive attributes of high filtering efficiency and low resistance to air flow. The filter could be manufactured with a transparency of 90 % and an efficiency of > 85% under intense smoke exposure. Consequently, the filter could be applied as a muzzle, an alternative for catalytic converters of car exhausts or fabric filters used in the treatment of factories emissions. Additionally, the filter is made from hydrophilic polyacrylonitrile which makes it recyclable and efficient in humid circumstances.



EGYPT

Stand: 025

Project: Computing-03



## PlantPlanet

### Abdallah Ali Bekhit

Male | 18 years

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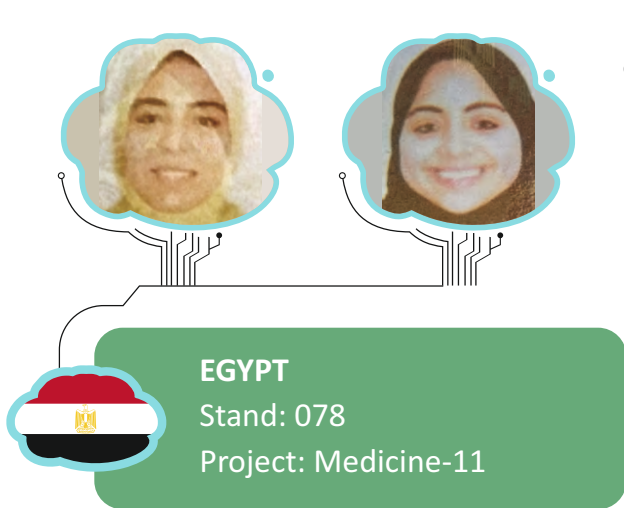
### Alaa Mohamed Mohamed

Female | 17 years

alaazaki3131@gmail.com

PlantPlanet is a mobile doctor crop in your pocket. Our project aims to help small farmers in developing countries that had a limited access to experts. The only thing that the user needs is a smartphone. Wherever the problem lies, a smartphone picture is enough and in seconds you will receive a diagnosis and the appropriate treatment tips. Take a picture of your arable crop by using a simple smartphone. Our application analysis it within the blink of an eye and reports detailed information about the plant's disease.

# PROJECTS BY COUNTRY



EGYPT  
Stand: 078  
Project: Medicine-11

The graphic features two circular portraits of young women at the top, connected by circuit-like lines to a green rounded rectangle containing the text. To the left of the rectangle is a small icon of the Egyptian flag.

## Save kidney, Save life

### Hagar Sallam

Female | 17 years  
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### Laila Elshrkawey

Female | 17 years  
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It is a device that contains sensors to measure the current percentage of minerals in blood and compare it with the normal levels such as blood pressure sensor, urine sensor and Ion selective electrode for potassium and sodium. Then it will be able to determine the excess components and wastes and the percentage of kidney failure. The device will be connected to an app on the mobile phone to send a report to the patient to inform him about the disease and the needed information. This part for getting rid of determined wastes and excess minerals as we will design a membrane of substance called Zeolites which is an aluminosilicate substance that has the ability to absorb nitrogenous wastes and minerals. We chose a specific type of zeolite because it absorbs the highest amount of creatin.



ESTONIA  
Stand: 004  
Project: Biology-04

The graphic features a circular portrait of a young woman at the top, connected by circuit-like lines to a pink rounded rectangle containing the text. To the left of the rectangle is a small icon of the Estonian flag.

## The Inheritance of the Silver Gene in the Gene Pool of the Estonian Horse and the Expression of the PMEL17 Gene in the Silver Dapple Phenotype

### Hana Geara

Female | 19 years

Current study describes the occurrence of the PMEL17 mutation that causes the Silver phenotype on the example of an Estonian horse called Muuksi Tuul. The aim of the research is to explain the diluting effect in mane and tail of the PMEL17 mutation which is also associated with several eye disorders (MCOA syndrome) e.g. cysts and cataracts. In addition to the studies about individual horses, the research offers a possible reason to the wide range of Estonian horse coat colours and gives a possible answer to the origin of the Silver gene in its genotype. Furthermore, the research tries to fill the gap between new knowledge in colour genetics and linguistically used colour terms, proposing one possible solution for creating a system for the designations of the (Estonian) horse coat colours.

# PROJECTS BY COUNTRY



**ESTONIA**

Stand: 053

Project: Environment-04



**ESTONIA**

Stand: 088

Project: Physics-07

## The Influence of the Content of Nutrients and Soil pH on the Needle Measurements of the Scots Pine (*Pinus sylvestris* L.) on Puhatu Cutaway Peatland

### Merilin Radvilavičius

Female | 18 years

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The aim of this study was to research the influence of nutrient contents and soil pH to Scots pine needle length and area in cutaway peatland. The samples were collected from 5 different experimental areas: fertilized with various amounts of wood and oil shale ash (3), control and natural area. The main result of the study was that fertilizing with ashes affected the growth of the needles positively, the most effective fertilizer was ash mixture. Also, the most important nutrients were phosphorus and potassium instead of nitrogen. Besides, the soil pH showed no correlation with the needle measurements. Further research is needed concerning the properties of ash mixtures as bio-innovative fertilizers and to find sustainable opportunities to reduce the amount of accumulated industry's ashes.

## Fabrication of binary amplitude holograms using a film camera

### Richard Luhtaru

Male | 19 years

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Fabrication of holograms is generally complicated and expensive. Therefore, it was studied, how to create high-quality computer-generated holograms using only affordable and widespread equipment. To make binary amplitude holograms with customized diffraction patterns, a computer program was written and photographic reduction with a film camera was used. The optimal parameters of the fabricated holograms as well as differences between using three different film types were determined. It was found that all film types are suitable for fabrication and in addition to laser light, the diffraction patterns are clearly visible when a mobile phone flashlight is viewed through the holograms. Such holograms can be used, for example, in physics lessons, science events, or escape rooms.

# PROJECTS BY COUNTRY



**EUROPEAN SCHOOLS**  
Stand: 023  
Project: Computing-01



**FINLAND**  
Stand: 059  
Project: Materials-01

## UVI Wristwatch (UVW)

### Armin Alfredo KRULL

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The ultraviolet part of the sunlight can damage the human skin by sunburn depending upon the radiation intensity. For people who are heavily exposed to sunlight (beach tourists, sailors, mountain hikers), it would be useful to know whether the current UV radiation they are exposed to can cause sunburn. Ideally, these people would carry a small measuring device with them that gives them continuous information about the intensity of UV radiation. It can be shown that open source hardware and software, 3D printing and a smartphone app are already sufficient to realize such a UVI measuring device in the form of a wristwatch.

## EcoMe: a reusable, ecological and affordable menstrual hygiene product for developing regions

### Ronja Holopainen

Female | 19 years  
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EcoMe is a reusable, ecological and affordable menstrual protection product aimed for developing regions. The qualities of the menstrual pad are based on an interdisciplinary research. A user survey was conducted in three Asian regions: Mongolia, Azerbaijan and China. From the results, limitations and preferences towards an ideal menstrual product were obtained and further used in the design of the product. Different materials were explored and the decision on using sea sponge as an absorbing material is based on the most important qualities of the material: absorbance, drying time and cleansing. In addition, an informative mobile application was created. The mobile application includes information about topics such as puberty, menstruation and contraception.

# PROJECTS BY COUNTRY



**FINLAND**

Stand: 063

Project: Mathematics-03

## On the Common Prime Divisors of Polynomials

### Olli Järviemi

Male | 18 years

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We inspect those polynomials whose coefficients are integers. We say that an integer  $m$  is a divisor of a polynomial  $P$  if some value of  $P$  in an integer is divisible by  $m$ . Our main result is that the common divisors of any several polynomials are exactly the divisors of a single polynomial. This is extended to prove that the set of prime numbers for which a system of polynomial equations in multiple variables is solvable is exactly the set of prime divisors of some polynomial in one variable. In addition, we prove results on how often a prime number is a common prime divisor of some polynomials – we prove a tight lower bound for this so-called density, and under additional assumptions give a formula for this density. Our work generalizes previous results, and we propose several ideas for further research.



**FRANCE**

Stand: 036

Project: Engineering-04

## BoneSound

### Émilie Dalens

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### Lou Goubin

Female | 17 years

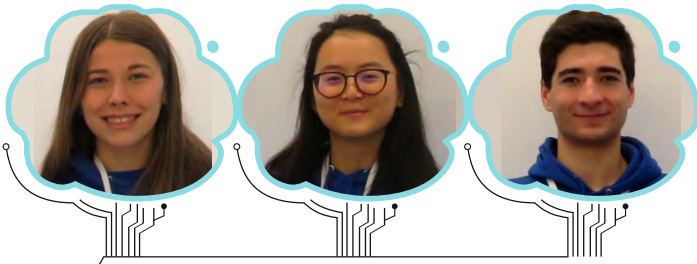
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### Mathieu Duret

Male | 18 years

Bone conduction headphones offers the possibility to listen music to deaf people. The bone conduction is a sound propagation method that passes sound not through the air but through bones onto the ears. Hearing people can also listen music, additional the environment noises. We choose to propose a system based on simple components. The aim was to put forward assembly plan accessible to everyone, for a self- manufacture, much less expensive (approximately 50€) and custom-made. All of our work and researches are gathered on a website. We coded a software to optimize the listening of music with the bone conduction. Indeed, bone conduction absorbs some frequency differently than others. Also, we need to be able to rise to volume without overloading the music.

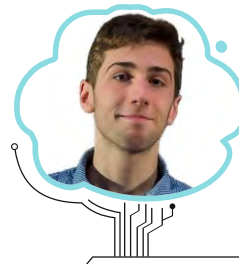
# PROJECTS BY COUNTRY



**FRANCE**

Stand: 084

Project: Physics-03



**GEORGIA**

Stand: 009

Project: Chemistry-01

## Advanced ARAGO, a "gravitational wave" detector

### Sékolène Mosser

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### Louise Richard

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### Hugo Montan

Male | 18 years

LIGO and Virgo American-European scientific collaboration made first detection of gravitational waves produced by a binary black holes merger (BBH). On the same principle, we simulate a gravitational wave detector with a completely innovative technique. This way we create a deformation of the space which corresponds to an hypothetical BBH merger. We detect and analyze it thanks to techniques which are similar to those used by scientists in order to determine the parameters of the event: mass of merging objects and distance to the Earth. On the footsteps of the scientist Arago, a pedagogue and a great popularizer, we propose an innovative approach to popularize the latest discoveries in gravitational astronomy.

## Novel Biodegradable Polymer for Pharmaceutical Applications

### Saba Gogichaishvili

Male | 18 years  
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### Nia Gogokhia

Female | 18 years  
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Chemotherapy has a bad reputation for severe side effects and this problem is one of the major challenges for modern medicine. Targeted drug delivery has become popular for its main advantage to differentiate between healthy cells and cancerous ones. However, targeted drug delivery still has problems to overcome and one of them is the need of new, promising materials for drug encapsulation. We present novel polymer, which forms micelles in aqueous solution and provides a hydrophobic reservoir for Water-Insoluble Drugs. We claim to achieve complete biodegradability and non-toxicity of micelles as well as high stability below CMC and long blood circulation time. We desire our project to play a role in the development of targeted drug delivery systems and to bring socio-scientific benefits.



# PROJECTS BY COUNTRY



Two portraits of team members, a woman and a man, are shown in cloud-like frames. Below them is a green box containing the Georgian flag, the text "GEORGIA", "Stand: 035", and "Project: Engineering-03".

**GEORGIA**  
Stand: 035  
Project: Engineering-03

## Triboelectric Curtain

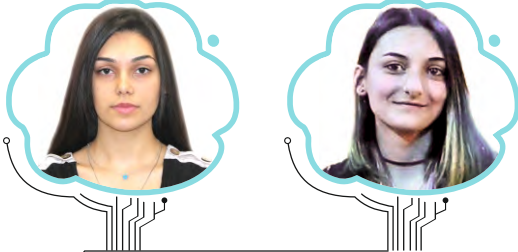
### Mariam Gurjivi

Female | 18 years  
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### Davit Berulava

Male | 16 years  
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This is an eco-friendly electric station producing enough green energy in an unique way from wind at any time of the day. We take one couple of materials: one has a negative charge and the other has positive, then we place a conductor on each of them. When they touch each other, they exchange charges. After these 2 sides get separated voltage between them rises. This is "Triboelectric Effect" but we discovered that here also works electromagnetic field. When curtains are exchanging charges, they move to each other & vice versa, but mostly this action is accelerated, so we get induced electromotive force between those conductors. Invention is eco-clean as these materials can be recycled; cheap & easy to construct requiring no special professionals; durable as materials are self-cleaning.



Two portraits of team members, a woman and a man, are shown in cloud-like frames. Below them is a green box containing the Georgian flag, the text "GEORGIA", "Stand: 068", and "Project: Medicine-01".

**GEORGIA**  
Stand: 068  
Project: Medicine-01

## Distant Monitoring

### Nino Bulbulashvili

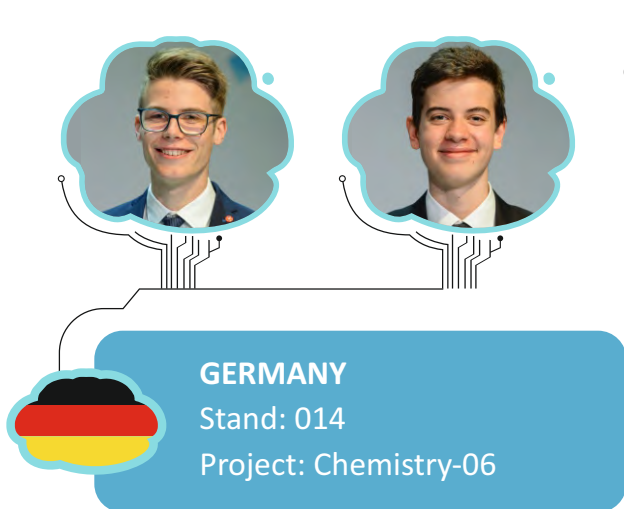
Femle | 17 years  
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### Mariami Bariashvili

Female | 17 years  
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Our project is innovative, it does not resemble the applications provided today as the tele-medicine develops. This multi-functional device unites the blood pressure, electrocardiogram, pulse, breath frequency and temperature measurement, and lets doctors and patients have a consultation distantly and rapidly, using the internet. The patient owns this device, connects to the doctor, who gives the patient instructions on how to use all the tools, controls the device and starts it up. He sees everything on his tab(or any gadget) at that very moment he starts measuring, and most importantly he observes everything graphically, virtually and numerically, synchronized with the patient's heart.

# PROJECTS BY COUNTRY



**GERMANY**  
Stand: 014  
Project: Chemistry-06

## ASA treatment for oil spills

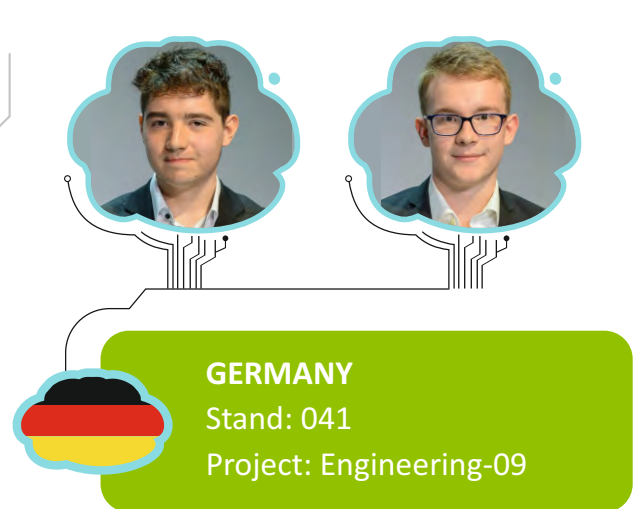
### Paul Kunisch

Male | 17 years

### Thomas Alexander Derra

Male | 17 years

In the event of a maritime oil spill, good advice is hard to come by. While traditional binding agents can absorb crude oil on the surface, they are expensive and have a limited effect. Paul Kunisch and Thomas Derra are on the hunt for better sorbents. They impregnated pulp with ASA, an industrial sizing agent that resembles well-known oil binding agents in its structure. Its traditional use is to make paper water-repellent. The young researchers' experiments were successful: their ASA-impregnated sawdust, cellulose fibre granules and non-woven fabrics are cost-efficient and even have a better sorption capacity than commercially available agents. Chromatographic measurements demonstrated that the new sorbents remove not only crude oil, but also hydrocarbons from deeper water layers.



**GERMANY**  
Stand: 041  
Project: Engineering-09

## Hoverboard - a Magnetically Levitated Vehicle

### Alex Korocencev

Male | 18 years

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### Felix Christian Sewing

Male | 18 years

[felix@familie-sewing.de](mailto:felix@familie-sewing.de)

In the science-fiction classic "Back to the Future II," actor Michael J. Fox whizzes through the streets on a skateboard that has no wheels - it floats over the ground like a hovercraft. This is precisely the technology that Felix Sewing and Alex Korocencev have been puzzling over. Their vehicle is based on four rotating discs that can induce a powerful, repulsive magnetic field on a metal plate located beneath it. The load capacity of the board is impressive indeed: the prototype can lift a considerable weight. In addition, the rotor discs can be tilted individually, allowing the board to be purposefully steered. The technology functions so well by this point that the two young researchers have even been able to apply for a patent covering the new arrangement of the magnets.

# PROJECTS BY COUNTRY



**GERMANY**

Stand: 066

Project: Mathematics-06

## Neural Network application to key-point-detection in radiographs

### Constantin Tilman Schott

Male | 16 years

Occasionally, physicians have to measure certain bony structures of a patient precisely and locate so called key points e.g. for purposes such as surgical procedures. Up to now, the radiographs were usually analyzed manually. With increasing frequency, classification tasks are done by a computer in an automated process. In order to automate the key point detection on radiographs, Constantin Tilman Schott developed innovative software that uses artificial intelligence (AI) to identify these important key points. His program uses self-learning algorithms to perform this task. If enough training data is provided, the program can predict the key points with a high degree of accuracy—making the AI as precise as a physician.



**GREECE**

Stand: 089

Project: Physics-08

## PLANet B-Exoplanet Pursuit

### Georgios - Kalpaxis

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### Andreas Vatistas

Male | 18 years

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### Athanasios Vasilainas

Male | 19 years

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Is there an efficient method to look for alien worlds? By capturing astronomic data from the Kepler Space Telescope and using 2 self-made programs, we try to discover exoplanets. Analysing stellar light curves we managed to find an exoplanet and a pulsating star, while we were the first to calculate and publish their characteristics.

# PROJECTS BY COUNTRY



**HUNGARY**

Stand: 033

Project: Engineering-01

## Moth.NET

**Miklós Zsigó**

Male | 17 years

Pests can ruin every healthy tree crop within 10-15 days. If pest-control is executed, 50-75% loss may occur. Observation, forecast, prevention. These three words can describe my project. How is it possible to keep track about all of the pests inside the fruit? – I developed a system which can monitor the insect traps. In this trap there is a high-quality camera and a monitoring microcontroller. The automated pheromone trap what I developed would be effective for farmers for economical, environmental protection and environmental reasons. It helps the owner to buy the right amount of pheromone, glue and spray, so you can plan financially.



**HUNGARY**

Stand: 061

Project: Mathematics-01

## Reduction and visualization of high-dimensional systems

**Botond Mészáros**

Male | 19 years

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The method described is applicable to quick visualization of high-dimensional systems as well as a general, system-independent model capable of significant optimization in studying large classes of complex systems. With the help of the solution an arbitrary high dimensional system with a number of derivatives studied can be stored like we were only studying 3-dimensional series. Even for small systems the storage requirement can be decreased with two orders of magnitude. The reconstruction time is less than 0.07 % of that of the time needed for the direct, classical evaluation, this time is quickly decreasing with the number of elements. The model is general enough for answering questions in economy, medicine, ecology, computer science, natural sciences, construction engineering etc.

# PROJECTS BY COUNTRY



**HUNGARY**  
Stand: 082  
Project: Physics-01

## Automation and Remote Control of Astronomical Telescopes for a Global Asteroid Survey

### Péter Pósa

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### Flórián Balázs Vámosi

Male | 18 years  
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Our goal is to solve the problem of important astronomical observations not getting enough telescope time. We think this problem can only be solved by involving amateur astronomers. To make this easier we have designed a system to automate the data collection and some of the processing of astronomical data. With the hardware and software designed to operate together, we can collect quality datasets, therefore they can be used for scientific research. We are mainly concentrating on Minor planet research, more specifically photometry and orbit calculations of Near Earth Objects. The product also functions as an automation controller for artistic astrophotography in addition to research. With this system, other surveys could easily be conducted in the future.



**IRELAND**  
Stand: 024  
Project: Computing-02

## Optimised Simulation of General Quantum Circuits

### Adam Kelly

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Quantum computers may tackle problems beyond the capabilities of current computers. However, only small scale quantum devices are currently available. This introduces a need for fast and accurate simulation methods and tools. In this work, a series of tools for simulating quantum computers are developed. Existing techniques are built upon, and new algorithms are developed. A classical preprocessing step is introduced, allowing for optimizations throughout the simulation process. These developments create a coherent approach towards the simulation of quantum circuits, that can be used by any researcher to improve the simulation process for any quantum circuit, allowing more qubits, more quantum gates and faster development times.

# PROJECTS BY COUNTRY



ISRAEL

Stand: 048

Project: Engineering-16



ISRAEL

Stand: 077

Project: Medicine-10

## Improving recovery time of patients with an Ilizarov external fixator around the ankle

### Omry Benjamin

Male | 19 years

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### Tal Tumpovsky

Female | 19 years

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The Ilizarov apparatus is used in orthopedic surgery to treat complex fractures by using an external ring around the ankle to fixate the limb in order to lengthen and heal the bone. When the fracture occurs in the ankle area the bottom ring is often located under the foot and prevents the patient from bearing weight on their broken limb. Weight bearing is essential to the recovery process. Our project provides a method for patients with an Ilizarov apparatus fixated at the ankle area to bear weight on their leg, improving the recovery time for such fractures.

## The effect of the E12 antibody on multiple sclerosis

### Elias Elias

Male | 18 years

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Multiple sclerosis (MS) is an autoimmune disease in which immune cells attack neurons. When an immune response terminates, memory cells remain in the body in order to respond more effectively in future encounters. Previous studies found that the E12 antibody can increase differentiation of T-cells into T-type regulatory cells (Tr1), that secrete the cytokine IL-10 which represses abnormal immune responses. Our research examines whether E12 can increase their differentiation into memory cells. MS mice models treated with E12 showed substantial a reduction in clinical symptoms, and an increase in memory cells and IL-10 secretion compared to control. This indicates that Tr1 cells induced by E12 function as memory cells that can respond more effectively to the disease in future relapses.

# PROJECTS BY COUNTRY



**ISRAEL**

Stand: 099

Project: Social sciences-05

## Maat in old Kingdom Egypt

### Guy Shapira

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Maat is a word, principle and goddess in Ancient Egyptian thought and religion. Maat was thought of as the embodiment of order, both in the cosmic sense, and in the social sense. On the one hand, Maat was perceived as justice and social hierarchy, and on the other – as truth and “physical” order (such as gravity, tide and sunsets). In this paper, I examined the textual references of Maat in the Old Kingdom, focusing on the second half of the fifth dynasty (2445-2345 BCE). This period is thought to be a time of great changes, both political and religious. In order to do so, I examined titles and personal names from the period that contain the word "Maat", as well as inscriptions from Ancient Egyptian tombs, both royal and non-royal.



**ITALY**

Stand: 013

Project: Chemistry-05

## Prunosom from Leaves to Anti-age Creams: the Magic of Liposomes and Vegetable Antioxidants

### Gabriele Merlo

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### Cristina Caprioglio

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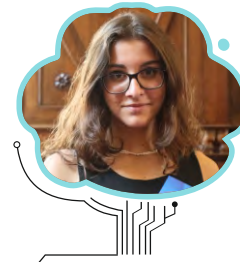
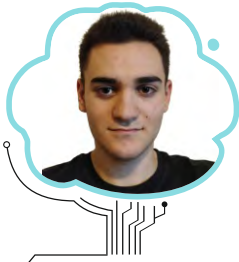
### Andrea Zeppa

Male | 18 years

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Vegetables substrates, because of their antioxidant powers, are being used by pharmaceutical, cosmetic and food fields. We analysed the quali-quantitative composition of total flavonoids, anthocyanins, flavanols and HCTA retrieved from leaves of *Prunus Pissardii* (a very common plant in Europe), which provided the most significant amount of antioxidants. With the retrieved extract we produced a cream, which allowed us to exploit *Prunus* antioxidant and antiradical powers. To improve cutaneous absorption we decided to encapsulate the antioxidants inside liposomal nanocarriers, used as drug delivery system. Our project has a high eco-sustainability as the chosen vegetal substrates are waste materials, thus reducing their cost for the disposal, following the rules of circular economy.

# PROJECTS BY COUNTRY



**ITALY**  
Stand: 040  
Project: Engineering-08



**ITALY**  
Stand: 098  
Project: Social sciences-04

## Motorised Platform for Inverted Microscopes Olympus IX 50 and IX 70

### Fabio Rinaldini

Male | 19 years  
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Moving samples at high magnification manually is not easy and purchasing motorized platforms often is not affordable. This brings about the idea of building a platform from scratch, through Open Source tools and under Creative Commons license, making the project a starting point for further developments as well as an incentive for young people who may want to experiment. The minimum movement along the axes equals  $\sim 27\text{nm}$ . The platform allows to automatically go back to a previously saved position, with a tolerance of  $\sim 30\mu\text{m}$ . A display shows the current position and so it is possible to take note of all interesting positions to go back there. Finally, the automatic positioning at the center of the microscope upon turning on, guarantees that the positions remain valid even upon restart.

## OnMind: an IoT wearable biofeedback system for the treatment of psychosomatic disorders

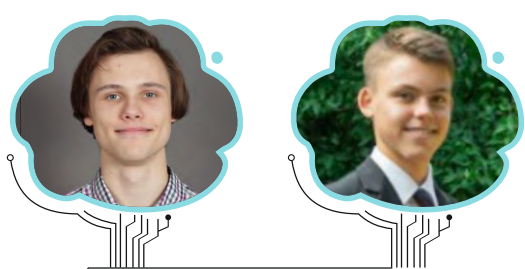
### Elisa Seghetti

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The situation of mental disorders is always more worrying while the IoT has proven to be an ally of medicine for its ability in receiving, processing, and analyzing great quantities of data. OnMind is a biofeedback device for psychophysiological disorders, especially for depression and anxiety. OnMind has a wrist-band, that monitors stress (HRV, HR, SpO<sub>2</sub>, EDA) and environmental parameters (Light and Temperature), an App for the patient and a Platform for the therapist. App shows graphics and behavior-related tips to improve user well-being. On the platform patients data are shown. The patient understands the body's reaction to stress and how the environment influences his mood. It basis on the literature related to the circadian rhythms, with a focus on HRV, EDA, sleep phases and light.



# PROJECTS BY COUNTRY



**LATVIA**  
Stand: 020  
Project: Chemistry-12

## Synthesis of Novel Betulin-Triazole Conjugates

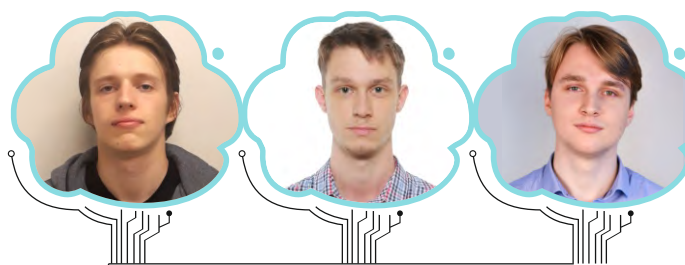
### Roberts Reikmanis

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### Miķelis Putnieks

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Synthesis of Novel Betulin-Triazole Conjugates. Miķelis Putnieks, Roberts Reikmanis. This paper studies effectiveness of different synthetic routes to acquire betulinaldehyde and the use of it in further derivatization to obtain novel betulin-triazole conjugates. Aim: Explore how acquire novel betulin-triazole conjugates effectively from Betulin using multi-step synthesis and to explore their physical properties. The results of the scientific research paper: In the course of this work there has been done the synthesis of betulinaldoxyme using two different routes, in total there have been done 9 syntheses followed by synthesis of four novel betulin-triazole conjugates. High school scientific research paper was developed in RTU Institute of Technology of Organic Chemistry.



**LATVIA**  
Stand: 031  
Project: Computing-09

## Algorithms for independent operations of a robot in a lava tube on the Moon

### Artūrs Masļenkovs

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### Vladimirs Ščigoļevs

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### Roberts Gordins

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For decades, mankind has been dreaming of colonizing the Moon and Mars. This idea raises various scientific, technological and economic challenges. In 2009, lunar probe discovered moon cave, which may be optimal base for a habitable base protected from radiation. First exploration stages may include robotic mission. In this work authors designed algorithms that implement automatic robot rescue if communication was lost. A new method of measuring the efficiency of the rescue algorithm was developed — a complex parameter that includes the time to search for a communication site and the amount of energy consumed. The algorithms were tested and verified using computer simulation and using the physical robot developed in this work.

# PROJECTS BY COUNTRY



**LATVIA**

Stand: 079

Project: Medicine-12



## Calcium Phosphate Bone Cements: from $\alpha$ -Tricalcium Phosphate Synthesis to Production of Bone Cement

### Maksims Podskočijs

Male | 17 years  
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The aim of the work was to synthesize bone cement based on calcium phosphate, which is the main inorganic component of human bones. The bone cement based on calcium phosphate nowadays can be used to treat even fractured vertebra, thus improving the life quality of those peoples who suffer from osteoporotic bone fractures. In my project, I review the different methods of bone cement synthesis and compare the mechanical properties of cement made from calcium phosphate which is synthesized in high temperature and it's mix with calcium phosphate which is synthesized in low temperature.



**LITHUANIA**

Stand: 001

Project: Biology-01



## The link between body thermal expression and the trauma presence: quick, cheap, easy, and safe diagnostic approach

### Augustas Skaudickas

Male | 19 years  
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### Gabija Skaudickaitė

Female | 17 years  
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Our experiment is based on thermographic scans that were used to study occurrence of serious trauma in professional athletes. We investigated professional basketball team players, therefore, an information about their health or upcoming injuries was interesting and helpful not only for us but also for the players involved. We performed front and back thermographic scans with the camera FLIR Tools 640 before and after exercises. Our investigation proved, that thermographic scans are sensitive, specific, and valuable information in order to prepare effective recommendations for the athletes. Our method is quick, cheap, easy, and safe diagnostic tool that can be used to reveal hidden traumas not only for athletes but also for ordinary people.

# PROJECTS BY COUNTRY



**LITHUANIA**

Stand: 070

Project: Medicine-03

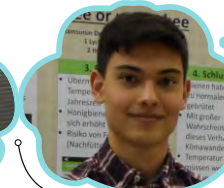


## Individualised footwear to correct children's feet

### Emilė Gudaitė

Female | 18 years  
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Companies producing orthopaedic footwear use a static model for children's shoe production. As a consequence, children do not wear orthopaedic shoes regularly because they are not comfortable. I have studied the possibility of correcting children's flexible feet by analyzing the dynamics of load forces between toes and heels both when walking barefoot, and when various combinations of shoes and insoles are worn. As a result, I have developed a method to design comfortable footwear which is effective in correcting asymptomatic flexible children's feet. I suggest using the dynamical method to improve the quality of orthopaedic shoes, and working together with footwear companies, I will try to help children to prevent irreversible deformations of their feet.



**LUXEMBOURG**

Stand: 050

Project: Environment-01



## Analysis of glyphosate residues in honey

### Marie Morgane Anaïs Croquet

Female | 15 years

### Dylan Avinase Ramsurrun

Male | 17 years

### Anaïs Marjorie Nicole Croquet

Female | 17 years  
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This study is about the analysis of glyphosate residues in honey. We tested 8 different honey samples with the ELISA technique. From 8 samples, 12.5% of the honey samples were positive, 12.5% were not conclusive and 75% were clearly negative, since the average concentration was under the limit of detection. The one positive sample was near the MRL (Maximal Residue Level) in Europe. The positive sample is known to come from an organic beekeeper. The question arises how and why the honey contains glyphosate residues.

# PROJECTS BY COUNTRY



**LUXEMBOURG**

Stand: 097

Project: Social sciences-03

## Putin's Russia and how do young people react to it

### Marina Yakubova

Female | 16 years  
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My project is about the development of modern Russia and the relationship with its future generation. The project firstly exhibits the short history of Russia from the beginning of Putin's first presidency until recent events and then analyzes a survey done by me which summarizes opinions of Russian youth on these topics. This project places main Russian events as well as reasons for them in order. It presents motivations of political leaders and events in a clear way. It helps people not understanding Russian politics fully to imagine the idea of them as well. For people who already know Russia's politics it introduces new information which has not been known before about Russia's young generation. (P.S. there is more further research going on in the project right now).



**NORWAY**

Stand: 002

Project: Biology-02

## An investigation of genomic alterations for the survival of high-grade astrocytic tumours

### Whydah Uwampa Kwizera

Female | 19 years  
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Glioblastoma is a grade IV astrocytic tumour and is an aggressive brain tumour mostly affecting adults. Survival rates are poor and in an attempt to further understand the cancer and develop treatment that can better fight the tumour and further increase survival rates, experts aim to understand Glioblastoma biology and different genetic alterations that may have an effect on survival. This essay aims to explore two genetic alterations, MGMT gene methylation and IDH gene mutation and their effect on the overall survival rate of Glioblastoma when given the Stupp protocol as treatment.

# PROJECTS BY COUNTRY



**NORWAY**

Stand: 085

Project: Physics-04



**NORWAY**

Stand: 095

Project: Social sciences-01

## Wave-particle duality: an experimental test of Compton's theory

### Erica Magnhild Maria Frostegård

Female | 19 years

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The aim of my project was to test Compton's model for the interaction between electromagnetic (EM) radiation and free electrons. Compton's development of this model was of great importance for the understanding of the wave-particle duality. It is based on a particle model for EM radiation, which in classic physics is interpreted as waves. I tested the model by analyzing scattering in the angles between 60 and 120 degrees. The results in the angles above 70 degrees corresponded well with the model, and the deviations in the lower angles could be explained by systematic sources of error. Thus the results do not indicate that the theory should be reevaluated, but support the particle model for the interaction between EM radiation and matter. The aim of my project was to test Compton's model for the interaction between electromagnetic (EM) radiation and free electrons. Compton's development of this model was of great importance for the understanding of the wave-particle duality. It is based on a particle model for EM radiation, which in classic physics is interpreted as waves. I tested the model by analyzing scattering in the angles between 60 and 120 degrees. The results in the angles above 70 degrees corresponded well with the model, and the deviations in the lower angles could be explained by systematic sources of error. Thus the results do not indicate that the theory should be reevaluated, but support the particle model for the interaction between EM radiation and matter.

## The Church of Stalin

### Ane Grieg Riisnaes

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A dramatic shift of Stalin's policies had significant impact on the Soviet society during World War II. Stalin decided to tolerate the Church playing a greater role in the war after a decade of systematic repression. The focus question of this essay is "How did the role of the Russian Orthodox Church change between 1941 and 1945?". This essay will examine multiple perspectives including economic, social and political reasons for Stalin's decision in regard of the Second World War. When looking into the significant shift, 1941 stands out because the Church was again allowed to operate. Whereas 1945 marks the year when the persecution of the Church was reintroduced. This topic is clearly present in Russian society today. Even 70 years after the persecution many questions go unanswered.

# PROJECTS BY COUNTRY



**POLAND**

Stand: 011

Project: Chemistry-03



## Nanoparticles in antitumor therapy

### Antoni Ignacy Lis

Male | 19 years

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One of the most common cause of deaths are various tumor diseases. Tumor cells often appears to be not vulnerable for some drugs. That is why developing therapies which includes many different mechanisms of work are very important. In my studies I was trying to synthesize iron oxide extremely small rounded shaped particles which could handle three different mechanisms of killing tumor cells. Firstly they have special magnetic properties which, allows us to local increasing temperature thanks to variable magnetic field. So we could in some way "boil" cells. Secondly I tried to admixture radioactive element. And thirdly I connected the particles with antitumor drug. In my project I was synthesizing those particles and investigated their properties and also how they interact with cells.



**POLAND**

Stand: 038

Project: Engineering-06



## High Altitude Micro Air Vehicle

### Mateusz Leon Mazurkiewicz

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### Łukasz Bartłomiej Gałecki

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### Jan Marcin Strużiński

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Stratospheric missions allow us to forecast the weather and broaden our horizons in many fields, ex. astrobiology. Whenever we send a balloon into the stratosphere it gets blown off course which makes it hard to find and retrieve the experiment. We designed a drone that could, after being lofted into the stratosphere suspended from a balloon, return with a payload to the location of launch. We produced a prototype that we put through a series of tests, during which it became the worlds' first micro class drone to return from the lower layers of the stratosphere carrying a scientific payload. The data and experience we gathered allowed us to outline a path for development of the HAMAV, that we are currently following in order to ready the drone for a voyage 30km above the earth's surface.

# PROJECTS BY COUNTRY



**POLAND**

Stand: 064

Project: Mathematics-04

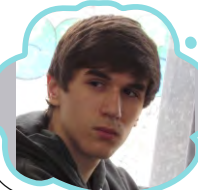


## Elongated hexapawn

### Paweł Andrzej Sawicki

Male | 20 years

Elongated hexapawn is a board game based on chess, devised by T. R. Dawson. It gained recognition when Martin Gardner used it for the first popular description of machine learning. Still, the game remained unsolved: perfect gameplay was not known. The paper Elongated hexapawn closes this gap, using many combinatorial transformations and the basis of game theory, Sprague-Grundy theorem. Apart from describing the best moves in every position and giving some possibility of using similar methods for solving other board games, there is also a potential application in improving the quality of machine learning. The artificial intelligence can play against the perfect player designed in this paper, effectively measuring the rate of its progress.



**PORTUGAL**

Stand: 015

Project: Chemistry-07



## Mycotoxins: a major issue

### Berke Duarte dos Santos

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### Pedro Manuel Martins Cortez

Male | 17 years

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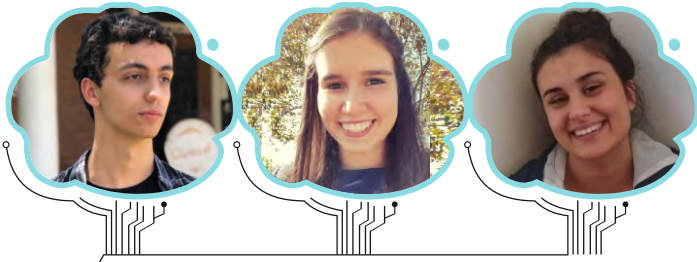
### Tomás de Lucena Teixeira dos Reis Carneiro

Male | 18 years

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Mycotoxins are small compounds, which consist of by-products of fungal metabolism, and that can be found in various food consumables of our diet. When ingested, these chemical substances may cause various diseases and, in extreme cases, the death of contaminated individuals. Therefore, it seems to be essential to develop an easy and effective method that enables the detection of some of these toxins in our body. In order to tackle this issue, this project's main purpose was to create a non-invasive, easy-to-use and 3D printed kit, which is able to detect the presence of a biomarker of Aflatoxin B1 (a type of mycotoxin) – entitled AKR7A3 – in human urine samples. The detection procedure chosen for the kit is similar to a Membrane Based Antibody Array, a colorimetric procedure.

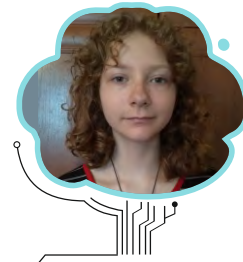
# PROJECTS BY COUNTRY



## PORTUGAL

Stand: 054

Project: Environment-05



## ROMANIA

Stand: 018

Project: Chemistry-10



## From Waste to Bioplastic

### João Pedro Gama Silva Gomes

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### Patrícia Maria da Silva Cruz

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### Maria Miguel Lopes de Castro

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We produced bioplastic sustainably from natural materials that are not very useful nowadays, namely coffee dregs, dried leaves, annual plants, acorns, lupine seed peels and acacia seeds and leaves. Promoting a circular economy, from rice grains discarded by large industries, we produced a bioplastic that can be used in the manufacture of packaging and biofilters capable to remove heavy metals in aqueous solution. We also produced bioplastic from surplus cooked rice in order to combat food waste. We used commercial glycerin, but also glycerin in excess of biodiesel production from used cooking oil. The bioplastics obtained are flexible and resistant. We performed mechanical and biodegradation tests, too. We also made bioplastic articles, such as bags and packaging.

## The action of prednisone, sodium chloride and microwaves on living organisms

### Iuliana-Paula Huțanu

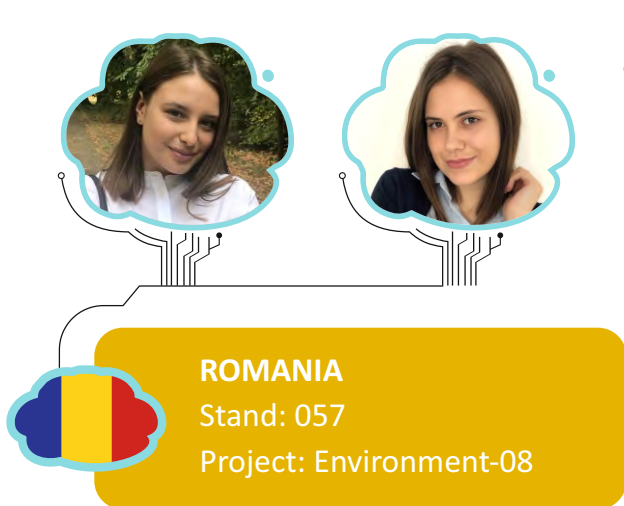
Female | 14 years

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Taking into account the benefits and adverse effects of using prednisone acetate - anti-inflammatory and anti-allergic cortisone derivative - we studied its effects in combination with salt. Salt affects the growth of plantlets at a concentration of 5%. Higher values are obtained in the case of plants treated with a mixture of prednisone acetate and microwaved non-iodised kitchen salt compared to those treated with prednisone acetate and non-iodised kitchen salt. People under medication with prednisone acetate could consume small amounts of salt subjected to microwaves. Using MM +, Monte Carlo, a RMS gradient of less than 0.1 is obtained for Complex Pred. Na: K1 after Run Steps 100. The pH of the treated seeds decreases to 24 hours.



# PROJECTS BY COUNTRY



**ROMANIA**  
Stand: 057  
Project: Environment-08

## Environmental magnetism on the Black Sea Coast, in situ versus laboratory measurements

### Cristiana Savuca

Female | 17 years  
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### Iulia Mihaela Dragan

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The objective of our project is to monitor the pollution of the seaside environment using magnetism as a working method. The following types of measurements were made: 1. In situ: magnetic susceptibility measurements 2. In laboratory: magnetic susceptibility measurements, magnetic hysteresis, curie temperature. We have also monitored this year: beaches in our town and trees in the areas adjacent to the main seaside highway. The main conclusion is that measurements of magnetic susceptibility can be used in the study of environmental qualities. The susceptibility level can be used as an indicator of environmental pollution. Comparing the measurements in situ in the laboratory showed that measurements in situ are much cheaper and simpler to achieve and lead to very good results.



**ROMANIA**  
Stand: 100  
Project: Social sciences-06

## The Glasses of Happiness

### Ioana Ruxandra Greculeac

Female | 17 years  
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### Tudor Petracovici

Male | 17 years

Wear our glasses and you will be happy! Happiness is a complex feeling, regarding the hormones chemistry which man can learn to handle in order to ensure as much as possible a desired state. The "Glasses of Happiness" is an encapsulated system that contains a module in contact with the wearer's skin in order to collect biological information. These are interpreted by the attached electronic system and, depending on the results, the device decides what message / messages the person who wears the glasses should receive from their own phone. Messages specifically target to excite the emotions and sensations (images that simulate or induce the idea of enveloping, hugging) that are accepted as realities by the brain and lead to the release of one or more hormones.

# PROJECTS BY COUNTRY



**RUSSIA**

Stand: 010

Project: Chemistry-02

**RUSSIA**

Stand: 034

Project: Engineering-02

## Synthesis of catalyst for aldol condensation of propionaldehyde

### Yana Olegovna Kachenyuk

Female | 17 years

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Aldol condensation of aldehydes is one of the most demanded reactions for the formation of a connection between two carbon atoms. Products obtained with its help are widely used in various areas of the pharmaceutical, cosmetic and petroleum industries. Aldol-croton condensation of propionaldehyde allows to obtain products that can improve the quality of motor fuel, and valuable intermediates for organic synthesis. The scientific novelty of the results obtained is that the process has been heterogenized. A new pathway for the formation of heterogeneous catalysts on titanium (IV) oxide has been proposed. A unique method for selectively proceeding the reaction to obtain 2-methyl – 2-pentenal by using 5% AA (Norleucine) on TiO<sub>2</sub> as a catalyst is proposed.

## Next generation of solid-fuel rocket engines

### Alexander Alexandrovich Sokko

Male | 17 years

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Using of powdered fuel is almost impossible during all history of rocket engines. It burns so fast that the gas pressure destroys the engine's casing. To solve this problem the fuel is pressed usually and an inhibitor is added. In my research I developed a new technology of controlling pressure inside the solid-fuel rocket. It simplifies greatly the process of making engines, allowing adjusting their parameters to get the maximum thrust safe pressure inside engine. Using this technology I created a working small engine for rocket modeling. It was tested and works well in real flights. I will continue the research of my new technology to understand its limits, increase efficiency and possibility to scale up for bigger appliances. It's the next generation of solid-fuel rocket engines.

# PROJECTS BY COUNTRY



**RUSSIA**

Stand: 069

Project: Medicine-02



**SLOVAKIA**

Stand: 021

Project: Chemistry-13



**Electronic hardware and software system for posture correction and platypodia diagnosis among adolescence and middle school students**

**Olga Antonovna Yarotskaya**

Female | 16 years  
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The accomplished scientific and technical project is aimed at preserving children's health. School age is a period of ontogenesis, when various types of impaired posture are clearly manifested. According to statistics, 10-40% of school-age children show signs posture faults. The project solves a complex of interdisciplinary applied problems of posture correction and flatfoot diagnosis, taking into account the interdependence of posture disorders and foot deformities. The project is done at the intersection of human physiology, rehabilitation science, and electronic engineering. A hardware-software complex including a combined posture corrector for teenagers and a stop-meter detecting signs of flatfoot is developed. Several models of the device are produced and tested.

**Development and application of analytical method for determining iodine anion in highly mineralized water matrices**

**Laura Nižníková**

Female | 18 years  
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It is not spoken so much about Iodine in the world. But Iodine, in the nature represented like iodine is as important for our body as every single needed element. In my work, I was determined iodine anion in mineral water. There are not some exact value for available quantity in mineral water and many of producers does not mentioned quantity of iodine, which is contained in each mineral water. There are not any qualified method to determine iodine in water. In old database I found out some old spectrophotometry method and I started with modifying this method according necessary parameters. After this process we determined iodine in water. According our results and qualified results our method was correct. The found results may be dangerous to people with Thyroid gland problems.

# PROJECTS BY COUNTRY



**SLOVAKIA**

Stand: 032

Project: Computing-10



**SLOVAKIA**

Stand: 080

Project: Medicine-13

## Prevention of Cheating in eSports

### Ján Varga

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eSports are a rapidly growing industry, and thus, there is a lot of attention drawn to it lately. One hot button issue is cheating. As with other more traditional sports, doping is also present in eSports, however with the sport moving onto electronic devices comes a new way - cheating using digital programs aimed to give the player an unfair advantage. In my project I have researched the various cheating methods, and created various solutions to detect and prevent players from using such things to their advantage.

## E250 - The Silent Killer

### Dominika Pánska

Female | 18 years

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E250 or sodium nitrite is a synthetic additive used in meat products. Its consumption leads to many disorders including the cancer of large intestine. Our goal was to find out the concentration of E250 in meat products and its effect on blood cells. We examined 20 samples. Average concentration of nitrites was 1.6 mg/kg (in drinking water it is approx. 0.3 mg/l). We applied this amount into the five samples of human blood and using blood cells' analyser we observed the rapid decrease of leukocytes, erythrocytes and platelets as well as the changes in hemoglobin and hematocrit. We proved that the amount of sodium nitrite used in meat products is harmful and in case of regular consumption it can affect the amount of hemoglobin in blood cells and therefore the transport of respiratory gases.

# PROJECTS BY COUNTRY






**SLOVENIA**  
Stand: 051  
Project: Environment-02

## Microorganisms and Proper Nutrients as Natural Protection from Frost

### Ožbej Ivan Zorko

Male | 20 years  
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In years 2016, 2017 spring frost caused a major plant damage over the large majority of Slovenian territory which had a strong impact on national economy. With our research, we wanted to prove correlation between microorganism activity and plants ability to store osmotically active nutrients which could serve as a protection from spring frost. These nutrients form bound water which has a much lower freezing point. In our research we used plants with longer lifespan, for they are most affected by spring frosts and the damage is of larger consequence. Because of that we chose vines. We tested the nutrient content of soil, roots and young foliage. The results confirmed our expectations. The plants that were added microorganisms had higher levels of previously mentioned nutrients.



**SLOVENIA**  
Stand: 065  
Project: Mathematics-05

## Pythagorean Quintuples

### Patrik Mikuz

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### Rok Jurinčič

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Pythagorean quintuple is a quintuple of five numbers  $a, b, c, d$  and  $e$  corresponding to the equation  $a^2 + b^2 + c^2 + d^2 = e^2$ . In the first part of the research, several different parametrizations of natural Pythagorean quintuples were discovered. Using the parameter selection, a Pythagorean quintuple is obtained, so the generator of Pythagorean pentacles is also called parametrization. The generator that generates all Pythagorean pentacles was discovered and also proved. In the second part of the research, in the set of the whole Pythagorean quintuple the multiplication was defined. It was proved that there is a multiplication unit, and that the multiplication is associative but not commutative. The dismantling of Pythagorean quintuples was also explored.

# PROJECTS BY COUNTRY





**SLOVENIA**  
Stand: 073  
Project: Medicine-06

## Synthesis Of A Water-soluble Fluorescent Dye For Labelling Normal And Cancerous Urothelial Cells Of The Urinary Bladder In vitro

### Patrik Pečavar Nežmah

Male | 20 years  
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Our research was aimed at differentiating between healthy (normal) and cancerous urinary bladder urothelial cells. We developed a fluorescence derivative of fluorescein, sodium disulfonate (SUF), which is an organic compound and emits intense fluorescence. We analysed if SUF can be used in cancer cell diagnostic and examined its potential for targeted therapy as an alternative to the currently used fluorescent dyes, which are more expensive and harder to obtain, and with this approach make such research more accessible. The results of the study have shown that SUF is not toxic to urothelial cells of the urinary bladder and that it may be used to distinguish between healthy and cancerous urothelial cells, based on the way of labelling. SUF was proven to be a useful fluorescent marker.



**SOUTH KOREA**  
Stand: 012  
Project: Chemistry-04

## A Study of Transition Metal Substituted Prussian Blue Analogues

### Minseok Kim

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### Hajin Kim

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### Jihun Ha

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The sodium ion battery has limited usage of cathode materials due to its large ionic radii. Prussian Blue Analogues (PBA) have appropriate structure to storage sodium ion but low specific capacity and structural stability cause hardship for commercialization. To solve this problem, it has been preferred to improve the performance by substituting R-site metal. In this study, however, we changed the P-site ion to optimize PBA. We synthesized PBA with 5 different transition metals and the  $\text{Fe}[\text{Co}_3(\text{CN})_6]$  exhibits a specific capacity of 625mAh/g at 0.1C. Furthermore, the result suggests the tendency between Jahn-Teller effect and reversibility of cells. We believed this work provides the possibility of PBA as cathode materials for sodium ion battery and opens new perspectives for optimizing PBA.

# PROJECTS BY COUNTRY



**SOUTH KOREA**

Stand: 087

Project: Physics-06

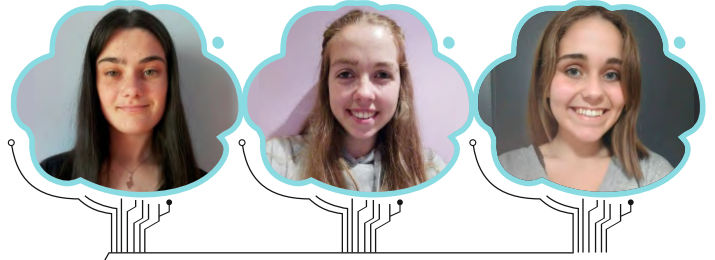
## Introduction of a Novel Diodicity Evaluation Criteria and 1-D Approximate Model for Multistaged NMP (No-Moving-Parts) Check Valves and Methods for Valve Stage Optimization

### Jaehyun Lee

Male | 17 years

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A new diodicity evaluation criteria, Volumetric Diodicity (Dv), is introduced to analyze the diodicity of NMP (No-Moving-Parts) valves. Recent studies about the valve system are based on the pressure diodicity, defined as the ratio between the pressure drop in forward and reverse flow. However, existing evaluation criteria do not show discrete relationships with actual data. In this paper, an inelastic collision-based analytic turbulent model was designed to approximate the tendency of diodicity by stage number and was verified both experimentally and numerically with CFD (Computational Fluid Dynamics). The new diodicity criterion can be applied in numerous fields that require NMP valves which are operated in relatively low-pressure ranges.



**SPAIN**

Stand: 003

Project: Biology-03

## O da la miúda. Distribution, ethology and phenology of the Iberian wolf

### María Bouso Posada

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### Xiana Rego Fernández

Female | 17 years

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### Ana Rubal Sánchez

Female | 18 years

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In order to obtain data on the distribution and behavior of the Iberian wolf in the study area (Mountains of O Xistral and surroundings), a methodology different from previous studies carried out in the province of Lugo is used where the IKA indexes do not represent a tool to confirm the presence of the groups, but a method prior to the photo-trapping of specimens with which more accurate data is obtained and that would allow to assess the population trends of the *Canis lupus signatus* in the area. It has been confirmed the existence of three 3packs and other 3 are pending to be corroborated as independent groups. After a meticulous study of these, we were able to reach common conclusions, such as the presence of anal pha breeding couple in each pack.

# PROJECTS BY COUNTRY



SPAIN

Stand: 086

Project: Physics-05



**Acoustic levitation. Building and analyzing two different acoustic levitators based on piezoelectric transducers, and exploring its current and possible future applications using simple physical and chemical experiments**

## Nadia Weronika Brzostowicz

Female | 18 years

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The paper explores the notions of Acoustic Levitation using acoustic tractor beams with both single and double arrays. These devices are able to generate different types of acoustic traps allowing the levitation of objects of low density and up to the size of half a wavelength. For this purpose piezoelectric transducers have been used. Based on Dr. Asier Marzo's investigations, the main aim of this research paper is to prove the effectiveness of this method and to explore its potential applications in areas such as medicine, biology and technology. To test the applications of this method, several measurements, experiments and chemical reactions have been carried out and documented, as a demonstration and example of the possible practical uses of acoustic levitation systems.



SPAIN

Stand: 096

Project: Social sciences-02



**With Death at His Heels. Chronicle of an Escape and Two Wars**

## Claudia Lidia Pubill Quintillà

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Based on a recording made by the protagonist himself, I have tried to reconstruct Miguel Quintillà's biography. A member of the Republican Council of Purroy (Spain), he managed to escape execution by the Guardia Civil in 1938 and became a republican combatant in the Segre and Ebro battles. Prisoner by Franco, he managed to escape in the Navarre Pyrenees. He joined the French Légion étrangère and fought against Hitler during the 2WW in the battle of the Norwegian fjords. He was also a soldier of the NOSC of the British Army, which landed on the Normandy coast. My analysis is an attempt at portraying a carpenter who became a fugitive, a prisoner and a soldier in two wars, but it may be as well a way of recognising the role played by anonymous people, the true heroes in our History.



# PROJECTS BY COUNTRY



**SWEDEN**

Stand: 005

Project: Biology-05

## The bean beetle's ovoposition over four generations / Bönbaggens ovopositionering över fyra generationer (Swedish title)

**Nathalie Anna Kristina Winther**

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In this work I have investigated the ovoposition behavior of bean beetles over four generations. The purpose of this work is to investigate whether the bean beetle will prefer to lay eggs on the bean, mung bean or adzuki bean, they were born from for four generations. I was interested in exploring which of the beans, mung or adzuki, the bean beetles would prefer to lay eggs on and if there would be an increase in egg laying on the bean they were born from. The method used in the investigation involves on raising four generations of bean beetles, one culture breed from mung beans and one culture breed from adzuki beans. The result shows that the ovoposition behavior of the bean beetles depends on several factors as genetic selection, the nutritional value of the beans and the inbreeding.



**SWEDEN**

Stand: 017

Project: Chemistry-09

## Catching the Bad Guys: Capturing Oligomers of the Amyloid-beta Peptides / Metod för framställning av amyloidogena oligomerer (Swedish title)

**Mattias Sven Anders Akke**

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**Elsa Maja Greta Axby**

Female | 19 years  
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Alzheimer's disease, Parkinson's disease and type 2 diabetes have been linked to the formation of amyloids, large aggregates formed by missfolded proteins. Studies show that a so called oligomer forms as an intermediate in the reaction when smaller peptides form amyloids and it has been hypothesised that these oligomers are the main causes for the diseases. However, research on the oligomers is hindered by difficulties in capturing them. The goal with our study was to tackle this problem. Using a method referred to as Trap-and-Seed, we were able to consistently produce and capture relatively large quantities of oligomers in less than 30 minutes. The oligomer concentration also seemed to be predictable, a necessary criterion if the method is to be used on a larger scale.

# PROJECTS BY COUNTRY



**SWEDEN**

Stand: 045

Project: Engineering-13



**SWITZERLAND**

Stand: 007

Project: Biology-07

**Evaporative desalination with industrial waste heat / Avsaltning för industriell tillämpning mha högt tempererad restvärme (Swedish title)**

**Jonatan Carl Persson**

Male | 19 years

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One of mankind's biggest threats is the ever growing water shortage. One way to solve this is to clean seawater. Today more than 300 million people get their water from desalination plants around the world. Conventional desalination is however both expensive and energy demanding. Therefore I have developed a new way to desalinate seawater by utilizing water's evaporative properties together with industrial waste heat, reducing the cost of cleaning 1000 liters of water to just 0.06€. Industries use 20% of freshwater around the globe and 60% in wealthy countries so self sustaining factories through my invention would be a huge step towards securing the water supply in the future. I am now leading a full-scale pilot project in Sweden capable of cleaning 40.000 liters/day with a local smeltery.

**Gene regulation during development: The roles of the genes *xbp1*, *creb3l1* and *creb3l2* in axial mesoderm differentiation**

**Jannik Lukas Wyss**

Male | 19 years

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By dividing and differentiating, a single cell can develop into a complex multicellular organism such as a human being. Transcription factors are proteins that play an important role in the development by regulating the activity of genes. In this project, three transcription factors and their roles in the development of a specific tissue in zebrafish were investigated. By using new methods, I revealed previously unknown regulatory interactions, which improved our understanding of the roles of the three transcription factors. The findings could lay the foundation for the development of new medical diagnostics and therapies, since all three transcription factors have been implicated in diseases such as cancer or Alzheimer's disease.

# PROJECTS BY COUNTRY



**SWITZERLAND**

Stand: 029

Project: Computing-07



**SWITZERLAND**

Stand: 046

Project: Engineering-14

## Blockchain Decrypted

### Georgette Kim Weingärtner

Female | 19 years

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In my project Blockchain Decrypted I developed a method how the complex fundamentals of Blockchain can be explained in an intelligible way. The functionality and mathematical backgrounds of the future-oriented Blockchain are presented in an understandable way. Furthermore, an exciting application of the Blockchain, called Smart Contract, is described. An own Smart Contract, which implements a TicTacToe game, has been developed and an own crypto currency has been created and integrated. Thus the most exciting aspects of the Blockchain are demonstrated, the possibilities of the technology are clearly recognizable. Thanks to a webpage-interface, the game is easy to use. My work offers a great opportunity to get to know the dimensions of Blockchain on the basis of a specific example.

## Remote Controlled Cylinder

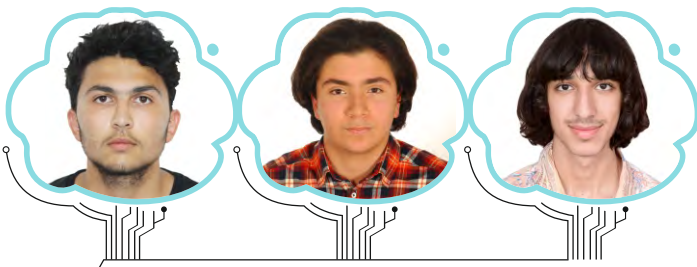
### Océane Zofia Adrienne Patiny

Female | 19 years

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This research work consists of the conception and open-source development of a robotic cylinder whose speed is remotely controlled through a web page. To induce the movement, an innovative approach has been developed, which uses the coordinate movement of three motors to move a mass inside the cylinder. As the mass is placed away from the center, an imbalance is induced, causing the cylinder to accelerate. This project is very transdisciplinary, which is what makes it especially interesting: mathematics, physics, mechanics, electronics and programming notions were necessary to build the final prototype. It weighs 1.4 kg, has a diameter of 32 cm, an autonomy of about 4 hours and a maximum speed of 1 m/s.

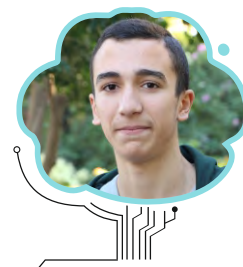
# PROJECTS BY COUNTRY



**TUNISIA**

Stand: 043

Project: Engineering-11



**TUNISIA**

Stand: 055

Project: Environment-06



## The Invisible Pollution of Sea Water

### Mohamed Khalil Mattar

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### Khalil Selmane

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### Selim Makni

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This project began on a beach, with an experiment, triggered by an image to become a concept: The Invisible Pollution of Sea Water. We thought of microplastic, quite nefarious, invisible and so abundant that removing it from the sea is highly challenging. This project is a driver for evolution, shifting mentalities and fostering social and scientific changes in unconventional ways; by engaging the community, you not only build a cheap and doable underwater remote operating robot / vehicle (ROV) or provide data for scientists, manipulate equations and laws of STEM found everywhere in our ROV but also interact and send pictures of our shores via a platform web that forms, informs and collects information and funds as well. From nothing we make something and from zero we will go here.

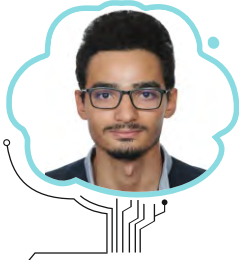
## An intelligent system to monitor air pollution and prevent its health effects

### Omar Besbes

Male | 16 years  
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Knowing in advance how air quality will change over time can help prevent the harmful effects of air pollution on health. Therefore, an entirely self-developed forecasting system consisting of a strong statistical model evaluated using different regression methods was built for this purpose. Data is provided by a wirelessly interconnected, self-sufficient measuring station built using a nanocomputer and sensors. The intelligent system I designed learns what air quality disturbs a specific user since people from different age groups with different diseases don't endure the same pollution level. Thus, the platform tries to implicitly diagnose the capacity of a certain user to resist to air pollution so that adequate precautions can be provided

# PROJECTS BY COUNTRY



**TUNISIA**

Stand: 075

Project: Medicine-08



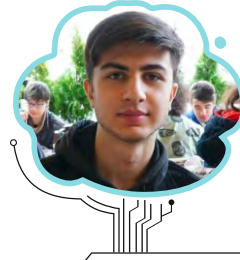
## Life Shirt

### Mohamed Ihsen Bouallegue

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Nowadays, heart attacks are one of the leading causes of death. My solution is Life Shirt; a shirt that monitors one's vital parameters in order to predict the risk of having a heart attack. The shirt uses a range of custom-made sensors and is able to monitor in real time. It is suited for intense activities like sport and people that are aged above 50. The shirt contains dehydration, temperature and heartrate sensors. With all the information that these sensors provide, it is able to predict a heart attack. As it will detect low hydration and high temperature accompanied with abnormal heartrate meaning the user's body is danger. It will directly notify emergencies and loved ones. Hopefully, my solution will be the savior of many lives. That is my goal.



**TURKEY**

Stand: 026

Project: Computing-04



## Artificial Intelligence System Object and Place Recognizer for Blind People and Development of Data Set

### Abdullah İşik

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### Umut Şenol

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In many areas, such as finance, health and safety, and in the process of facilitating the lives of persons with disabilities, artificial intelligence systems operate. Applications developed using artificial intelligence technologies are able to identify visually impaired objects, while location recognition practices are inadequate. With a mobile application that works on deep learning as we develop for our project and does not require an Internet connection, visually impaired individuals can identify places near the external environment. Individuals with no visual impairment can also be part of the solution by taking pictures of the surrounding sites, thereby contributing to the growth of the data set.

# PROJECTS BY COUNTRY



**TURKEY**

Stand: 042

Project: Engineering-10



**TURKEY**

Stand: 090

Project: Physics-09

## Design Of A Self-Learning Prosthetic Hand Using Wireless Data Transmission and Flex Sensor

### Sude Aksaray

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### Serenay Akgün

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The project aims developing a prosthetic hand that can transfer data received from the flex sensor glove wirelessly and memorizing the desired movement. Prosthesis hand designs were examined and two of them were printed by 3D printer. In order to detect the desired movement of the hand, flex sensor glove was made. Flex sensor glove uses XBee for wireless data transmission. Movement of the prosthetic's fingers is provided by servos. When the motors stretch the line the fingers close and when they release they open. A keypad is added for reducing the use of gloves. Once the desired movement has been registered, a key can be easily switched. As a result; a learning, RC prosthesis design which is open to development has been developed.

## The Design of Computer Controlled Refractometer

### Ali Tunahan İşik

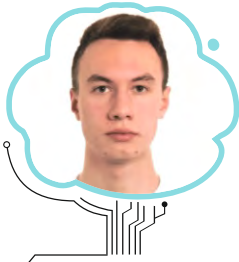
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### Enis Kerem Çakmak

Male | 16 years  
eniskeremcakmak@gmail.com

In this project, we aimed to design a computer-controlled refractometer with the basic tools we had. For this purpose we used a hollow glass prism which is filled with a liquid whose refractive index to be measured. We placed this prism on a stepper motor in front of a laser module. So the laser beam refracts as it passes through this liquid and falls to the screen on the other side of the prism with a deviation. To determine angle of this deviation, we used a webcam. We adjusted the angle of incidence of the beam by rotating the stepper motor. A Python code is used to determine the amount of deviation and to rotate the stepper motor via Arduino. In order to test the refractometer we designed, refractive indices of different liquids were measured and presented with error calculations.

# PROJECTS BY COUNTRY



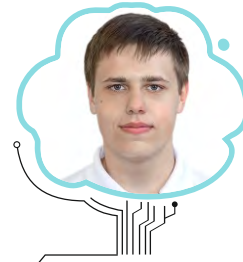
**UKRAINE**  
Stand: 067  
Project: Mathematics-07

## Orthodiagonal quadrilaterals

### Oleksandr Dziuniak

Male | 16 years  
sasha.dzuyniak@gmail.com

The project presents the properties of orthodiagonal quadrilaterals, new author problems in respective field of geometry and their solutions. Also, in this project some properties of orthodiagonal quadrilaterals are transferred to octahedron and pyramid. These properties and problems can be used to develop respective products in the field of web design, computer graphics, 3D modeling, engineering and printing on a 3D printer. In addition, the describing properties of orthodiagonal quadrilaterals (including the proposed new solutions of classical problems, also new problems and their solutions), can be applied when studying geometry in schools and in the work of scientific mathematical societies.



**UKRAINE**  
Stand: 091  
Project: Physics-10

## Extension of the application range and parameters of the Airy pendulum for obtaining Lissajous curves

### Ihor Tarkhan

Male | 16 years  
igor.tark@gmail.com

The Airy pendulum is a simple mechanical device for demonstrating the addition of two mutually perpendicular oscillations of the load which trajectory has the form of Lissajous curve. During experiments it was noticed that some Lissajous curves did not match with ones calculated according to the classical theory of Airy pendulum oscillations. In this project theoretical model of Airy pendulum load composite oscillations in specific conditions is developed and is used for the Lissajous curves form explanation. The proposed theoretical model is confirmed by the results of experiments in this project.

# PROJECTS BY COUNTRY



**UNITED KINGDOM**

Stand: 016

Project: Chemistry-08

## Investigating the Effect of Activated Charcoal on the Absorption of Medicines

### Maeve Jessie Stillman

Female | 16 years  
mstillman862@C2KNI.net

Activated charcoal is often found in toothpaste to whiten teeth, in face masks to clear the skin and as a food supplement to remove 'toxins' from the gut. My project investigated the effects of activated charcoal on the absorption of medicines by measuring the conductivity and Total Dissolved Solids of solutions. I created solutions of medicines with deionized water; either with or without activated charcoal, filtered the solutions and measured the change in conductivity in order to ascertain if the drugs were still available to be absorbed. My results showed that conductivity and TDS are both reduced after the addition of activated charcoal. This indicates that it is adsorbing medicine particles and removing them from the liquids, thus interfering with their absorption in the body.



**UNITED KINGDOM**

Stand: 027

Project: Computing-05

## Music Splash

### Aalia Sellar

Female | 15 years  
aaliasellar@hotmail.com

### Brendan Michael Miralles

Male | 14 years  
brendanmiralles@hotmail.com

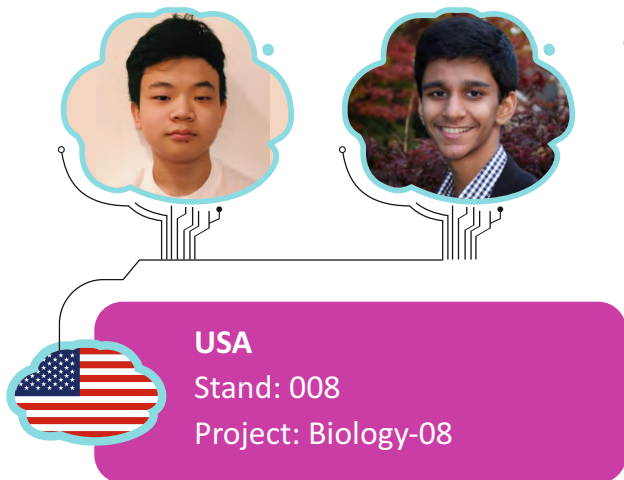
### Grace Hannah Patricia Lord

Female | 15 years  
lhs15lordg@lsf.org

Music Splash is an app designed to help students develop their musical ability and musicality. The app uses machine learning to account for and identify the players own elements of musicality and help to enhance them. The app gets input which is initially stored as a .wav file. This .wav file is then put through a process, parsed by the computer, to convert it into a file format that can be used. Once the file has been converted, it is compared to a base file that has been pre-recorded by a teacher. This analysis, due to the complexity of music, involves using machine learning to compare the two files. Based on the given comparison, the program then chooses, from a pre-set list of outputs, what feedback needs to be given to the user to improve their performance.



# PROJECTS BY COUNTRY



## Investigating the Role of the Novel ESCRT-III Recruiter CCDC11 in HIV Budding: Identifying a Potential Target for Antiviral Therapy

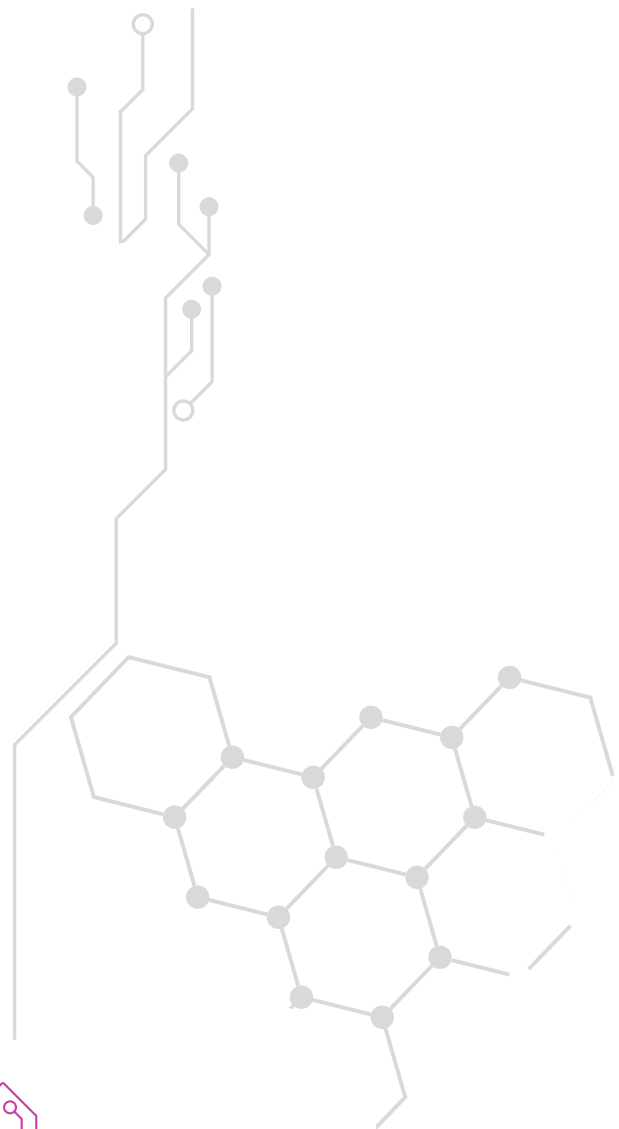
### Leo Li Takemaru

Male | 17 years  
leo.takemaru@gmail.com

### Poojan Pandya

Male | 18 years  
poojanpandya01@gmail.com

Infection with human immunodeficiency virus (HIV) causes acquired immunodeficiency syndrome (AIDS). Nearly 37 million people are infected with HIV worldwide, and 1 million people die of AIDS-related illnesses each year. As of today, there is no cure, and current medications are frequently associated with severe side effects. To discover a novel target for anti-HIV therapies, we studied the role of coiled-coil domain-containing 11 (CCDC11) in HIV formation. Our data suggest that CCDC11 is required for efficient release of HIV particles from the cell surface potentially through recruitment of the membrane scission machinery called ESCRT-III. Given the fact that CCDC11 is not present in the majority of adult human organs, it might be a viable target for potential antiviral therapeutics.



# EUCYS 2019

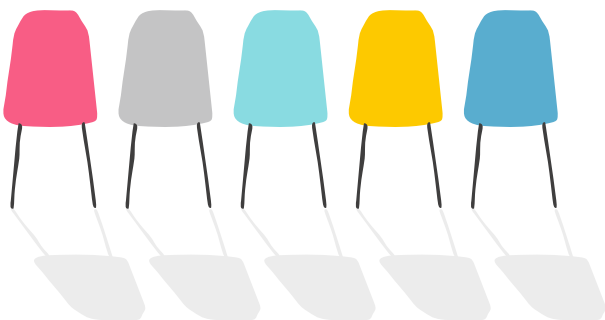
# THE JURY



# THE JURY

The contest Jury is composed of 19 highly qualified scientists and engineers with worldwide reputations in their chosen field. The jury carry out their duties at the contest as independent scientific experts and not as representatives of any institution, organisation or country. The European Commission appoints the Jury annually, basing its selection on the scientific and technological needs of the contest. They jury are selected both from academia and industry. The Commission ensures an appropriate geographical and gender balance. Jury members normally remain on the jury for up to 5 years. In exceptional circumstances the EC reserves the right to appoint Jury members for more than 5 terms.

The role of the Jury at EUCYS is of the utmost importance. The jury follow the Jury Rules and Guidelines established by the EC. The Jury assess and score the competing projects based on the written descriptions submitted by the projects and through interviews with the Contestants carried out during the Contest. Based on their assessment of the projects and on lengthy discussions with other jury members, the jury draw up the lists of winners of the core prizes and the special prizes. The decision of the jury is final.



This year the Commission is delighted to point out that three members of the jury are previous winners of the contest.

Since the European Commission took over the running of the European Union Contest for Young Scientists in 1989, the position of President of the Jury has been held by:

**Sir Peter Swinnerton-Dyer,**  
Trinity College Cambridge, 1989-1991

**Professor Galo Ramirez,**  
Universidad Autonoma de Madrid, 1992-1994

**Professor Gisela Anton,**  
Universitat Nurnberg, 1995-1996

**Professor Sue Kingsman,**  
Trinity College Oxford, 1997

**Professor Pedro Guerreiro,**  
Universidade Nova de Lisboa, 1998-1999

**Professor Pauline Slosse,**  
Universite Libre de Bruxelles, 2000-2002

**Dr. Ulf Merbold,**  
ESA/ESTEC Noordwijk, 2003-2005

**Professor Jane Grimson,**  
Trinity College Dublin, 2006 and 2008

**Professor Hansen Vagn Lundsgaarg,**  
Technical University of Denmark, 2007

**Professor Chris Phillips,**  
Imperial College, London, United Kingdom, 2009

**Professor Hagit Messer-Yaron,**  
The Open University of Israel, Israel, 2010

**Professor Maria Ana Viana-Baptista,**  
Lisbon Engineering Institute, 2011-2012

**Dr. Henrik Aronsson,**  
University of Gothenburg, 2013-2014

**Dr. Lina Tomasella,**  
Astronomical Observatory of Padua, 2015-2016

**Dr. Attila Borics,**  
Hungarian Academy of Sciences, 2017

**Professor Tony Fagan,**  
University College Dublin, 2018

# THE JURY FOR EUCYS 2019

## PRESIDENT OF THE JURY



## MEMBERS OF THE JURY



**Dr. Attila Borics**

Hungarian Academy of Sciences



**Franco Algieri**

Webster Vienna University



**Victoria Bloodworth**

Siemens Gamesa  
Renewable Energy



**Antony Fagan**

University College Dublin,  
Ireland



**Mella Frewen**

Food Drink Europe



**Milena Horvat**

Institut Jozef Stefan,  
Slovenia



**Hans Langeveld**

Biomass Research,  
the Netherlands



**Morten Lennholm**

EUROfusion (JET),  
Culham Science Centre,  
United Kingdom



**Mariya Lyubenova**

European Southern  
Observatory,  
Munich, Germany



**Maria Minarova**

Slovak University  
of Technology,  
Bratislava, Slovakia



**Estelle Mossou**

Institute Laue-Langevin,  
France



**Margus Niitsoo**

Music Education LLC,  
Tartu, Estonia



**Maria Angeles  
Moro Sanchez**

Universidad Complutense  
Madrid, Spain



**Luisa Pereira**

Institute of Molecular  
Pathology and  
Immunology, University of  
Porto, Portugal



**Lina Tomasella**

Astronomical Observatory,  
Italy



**Zuzanna Szymańska**

University of Warsaw,  
Poland



**Mira Van Thielen**

Ghent University  
Hospital, Belgium



**Anna Zajakina**

Latvian Biomedical  
Research and Study Centre



**Milan Macek**

Charles University,  
Prague, Czech Republic

# THE JURY



## Dr. Attila Borics

*Hungarian Academy of Sciences*  
**Hungary**

**President of the Jury**

Attila Borics graduated as a chemist and a chemistry teacher from the University of Szeged in 2001, then received his PhD degree in 2005 from Creighton University (USA) for his contribution to the field of chiroptical spectroscopy and conformational analysis of peptides. Currently he is working in the Biological Research Center of the Hungarian Academy of Sciences in Szeged (Hungary) as a senior research associate and teaching structural biology and bioinformatics at the University of Szeged. His research focuses on biomolecular structure, more specifically protein and peptide structure and interactions, conformational analysis and structure-activity studies. This includes the investigation of the three dimensional structural determinants of the biological activity of various neuropeptides, structural explanation of the mechanism of action of enzymes and receptors, location of interaction sites of proteins and the study of the interactions between native and semi-synthetic proteins and cells.



## Franco Karl Algieri

*Webster Vienna University*  
**Austria**

**Member of the Jury**

Franco Algieri is Associate Professor of International Relations and Head of the International Relations Department at Webster Vienna Private University. Prior to that he was Director of Research at the Austrian Institute for European and Security Policy (AIES) and Senior Research Fellow at the Center for Applied Policy Research (C.A.P), Ludwig Maximilians University Munich. He was lecturing Political Science at the Institut für Politikwissenschaft, Eberhard Karls University Tübingen and at the Geschwister Scholl Institut, Ludwig Maximilians University Munich. He was appointed Guest Professor at the School of International Studies and Senior Fellow at the Centre for European Studies, both at the Renmin University of China, Beijing. Franco Algieri studied Political Science and Sinology in Freiburg, Tübingen and Taipei, and European Studies in Bruges. He received his doctorate and M.A. both from the Eberhard Karls University Tübingen, and a Diploma of Advanced European Studies from the College of Europe Bruges. His research focus covers European and Asian security issues, the European integration process and EU-Asia relations, with special emphasis on EU-China relations.

# THE JURY



## Victoria Bloodworth

*Siemens Gamesa Renewable Energy*  
**Denmark**

**Member of the Jury**

Dr. Victoria Bloodworth studied Aeronautical Engineering at Imperial College London, UK, earning her PhD in 2008, specialising in carbon fibre composite structures. She then spent the next eight years working at Aerotrope, a small and radical engineering consultancy based in Brighton, UK. During this time, she was part of the design team with a diverse project portfolio, engineering wind turbines, large-scale artworks and zero carbon vehicles. In 2017, she moved to Denmark to join one of the world's leading wind turbine manufacturers, Siemens Gamesa Renewable Energy, where she is now developing the next generation of wind turbine blades. Her project portfolio includes an assortment of wind turbine and wind turbine blade designs, exploring kite power, Vestas Sailrocket 2 (the current speed sailing world record holder), and engineering art sculptures in a variety of mediums - the London Olympic tower, creating vortices, tuning infrasound. A British national, currently residing in Denmark, she spent her childhood years in Singapore before moving to the UK for higher education and work.



## Anthony Fagan

*University College Dublin*  
**Ireland**

**Member of the Jury**

Professor Tony Fagan received a PhD in Electronic Engineering from University College Dublin (UCD). He spent a number of years working on advanced digital communication research at Marconi Research laboratories in England. On his return to UCD in 1980 he established the DSP research group. Well over 100 research graduates have been produced by the group. Through his work at UCD he helped establish a strong digital signal processing industry in Ireland with many companies being founded by his research graduates - often with his help. Many of these companies are now world leaders in the area of physical-layer communications design. For this work Tony was awarded the 2016 Charles Parsons medal by the Irish Academy of Engineering.

# THE JURY



## Mella Frewen

*Food Drink Europe*  
**Belgium**

**Member of the Jury**

Mella Frewen is Director General of FoodDrinkEurope, representing Europe's largest manufacturing industry. She has a wide experience of relations with International institutions, with the Institutions of the European Union and trade associations within the food chain, as well as with the agri-food, non-food, and chemical sectors. Ms Frewen is currently member of the EU Commission's High Level Steering Board for the European Innovation Partnership for Agricultural Productivity and Sustainability, of its High Level Group for the Sustainable Development Goals, and a member of the Governance Group of the Supply Chain Initiative for fair business practices across the food chain. She is also member of several food industry-related Boards. At the OECD & FAO, Ms Frewen is Vice President of the Advisory Group for Responsible Business Conduct along Agricultural Supply Chains. She has a Master of Science degree from the National University of Ireland, she holds a Harvard certificate on Agribusiness and an INSEAD certificate on International Operations Management.



## Milena Horvat

*Institut Jozef Stefan*  
**Slovenia**

**Member of the Jury**

Prof. dr. Milena Horvat is a Head of the Department of Environmental Sciences, [www.environment.si](http://www.environment.si), (since 1997) of the Jožef Stefan Institute and a Dean of the International Postgraduate School Jožef Stefan – [www.mps.si](http://www.mps.si) (since 2016). Her main expertise is related to mercury research activities which are interdisciplinary and cover the areas of analytical chemistry, human health with a focus on exposure science, contaminated sites, marine environment, and lately also clean technologies and sensor development. Based on her basic training and education as analytical chemist, she developed and significantly contributed to standardisation and harmonisation of analytical methods and production of reference materials. By this she contributed to international comparability of data on a global scale. For her international activities she was awarded a prize of Ambassador of Science of the R of Slovenia, and a Zois prize for scientific achievements. She also obtained a Life Achievement Award for her mercury related research at the ICMGP 2019 <https://mercury2019krakow.com/gb/how-to-participate/life-achievement-award.html>.

# THE JURY



## Hans Langeveld

*Biomass Research*  
**The Netherlands**

### Member of the Jury

I am an agronomist with 30 years of experience in sustainable biomass production. I am involved in research and give advice on the development and evaluation of bioenergy and biobased production. In my work, I collect and analyse data on biomass production and its conversion into products that help to green the economy. My aim is to support the development and implementation of innovative, sustainable and socially acceptable production and consumption routes together with industry, policy, NGOs and other stakeholders. Special focus is on the valorization of organic residues. It is a privilege to work with young scientists, and to contribute to their development and career.



## Morten Lennholm

*EUROfusion (JET), Culham Science Centre*  
**United Kingdom**

### Member of the Jury

Morten Lennholm has worked in the field of Nuclear Fusion Research for the last 30 years. From a microwave and control engineering education, he developed his knowledge of plasma physics and much of his work has involved a combination of engineering and plasma physics. He has published in journals such as 'Physical Review Letters' and 'Nuclear Fusion' on the control of fusion plasma, plus in 'Nature Communications' to describe the potential for control of certain plasma instabilities through 'phase space engineering'. He received his PhD degree from Eindhoven University of Technology in 2014 for his work on 'Real Time Control of the Sawtooth Instability in Fusion Plasmas with Large Fast Ion Populations'. Based at the Culham laboratories in Abingdon, England, Morten conducts, manages and coordinates work involved in the operation of the JET Tokamak (Joint European Torus), including engineering and physics studies associated with this project. His main areas of interest include: radio frequency heating employed in Tokamak fusion experiments; plus, plasma control systems, which allow the control of a number of plasma parameters including the location of the plasma itself inside the Tokamak vacuum vessel.



# THE JURY



## Mariya Lyubenova

*European Southern Observatory, Munich, Germany*  
**Bulgaria**

### Member of the Jury

Mariya Lyubenova holds a doctorate in astronomy from the Ludwig-Maximilians-Universität after pursuing 3 years of research at the European Southern Observatory (ESO) Headquarters in Garching bei München, Germany. In her work she observes and uses the motions and chemical properties of stars in galaxies as fossil records to unravel the build-up and evolution of galaxies. Well before she started her university studies in her home country Bulgaria, she was already an active astronomy club member and editor of an astronomy magazine and a newspaper. After the completion of her PhD in 2009, Mariya took a leading role in publishing the book “An Expanded View of the Universe — Science with the European Extremely Large Telescope” where the key science cases for this future telescope are summarised. Next, she worked for several years at the Max Planck Institute for Astronomy in Heidelberg, Germany, in parallel as a researcher and an equal opportunity officer. Then, Mariya spent 3 years as a researcher at the Kapteyn Astronomical Institute of the University of Groningen in the Netherlands. In May 2017 Mariya moved back to ESO, this time as a member of the astronomers’ faculty. She is currently head of the Media Relations Team and is the science consultant of the Department of Communication. Additionally, Mariya continues her active research activities in the area of galaxy evolution, as well as supervises and mentors a number of students and junior researchers.



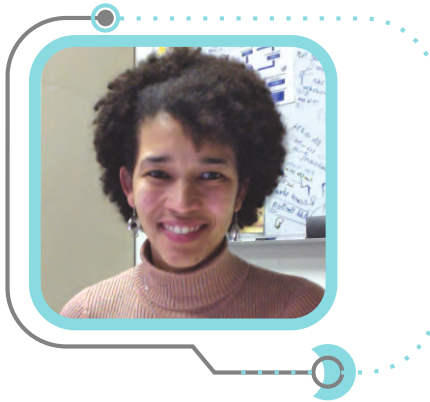
## Maria Minarova

*Slovak University of Technology, Bratislava*  
**Slovakia**

### Member of the Jury

I am a university teacher of math and applied math with applications in civil engineering, biomechanics and biology. I do some research in these fields, as well as in rheology. My habilitation thesis dealt with rheology. Nowadays I cooperate with engineers in the field of concrete structures collapse investigation. Moreover, I deal with theoretical background of data mining recently within the cooperation with a university in Pamplona. I like my work. I have some experience with evaluations of projects in Brussels and in Bratislava. I like, sport, languages and good music.

# THE JURY

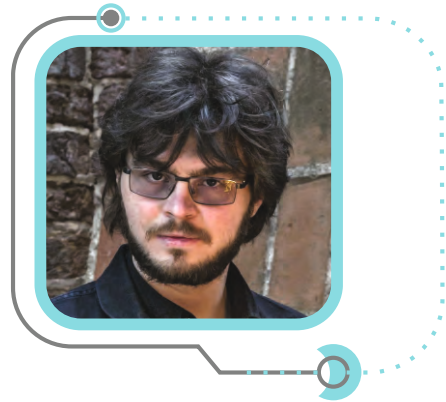


## Estelle Mossou

*Institute Laue-Langevin*  
**France**

### Member of the Jury

I am a biophysicist with a strong interest in biotechnology. I have a master of physics and a PhD in biophysics. My research interest lies in the study of self-assembling filamentous systems having biomedical and biotechnological interest (especially amyloid type systems). These are of particular interest because of their link to diseases like Alzheimer's, type II diabetes and Creutzfeldt-Jakob disease amongst others. I have an extensive experience in structural biology, more specifically X-ray and neutron crystallography through years of working at the Institut Laue-Langevin (Grenoble France) which operates the world's brightest neutron source.



## Margus Niitsoo

*Music Education LLC, Tartu*  
**Estonia**

### Member of the Jury

Margus Niitsoo was a competitor at EUCYS 2005 where he learned that the ability to communicate his findings is at least as important a skill as actually doing research. While studying for his degrees in mathematics and computer science in University of Tartu, he actively sought ways to also improve his skills in communication, becoming a teaching assistant in university, joining a science popularization initiative and also taking as many psychology courses as he could fit into his timetable among his own courses. However, his love of mathematics did not fade, and despite the new interests, he still managed to finish his BSc and MSc together in just 3 years instead of the usual 5, which was followed by another 3 years of PhD studies in theoretical cryptography. This briefly made him famous, as he was the youngest person to get a PhD in Estonia at just 24 years of age. Obsessed with teaching and finding ways to improve it, he was then offered the job of curriculum manager which allowed him to work not only on his own teaching but also to find better ways of organizing the curriculum and finding means to support both students and lecturers in their pursuits. He thoroughly enjoyed the work, but felt that he needed to see the world outside the academia as well and so headed for the industry, working on machine learning and audio analysis. Currently, he works as a freelance consultant in those fields.

# THE JURY



## Maria Angeles Moro Sanchez

*Universidad Complutense Madrid*  
Spain

Member of the Jury

Maria Angeles Moro is a graduate of Pharmacy and also has a PhD in Pharmacology (UAH, Spain, 1985 and 1990, respectively). She has completed several research stays (Centre of Neurochimie-Unité 44, CNRS-INSERM, Strasbourg, France; Wellcome Res Lab, Beckenham, UK; Massachusetts General Hospital / Harvard Medical School, MA, USA). She is currently Full Professor of Pharmacology at the Medical School of the Universidad Complutense de Madrid (UCM) and co-director of the Neurovascular Research Unit (UCM/i+12). Her main research focus is stroke and vascular dementia. Her work has resulted in 4 books, 60 chapters, 3 patents and approx. 160 publications in indexed journals such as JCI, Circulation, Immunity, Stroke, etc.

(<http://orcid.org/0000-0003-1010-8237>).

As PI, she has led several national public competitive projects and contracts with the industrial sector aimed to develop drugs for stroke treatment. She belongs to the Editorial Boards of "Stroke", "British Journal of Pharmacology" and "Journal of Cerebral Blood Flow & Metabolism". She has participated as chair, vice-chair or expert in more than 30 panels of various EC framework programs (FP5, FP6, FP7, H2020) as well as in the Spanish R+D+I Plan. She is ad hoc reviewer for international publications and evaluation agencies and was External Examiner for Trinity College Dublin. In 2016 she was appointed as Fellow of the British Pharmacological Society (FBPhS).



## Luisa Pereira

*Institute of Molecular Pathology and Immunology, University of Porto*  
Portugal

Member of the Jury

Luísa Pereira has a degree in Biology and a PhD in Human Population Genetics. She is a senior researcher and group leader at i3S-IPATIMUP (Institute of Research and Innovation in Health, University of Porto-Institute of Molecular Pathology and Immunology of the University of Porto), being interested in using genetics to infer the past and evolution of human populations and to evaluate susceptibility of human populations to complex diseases. She is co-author of 114 peer-reviewed papers in international journals and a book on popular science. She has been engaged in presenting her work to the general public, including young students in high schools, and regularly collaborates with local media.

# THE JURY



## Lina Tomasella

*Astronomical Observatory*  
Italy

### Member of the Jury

LINA TOMASELLA INAF Italian National Institute for Astrophysics Lina Tomasella is an astrophysicist of the Italian National Institute for Astrophysics (INAF), Astronomical Observatory of Padova. She has a degree in physics and a PhD in astronomy from the University of Padova. Her research interests are devoted to the physical properties of explosive astrophysical objects, supernovae and optical transients, in collaboration with Padova-Asiago Supernova Group. From 2015 she is a member of the GRAWITA (Gravitational Wave INAF team) collaboration, which has the aim of carrying out follow-up observational campaigns in the radio, optical, NIR, X-ray, and gamma-ray bands of the gravitational wave (GW) detector triggers released by the ground-based interferometers network actually composed of the two Advanced LIGO (USA) and Advanced Virgo (Italy). In 2018 she also entered the ENGRAVE (Electro-magnetic counterparts of gravitational waves at the Very Large Telescope) collaboration: the European consortium using ESO telescopes for the follow-up campaigns of GW events detected by LIGO/Virgo network. Her whole scientific production is summarised in about 90 refereed papers and in several hundreds among Astronomical Circulars, Astronomer's Telegrams, Gamma-ray coordinates Network and Transient Name Server classification reports. She lives in Asiago, where there are the telescopes and instruments operated by the Astronomical Observatory of Padova. Here she is also the Institute coordinator and head of outreach activities. Lina won a top prize in the 1st EUCYS, Bruxelles 1989.



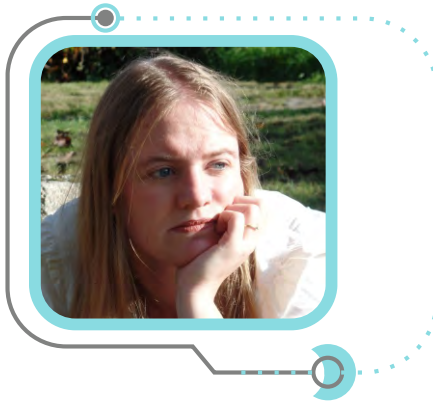
## Zuzanna Szymańska

*University of Warsaw*  
Poland

### Member of the Jury

Zuzanna Szymańska, PhD graduated in mathematics and computer science from the Faculty of Mathematics, Informatics and Mechanics University of Warsaw. In 2010, at the Polish Academy of Sciences she obtained her PhD degree with distinction in biology with a specialization in biophysics. She is an Assistant Professor at the Institute of Mathematics of Polish Academy of Sciences and the Interdisciplinary Centre for Mathematical and Computational Modelling (ICM) at the University of Warsaw. Her main area of research involves developing multi-scale mathematical models for processes such as growth and spread of cancer or wound healing.

# THE JURY

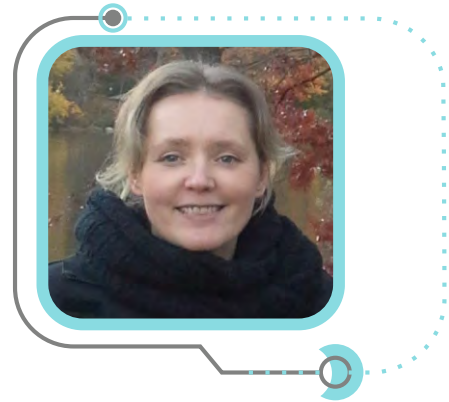


## Mira Van Thielen

*Ghent University Hospital*  
**Belgium**

**Member of the Jury**

Mira Van Thielen has a degree in pharmaceutical as well as medical sciences. At the age of 16 years she won several (inter)national prizes with her medical project. The same time she was one of the founders of the educative youth organisation at the public observatory MIRA (Belgium). Nowadays, she is working as resident at the department of Anesthesia in Ghent University Hospital (Belgium). Her research interests are devoted to a combination of physics and medical sciences. Besides, she is a board member of 'Jeugd, Cultuur & Wetenschap', a scientific youth organisation in Belgium.



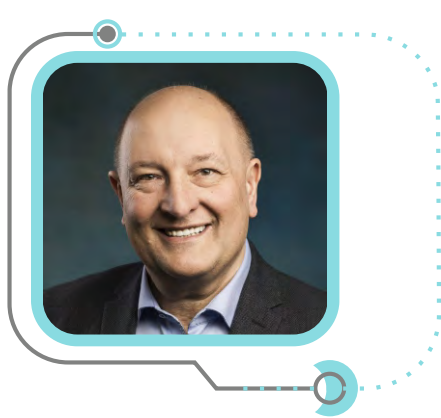
## Anna Zajakina

*Latvian Biomedical Research and Study Centre*  
**Latvia**

**Member of the Jury**

Dr. Anna Zajakina is the head of Cancer Gene Therapy group at Latvian Biomedical Research and Study Centre. She has completed her PhD in 2005 at University of Latvia, Molecular Virology and Biochemistry Division. She raised her expertise at University of Rostock (Germany), Uppsala University (Sweden) and University of Bordeaux (France). Dr. Zajakina is the author of more than 40 papers and conference presentations related to cancer research, molecular biology and virology issues. The main research interests involve the development of novel clinically translatable methods for cancer treatment based on gene therapy vectors and combination of treatment strategies with chemotherapy and immunotherapy. Currently, main research projects are focused on delivery of therapeutic genes by viral vectors into tumours for smart regulation of tumor microenvironment in combination of polyfunctional magnetic nanoparticles. Being a national coordinator of European Biotechnology Thematic Network Association, Dr. Zajakina is actively taking part in organization and hosting of international workshops, seminars and conferences, working in cooperation with students and researchers representing various organizations and universities.

# THE JURY

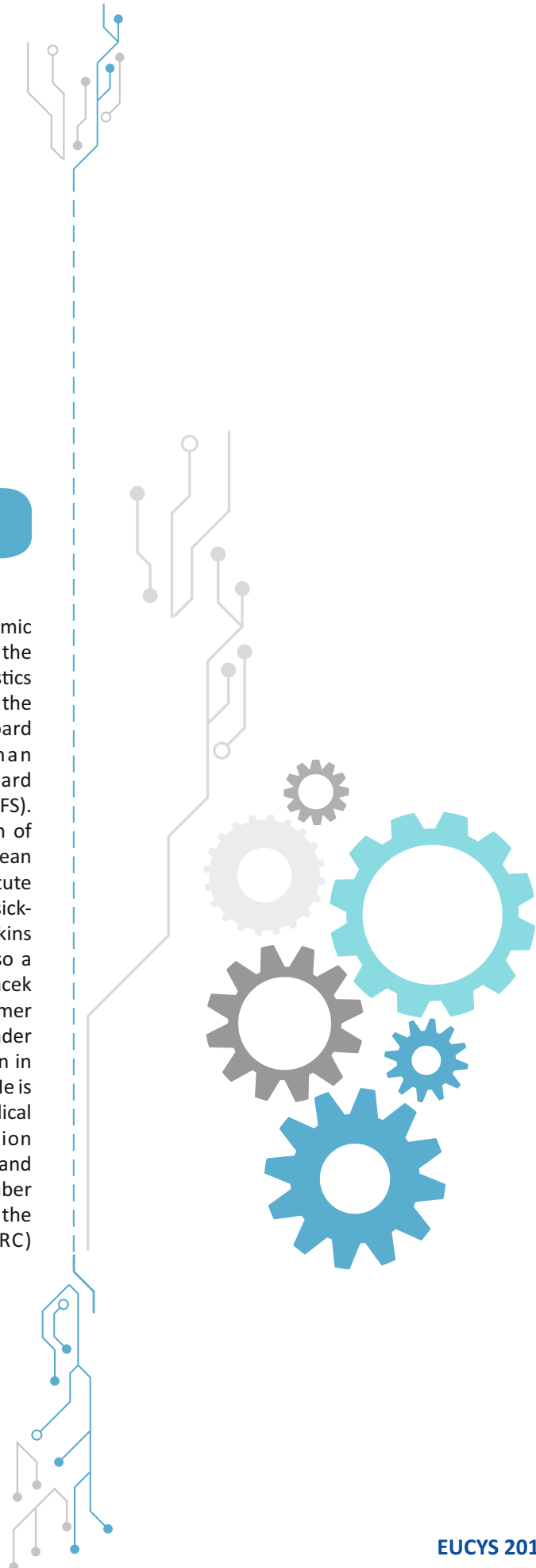


## Milan Macek

Charles University, Prague  
Czech Republic

### Member of the Jury

Prof. Macek is the chairman of the largest academic medical/molecular genetics/genomics institution in the Czech Republic, which comprises a research/diagnostics reproductive genetics center. He was a president of the European Society of Human Genetics (ESHG), board member of the European Society for Human Reproduction and Embryology (ESHRE), and board member of the European Cystic Fibrosis Society (ECFS). His institute is a “clearing center” for dissemination of knowledge in genetics gathered within various European projects. He did his first postdoctoral work at the Institute of Human Genetics in Berlin, followed by the McKusick-Nathans Institute of Genetic Medicine at Johns Hopkins University, Baltimore. During that time, he was also a fellow at Harvard School of Medicine in Boston. Dr Macek Jr is the national coordinator of Orpha.net and the former chief advisor of the Czech EU Council Presidency under which the “EU Council recommendation on an action in the field of rare diseases” was adopted in June 2009. He is the acting president of the Czech Society of Medical Genetics, a past member of the European Union Committee of Experts on Rare Diseases (EUCERD) and current member of the EU - European Board of Member States on Rare Diseases, and a past member of the International Rare Disease Consortium (IRDIRC) Diagnostic Committee.



# EUCYS 2019

# THE PRIZES



# THE PRIZES

The participants compete for a number of core prizes on the basis of a written description of their work, their exhibited material and the interviews with the Contest Jury. In addition to this, a limited number of special donated prizes are awarded by the Jury, to offer some winners the opportunity to benefit from the specific experiences linked to these prizes. It is up to the Jury to decide whether a prize-winner can receive both a core prize and a special donated prize.

## CORE PRIZES

The Core Prizes are the principal prizes awarded at the contest. These are cash prizes. In the case of a team winning such a prize, the amount is shared equally between the members of the team.

There are three categories of Core Prizes:

- **four First Prizes worth € 7.000 each;**
- **four Second Prizes worth € 5.000 each;**
- **four Third Prizes worth € 3.500 each.**

## HONORARY PRIZES ASSOCIATED WITH THE FIRST PRIZES

There are two Honorary Prizes associated with the first prizes.



### LONDON INTERNATIONAL YOUTH SCIENCE FORUM (LIYSF)

Up to three contestants receive an all-expenses paid trip to London to attend the London International Youth Science Forum (LIYSF). The prize covers the travel costs from the country of origin, accommodation, meals, registration and participation in full a programme of activities.

LIYSF brings together 300 science students from around 60 countries worldwide. The programme, which includes visits to industrial sites and world class research laboratories and facilities, lectures, demonstrations and seminars from leading scientists, highlights the links between individual fields of study and introduces all participants to the latest thinking across a broad range of science.

Participants are able to interact with the eminent speakers, to debate on current issues and to explore the way in which their chosen subject relates to other studies and has an impact on the world at large.

Each year's LIYSF becomes a multicultural community, and, with its busy social activities programme, provides a unique opportunity to meet and develop friendships and contacts across the world. The participants attending LIYSF are usually between the age of 17 and 21 years old.

**For further information, please contact:**

**London International Youth Science Forum,**

Royal Parade Mews, Chislehurst,  
Kent, BR7 6TN, United Kingdom.

**Tel:** +44 (0)20 8295 8395.

**Fax:** +44 (0)20 8295 8650.

**Email:** [enquiries@liysf.org.uk](mailto:enquiries@liysf.org.uk)

**Web:** [www.liysf.org.uk](http://www.liysf.org.uk)

**Conference Director:** Richard Myhill

[Richard.myhill@liysf.org.uk](mailto:Richard.myhill@liysf.org.uk)



## STOCKHOLM INTERNATIONAL YOUTH SCIENCE SEMINAR (SIYSS)

The Stockholm International Youth Science Seminar (SIYSS) is an annual weeklong event for international young scientists, arranged in connection with the Nobel festivities by the SIYSS Committee of the Swedish Federation of Young Scientists.

The history of SIYSS dates back to 1976 when the first seminar was organized by the Swedish Federation of Young Scientists together with the Nobel Foundation, with inspiration from Society for Science & the Public in USA. Turning into a great success, the SIYSS program has continued to combine Swedish science with the Nobel festivities with an intense social program.

The programme aims to promote international understanding and friendship, bringing together young people from all over the world with similar interests. The participants are selected in different ways; some are winners of national science fairs, others represent organizations for young scientists or are selected by merit at their home universities. Whatever their background, they all have two things in common: a great interest in natural sciences and a curiosity for other cultures and people.

The programme of the week comprises scientific activities and lectures as well as an introduction to Swedish culture and customs. However, the main event of the week is a big seminar where the participants present their research to each other and to Swedish students. The week culminates with the Nobel festivities which the SIYSS participants will have the opportunity to experience up close.

With its connection to the Nobel week, SIYSS is widely considered the most prestigious youth science event in the world. Former participants often witness how the programme has inspired them to continue doing research and that the week in Stockholm was a truly unique experience.

**For further information, please contact:**

**The SIYSS Organizing Committee**

Förbundet Unga Forskare

Lilla Frescativägen 4C

S-104 05 Stockholm, Sweden

**Tel:** +46 (0) 700 176 309

**Email:** [siyss.international@ungaforskare.org](mailto:siyss.international@ungaforskare.org)

**Web:** [www.siyss.org](http://www.siyss.org)

**International coordinator:** Josefine Wahlström



## SPECIAL DONATED PRIZES

### THE JOINT RESEARCH CENTRE (JRC)

JRC kindly offers a two day stay at its Ispra site in Italy for 3 projects (up to nine students).

### EuCheMS

The European Association for Chemical and Molecular Sciences is pleased to offer a prize of €1000 to the best Chemistry project

### WOLFRAM

Wolfram are pleased to offer all contestants submitting projects in Mathematics a free one year licence to Mathematica and WolframAlphaPro.

**The European Commission is very grateful to the organisations that offer these special prizes to the contestants.**

### SPECIAL DONATED PRIZES OF EIROforum

The Special Donated Prizes of EIROforum are offered to contestants who, according to the EUCYS Jury, would benefit from the specific experience that these prizes offer. They consist of one-week visits to renowned scientific organisations, where the prize-winners would have unique opportunities to get acquainted with world-class facilities, experiments and cutting-edge instrumentation:

- EIROforum members [www.eiroforum.org](http://www.eiroforum.org) each kindly award individual prizes as follows:
- European Organization for Nuclear Research (CERN) – offers a project prize (for up to 3 people) of a week's visit to their Geneva site;
- EUROfusion (JET) – home of plasma physics and fusion research, offers one project a one week stay (for up to 3 people) at their Culham, Oxfordshire, UK site;
- The European Molecular Biology Laboratory (EMBL) – offers a project prize (for up to 3 people) of a week's placement at their premises in Heidelberg;
- The European Space Agency (ESA) - offers a single prize winner the opportunity to attend a major space science conference in Europe or to spend a week at ESA's main technical centre, ESTEC, in The Netherlands;
- European Southern Observatory (ESO) – offers the winner of a single-student project, a visit to their facilities in Chile including trips to the Paranal Observatory and ESO's Scientific Centre in Santiago;
- European Synchrotron Radiation Facility (ESRF) – operator of Europe's most powerful synchrotron radiation source, offers the leader of a winning project a one week visit to their site in Grenoble;
- The Institut Laue-Langevin (ILL) – operator of the world's most intense neutron source, offers the leader of a winning project a one week visit to their Grenoble site;
- European X-Ray Free-Electron Laser Facility GmbH (European XFEL) – offers one winner a one week placement at European XFEL Schenefeld (Hamburg metropole).

## EIROforum PRIZES



EIROforum is a partnership of Europe's eight largest intergovernmental research organisations. As world leaders within their respective fields of science, the member organisations of EIROforum constitute the vanguard of European science. Operating some of the largest research infrastructures in Europe, devoted to the exploration of fundamental quests of mankind such as the origin and the evolution of matter, biological life and structure of our Universe, they enable European scientists to engage in truly cutting-edge research, and be on the forefront on a global scale.

In support of the EUCYS initiative, EIROforum members are pleased to offer one-week visits/placements to their organisations.

To ensure optimum value of the experience to the prize winners, these will be offered on the basis of the relevance of the activities of the organisation to the field of interest of the nominated student. For safety and sometimes security reasons, age restrictions may apply.

EIROforum also sends experienced scientists to give a key note address to the contestants. As a courtesy to EIROforum, those students who would like to be considered for the EIROforum prizes, and their National Organisers, should endeavour to attend the EIROforum lecture during the contest.

**The EIROforum organisations are:**



### THE EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH (CERN)

The European Organization for Nuclear Research (CERN), Geneva, Switzerland, founded in 1954. CERN's main research area is particle physics.

Complex machines such as particle accelerators and detectors are developed and used to study the basic constituents of matter. The Large Hadron Collider (LHC), a 27-kilometre underground circular machine, began colliding particles at very high energy in 2010 giving new insights into the origin of the Universe. CERN is also famous for the invention of the World Wide Web, which was originally developed to give scientists access to data irrespective of their location. In 2013 the Nobel Prize for Physics was awarded for the theoretical discovery of the long-sought Higgs boson, which the LHC experiments confirmed experimentally in 2012.

[www.cern.ch](http://www.cern.ch)

CERN offers a prize of a week's visit for up to three students involved in the selected project. Topics should be related to a scientific or engineering field of relevance to CERN, which covers a large spectrum of projects, especially on the engineering side. Minimum age: 18 years at the time of the visit.



### EUROFUSION (JET)

EUROfusion (JET), Culham Laboratory, Oxfordshire, UK. EUROfusion is a framework between EURATOM and various fusion research programmes in many EU countries. Its aim is to provide an infrastructure for fusion research.

JET, the largest tokamak fusion reactor in the world, investigates the potential of fusion power as a safe, clean and virtually limitless energy source for future generations. It is paving the way for ITER, an engineering project currently being constructed in southern France, which is designed to be the first fusion reactor to release more energy than is needed to power it.

[www.euro-fusion.org](http://www.euro-fusion.org)

EUROfusion will award a one week stay at the JET facilities for up to three persons. Topics include: plasma wall interaction, real time control of plasmas, computer modelling of plasmas, magneto hydrodynamics, engineering related topics to build tailored diagnostics. Minimum age: 16 years.



### THE EUROPEAN MOLECULAR BIOLOGY LABORATORY (EMBL)

The European Molecular Biology Laboratory (EMBL) is Europe's flagship laboratory for the life sciences. Established in 1974 as an intergovernmental organisation, EMBL is supported by over 20 member states. EMBL performs fundamental research in molecular biology, studying the story of life. The institute offers services to the scientific community; trains the next generation of scientists and strives to integrate the life sciences across Europe.

EMBL is international, innovative and interdisciplinary. Its more than 1600 staff, from over 80 countries, operate across six sites in Barcelona (Spain), Grenoble (France), Hamburg (Germany), Heidelberg (Germany), Hinxton (UK) and Rome (Italy). EMBL scientists work in independent groups and conduct research and offer services in all areas of molecular biology.

EMBL research drives the development of new technology and methods in the life sciences. The institute works to transfer this knowledge for the benefit of society.

[www.embl.org](http://www.embl.org)

EMBL offers a prize of a week's visit to its Heidelberg headquarters for up to three students involved in the selected project. Eligible topics should be in the field of molecular biology. Minimum age: 18 years.



### THE EUROPEAN SPACE AGENCY (ESA)

The European Space Agency (ESA) Paris, France. ESA's mission is to provide cooperation in space science and to ensure that this science benefits citizens in Europe and world wide. Research programmes concern, among others, Earth Observation, Human Spaceflight, Launchers, Navigation, Space Science and Engineering as well as Telecommunications. Their focus is the Solar System and the Universe in general. The development of satellite technologies serves to achieve high-level research goals and to promote European industries at the same time.

[www.esa.int](http://www.esa.int)

ESA offers a single prize winner the opportunity to attend a major space science conference in Europe (usually either the European Geosciences Union General Assembly or the European Week of Astronomy & Space Sciences) or to spend a week at ESA's main technical centre, ESTEC, in The Netherlands. The winner must be at least 18 at the time of taking up the prize.



### THE EUROPEAN SOUTHERN OBSERVATORY (ESO)

The European Southern Observatory (ESO), Garching, near Munich, Germany, and Chile. ESO is the foremost intergovernmental astronomy organisation in Europe and the world's most productive ground-based astronomical observatory by far.

ESO is supported by 15 countries, and carries out an ambitious programme focused on the design, construction and operation of powerful ground-based observing facilities enabling astronomers to make important scientific discoveries. ESO also plays a leading role in promoting and organising cooperation in astronomical research. ESO operates three unique world-class observing sites in Chile – La Silla, Paranal and Chajnantor – and is planning a 40-metre-class European Extremely Large optical/near-infrared Telescope the E-ELT, which will become “the world's biggest eye on the sky”.

[www.eso.org](http://www.eso.org)

Only single-student projects are eligible for ESO's prize. The Laureate is offered a trip to ESO's facilities in Chile with visits planned to the Paranal Observatory and ESO's Scientific Centre in Santiago. Minimum age: 18 years.



## THE EUROPEAN SYNCHROTRON RADIATION FACILITY (ESRF)

The European Synchrotron Radiation Facility (ESRF) Grenoble, France, is supported and shared by 22 countries.

The ESRF is the most powerful synchrotron radiation source in Europe; it is a stadium-sized machine producing many beams of bright X-ray light. These are guided through a set of lenses and instruments called beamlines where the X-rays illuminate and interact with samples of material being studied. Here, at more than 40 specialized experimental stations, physicists work side by side with chemists and materials scientists. Biologists, medical doctors, geophysicists and archaeologists have become regular users. Companies also send researchers, notably in the fields of pharmaceuticals, cosmetics, petrochemicals and microelectronics. Each year approximately 7,000 researchers travel to Grenoble where they work in a first-class scientific environment to conduct exciting experiments at the cutting edge of modern science.

[www.esrf.eu](http://www.esrf.eu)

ESRF will award the prize of a one week visit to the EPN Science Campus in Grenoble, for the leader of a project in a topic related to the structural and dynamical study of condensed matter, materials and living matter using synchrotron radiation X-rays to achieve sub-nanometric resolution in both fundamental and applied research. This could be in the fields of biology, chemistry, cultural heritage, engineering, environmental sciences, materials research, medicine or physics. The visit will be undertaken in parallel with that of the winner of the ILL prize. Minimum age: 18 years.



## THE INSTITUT LAUE-LANGEVIN (ILL)

The Institut Laue-Langevin (ILL), Grenoble, France, operates the most intense neutron source in the world. It is used to examine conventional and newly created materials.

The research at ILL includes the analysis of the structure of new materials for future electronic tools, the measurement of stresses in mechanical materials, and examination of the behaviour of complex molecular assemblies, particularly in a biological environment. The ILL also tackles questions relating to the fundamental properties of matter. Recent research includes the world's first magnetic soap, great developments on gamma-ray optics and potential Alzheimer treatments.

[www.ill.eu](http://www.ill.eu)

ILL will award a prize of a one week visit to the EPN Science Campus in Grenoble, for the leader of a project in a topic related to a scientific or engineering field of relevance to ILL. The visit could include witnessing technical developments being made in connection with the neutron beams, such as detectors and optical devices, or taking part in an experimental session. Areas covered include: neutron research and technology in the disciplines of chemistry, nuclear physics, chemistry, biology, crystallography and magnetism. The visit will be undertaken in parallel with that of the winner of the ESRF prize. Students must be at least 18 at the time of taking up the prize.



## THE EUROPEAN XFEL (XFEL.EU)

The European XFEL (XFEL.EU), Schenefeld Hamburg metropole, Germany. European XFEL is a X-ray laser based on a linear accelerator with unique characteristics. Its operation started in September 2017.

The facility will open up new research opportunities for a whole range of scientific fields, such as medicine, pharmacy, biology, chemistry, physics, materials science and nanotechnology.

[www.xfel.eu](http://www.xfel.eu)

European XFEL will award a one week placement at their site in Schenefeld for one person presenting a physics project. The visit will provide insights into the process of operating a new, cutting edge international research facility. Students must be at least 18 at the time of taking up the prize.

## The EIROforum organisations constitute true success stories for Europe. In particular, they:

- were created by their member states as part of a long-term strategy for the future of European research;
- attract some of the best scientists and researchers from across the world, thanks to their scientific excellence and cutting-edge facilities;
- have implemented the European Research Area (ERA) concept and contribute significantly to structuring European research in their specific scientific fields;
- link European scientific communities with the rest of the world;
- develop new technologies, instrumentation and electronic infrastructures and support innovation and technology transfer for the benefit of society at large.

## The EIROforum organisations have world-class research infrastructures. Notably, they:

- operate major research infrastructures – unique in Europe and in some cases in the world;
- are funded by their member states, with a combined annual budget for science of around 1500 million Euros;
- are crucial to the competitiveness of European research, providing up-to-date and continually improved facilities for European scientists;
- serve more than 25 000 scientists every year (in astronomy, particle physics, fusion, space sciences, condensed matter physics, chemistry and the life sciences);
- are active in international, often global, research for the benefit of Europe;
- possess unique experience in building and operating research infrastructures of great value for the further development of the European Research Area.

EIROforum is also committed to promoting and supporting innovative science education in Europe, as demonstrated by its science education activities.

## SCIENCE IN SCHOOL

[www.scienceinschool.org](http://www.scienceinschool.org)

A quarterly journal to inspire and inform European science teachers, Science in School is:

- free in print version and online;
- written mostly by teachers and scientists;
- printed in English, with articles online in over 25 European languages;
- distributed throughout Europe (20 000 copies per issue).
- The Science in School articles, many of which can be used directly in the classroom, cover:
  - cutting-edge science articles;
  - experiments to use in the classroom;
  - innovative science teaching projects;
  - reviews of teaching resources.

Topics include biology, physics and chemistry and also maths, earth sciences, engineering and medicine.

## JOINT RESEARCH CENTRE (JRC) PRIZES



### THE JOINT RESEARCH CENTRE

kindly offers a two day stay at its Ispra site in Italy for 3 projects (up to nine students).

The Joint Research Centre (JRC) is the European Commission's science and knowledge service. It performs direct scientific research and provides evidence-based and independent scientific advice to European policy makers helping them to make informed decisions.

EU policies that address global and societal challenges - such as financial stability, climate change, food security, water availability or the ageing society - need to be based more and more on a solid scientific understanding. In close cooperation with international partners, the JRC elaborates models and scenarios to assess policy options while stimulating innovation through developing new methods, tools and standards.

The work of the JRC has a direct impact on the lives of European citizens. It promotes a healthy and safe environment; secure energy supplies, sustainable mobility and consumer safety, and helps improve preparedness and response to natural and man-made disasters.

### Serving society, stimulating innovation, supporting legislation

The JRC's headquarters are in Brussels and its seven scientific directorates, which host specialist and unique laboratories, are located on sites in Belgium, Germany, Italy, the Netherlands and Spain.

The JRC award will allow the participants from three successful projects to spend two days at its facilities in Ispra, Italy shadowing scientists from all over Europe according to the interests of the prize winners.



### EUCHEMS PRIZE

The European Chemical Society (EuChemS) brings together over 40 chemical societies which together represent more than 160,000 chemists in academia, industry, government and professional organisations in over 30 countries across Europe.

Founded in 1970, EuChemS aims to provide a single voice on key science and policy issues, based on expert scientific knowledge and to promote chemistry as a provider of solutions in a changing world. EuChemS Professional Networks cover all areas of chemistry, enable networks between European scientists to thrive, and provide expert advice to EuChemS' policy positions. EuChemS organises

the biennial EuChemS Chemistry Congress open to all, and has an event recognition scheme in place to promote chemistry-related events across Europe.

EuChemS is pleased to present a prize of €1000 for the best chemistry entry in the EU Young Scientists Contest. For more information on EuChemS please see:

[www.euchems.eu](http://www.euchems.eu)



### THE PRACE EUCYS AWARD

The PRACE EUCYS award is given to the best computational project. The winners will visit a supercomputing centre and all the costs related to the trip will be covered. The winner of the PRACE EUCYS Award for the best computational project will receive a travel prize in the form of a trip to SURFsara in Amsterdam, Netherlands.

Day 1 - travel to Amsterdam, Netherlands

Day 2 - Morning: visit to SURFsara's supercomputing facilities and data centre; afternoon: spent with a researcher from the area of interest of the visitors

Day 3 - Morning: visit to the high-tech research institutes located at Amsterdam Science Park; afternoon: spent with a researcher from the area of interest of the visitors

Day 4 - Visit to the Astron Radio telescope, or Delta works, depending on the preference of the students

Day 5 - travel back

All costs related to the proposed programme, travel, accommodation and meals will be covered by the sponsor of the prize Partnership for Advanced Computing in Europe (PRACE).

[www.prace-ri.eu](http://www.prace-ri.eu)



### WOLFRAM

#### WOLFRAM PRIZES

WOLFRAM Research is donating a one-year Mathematica Student Edition license plus a free one-year subscription to WolframAlpha Pro for all contestants submitting projects in the field of mathematics, physics and computer science.

[www.wolfram.com](http://www.wolfram.com)

## BIOECONOMY PRIZES

### The EUCYS Bioeconomy Bio-based Industries Prize

### The EUCYS Bioeconomy Food Industry Prizes



#### THE EUROPEAN FOOD AND DRINK INDUSTRY PRIZE, AWARDED BY FoodDrinkEurope

FoodDrinkEurope, on behalf of Europe's Food and Drink Industry, is very pleased to award the winner/each member of the winning team with a check for 2,000 euros, to help the young scientists in their research pursuits and provide support for their future academic or professional plans.



#### THE PEPSICO PRIZE

PepsiCo is once again delighted to support EUCYS 2019, and to invite the winning team to spend a day at our Beaumont Park R&D centre in the UK, following a range of different activities with our R&D team. PepsiCo would also propose to include a visit of our Leycroft factory nearby, to see first-hand how the R&D effort translates into delightful new product offerings to our consumers. We would also set up an opportunity for the winning EUCYS team to spend time with some of the students who intern with us for up to a year, to explain what they have been doing as well...

Research and innovation are key to the future of Europe, and key to the future of PepsiCo. We are delighted to be associated with this initiative again.



#### THE UNILEVER PRIZE

Unilever is pleased to welcome three students to its brand-new Global Foods Innovation Centre in Wageningen (Netherlands), also known as "the Silicon Valley of Foods". In this Innovation Centre, our scientists work together with the Wageningen University & Research, other companies and startups on exciting new food products for a better and healthier future.

During a two-day mini-internship, you get to experience how products from brands like Knorr, Hellmann's and Lipton are being developed. You will see the pilot plant, a mini factory where we produce and test small-scale products, the kitchens where our chefs try out new recipes, and laboratories where formulations are developed. As we are located on the University campus, you will also get a tour of the Wageningen University & Research.



## THE EUCYS BIOECONOMY BIO-BASED INDUSTRIES PRIZE

### About the bioeconomy

The bioeconomy is made up of those parts of the economy that use renewable biological resources from land and sea like crops, forests, fish, animals and micro-organisms to produce food, materials and energy.

The bioeconomy is an essential alternative to our current fossil-based economy. It can replace our current fossil fuel-based economy which is dependent on the planet's limited supply of non-renewable resources, such as petroleum and coal. It's hailed as the next wave in our economic development and should provide major opportunities for innovation, jobs and growth to help re-industrialize Europe.

In fact, the bioeconomy is already a reality. Biomass like plant material, municipal and livestock waste is converted into electricity, fuels, plastics and the basic building blocks for chemical processes. Many materials made from petrochemicals can be replaced with materials made from biomass. Sometimes, small changes to naturally occurring substances can produce useful alternatives to commonly used products such as packing or trash bags.

Using biochemicals instead of chemicals derived from petroleum can reduce pollution, increase efficiency, and limit the use of hazardous materials and chemicals in the manufacture process. Enzymes from plants and microorganisms, as well as bacteria and other microbes, can be used in industrial chemical reactions to make a number of everyday products. Enzymes help bring about and speed up chemical reactions. Enzymes are in laundry detergent to improve stain removal. They convert cellulose to sugar, bleach paper and curdle milk for cheese and yogurt.

Cups, forks, spoons, knives, plates, food storage containers, T-shirts and pillows can be made from biomass including waste and residues. These products can be made so that they are biodegradable and compostable. It is hoped that the production and use of these bio-products and materials will reduce the amount of biodegradable waste and materials going to landfills.

### About the Bio-based Industries Joint Undertaking (BBI JU)

The Bio-based Industries Joint Undertaking (BBI JU) is a partnership between the European Commission and the Bio-based Industries Consortium (BIC) set up in 2014 to fund research and innovation to help to develop the bio-based economy in Europe. BBI JU's funding is meant to encourage further investment by the private sector through industry. It works by setting up multi-partner projects who work together to solve the scientific, logistic and infrastructural challenges facing the bio-based industry in

Europe. Research can be in a lab or in a combination of lab, pilot plant or biorefinery.

The BBI JU programme offers enormous opportunities to tackle some major societal, environmental and economic challenges, including climate change, energy and food security and resource efficiency.

The bioeconomy EUCYS prize will be awarded by the judges to the project which they feel best uses biotechnology for the production and the conversion of biomass into non-food value-added products<sup>1</sup>.

The winning project should reflect three key principals of the bio-based economy in using raw material of a biological origin, for example whole or parts of plants, trees, algae, marine organisms, micro-organisms, animal in a way which is:

- **sustainable**
- **renewable**
- **innovative**

The winning project will also meet a fourth criteria based on the effectiveness of its overall **communicability** to the scientific community and the general public. The winning project should promote scientific studies, while raising environmental awareness, and promote the bioeconomy.

The prize will be awarded by BBI JU who will provide a paid 5-day trip to Brussels for the winning project including travel to/from, accommodation and daily allowance in Brussels<sup>2</sup> and participating in a tailor-made experience related to the science behind the BBI JU programme.

The prize awarded will comprise:

- a visit and introduction to the Bio-based Industries Joint Undertaking programme office;
- a visit to some of the key public institutions shaping European bio-based policy, including the European Parliament's visitor centre and a look behind the scenes at the European Commission's Directorate-General for Research and Innovation;
- Two one-day visits to bio-based biorefineries and laboratory facilities selected from the following based in:
  - Bio Base Europe Pilot Plant, DSM labs (tbc) and Biotech Campus (tbc) in Gent, Belgium (subject to confirmation)
  - Biotech Pilot Plant in Delft, The Netherlands (subject to confirmation)
- the possibility to visit local tourist sites in the relevant locations, where the itinerary permits.

During each one-day excursion, a range of age-appropriate supervised activities will be organised, along with an opportunity to meet and talk to the scientists working there about their research and a career in science. There may also be an opportunity to visit a few tourist attractions during the stay.

The prize will be awarded to the winning project (up to a **maximum of three** participants) and **one** teacher/lecturer

(who has made a significant & demonstrable contribution to the winning project), to be nominated by winners to accompany them. Where no teacher/lecturer<sup>3</sup> is nominated, an accompanying responsible adult **must be nominated** by the winning project. The winning person or persons will remain under the responsibility & supervision of this person during their travel, activities and visits.

**Special conditions:**

Minimum age of all project participants is 16 years at date of judges' final decision.

**Eligible countries:**

EU Member States, Associated Countries

**Insurance cover:**

The winner(s) must ensure they have suitable travel, medical and accident insurances and will be asked to provide evidence prior to the visit.

**Prize to be taken by:**

BBI JU will offer a maximum of three possible dates for the winning project to participate in the award. These will be provided according to availability of the winning project in conjunction with the availability of the organisations concerned in making the award.

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<sup>1</sup> The bio-based product must be wholly or partly derived from biomass and can be an intermediate, material, semi-finished or final product. Bio-based products include bio-chemicals, bio-plastics, pharmaceuticals, paper and paper products, textiles, 2nd generation biofuels and bioenergy and bio-based ingredients used in everyday products.

<sup>2</sup> Travel and accommodation will be provided on the same basis as for attending competition exhibition.

<sup>3</sup> Subject to the approval of their educational institution

## HOST COUNTRY PRIZES

### NATIONAL WORKSHOP ON CODING THEORY “PROFESSOR STEFAN DODUNEKOV” PRIZE

The annual National Workshop on Coding Theory (NWCT) named after Stefan Dodunekov (1945-2012) was established in 1980's. Prof. Dodunekov, the founder of the Bulgarian school of coding theory, was a world-renowned scholar in the area of algebraic and combinatorial theory of error-correcting codes and its applications for data protection and information security.

The workshop brings together experienced researchers and young people – university and PhD students, assistant professors, specialists from coding theory and cryptography. Special sessions are devoted to annual reports of the researchers from the department “Mathematical Foundations of Informatics” of the Institute of Mathematics and Informatics of the Bulgarian Academy of Sciences. New results are presented and PhD projects are shown in development.

Two EUCYS contestants will be awarded to participate in the next edition of NWCT (November 2019, Chiflika, Bulgaria).



Prof. Stefan Manev Dodunekov (1945-2012)



## BULGARIAN SUMMER RESEARCH SCHOOL AWARD

The award offers one student, who will not have finished his secondary education by August 2019 the opportunity to participate in the Summer Research School of the Bulgarian High School Students Institute of Mathematics and Informatics. The Summer Research School is a three-week program, held each August in Bulgaria, during which the participants have the opportunity to work on a research topic in Mathematics or Computer Science with a personal mentor.

The award is offered jointly by the Ministry of Education and Science and the High School Students Institute of Mathematics and Informatics (HSSIMI). HSSIMI is founded in 2000 by a consortium of foundations and research institutions to assist high-achieving students in the first steps of their careers, to promote inquiry in secondary education and to support citizen science initiatives. The Summer Research School is its biggest initiative, organized annually since 2001 and open to international participants since 2015. It is an intensive program for students aged 14-19, offering each participant a separate research topic in Mathematics or Computer science, resources and mentorship support. Mentors and lecturers at the summer school are graduate students and researchers from the Bulgarian Academy of Sciences and leading international academic institutions, such as Cambridge, ETH Zurich, Yale, MIT and others.

The Bulgarian Ministry of Education and Science (MES) is the main policy-maker and public authority responsible for the implementation of the state policy for science and research development. The ministry has the responsibility for creating a favourable environment and incentives for the development of science and research as well as implementing the commitments of the Republic of Bulgaria arising from its membership in the European Union. It is also the main organizer of the national contest "Young Talents" which selects the Bulgarian participants for EUCYS and other international forums, as part of its long-term commitment to supporting high-achieving students.

[www.math.bas.bg/srs](http://www.math.bas.bg/srs)



## INTERNATIONAL STUDENTS OF HISTORY ASSOCIATION (ISHA)

ISHA is an international network of students of history and related sciences. Its activities are open to all students with an interest in history from all academic backgrounds and levels of study – first-year through PhD. It has members in almost 30 European countries. The organization was born after the fall of the Iron Curtain in 1989 with the idea of enabling students of history to come into contact, cooperate and exchange ideas, something that had not been possible before.

What is it about?

- Meeting students from other countries and universities
- Discussing history academically in an international perspective
- Learning about each other's views and backgrounds
- Sharing and advancing one's knowledge
- Having a good time together

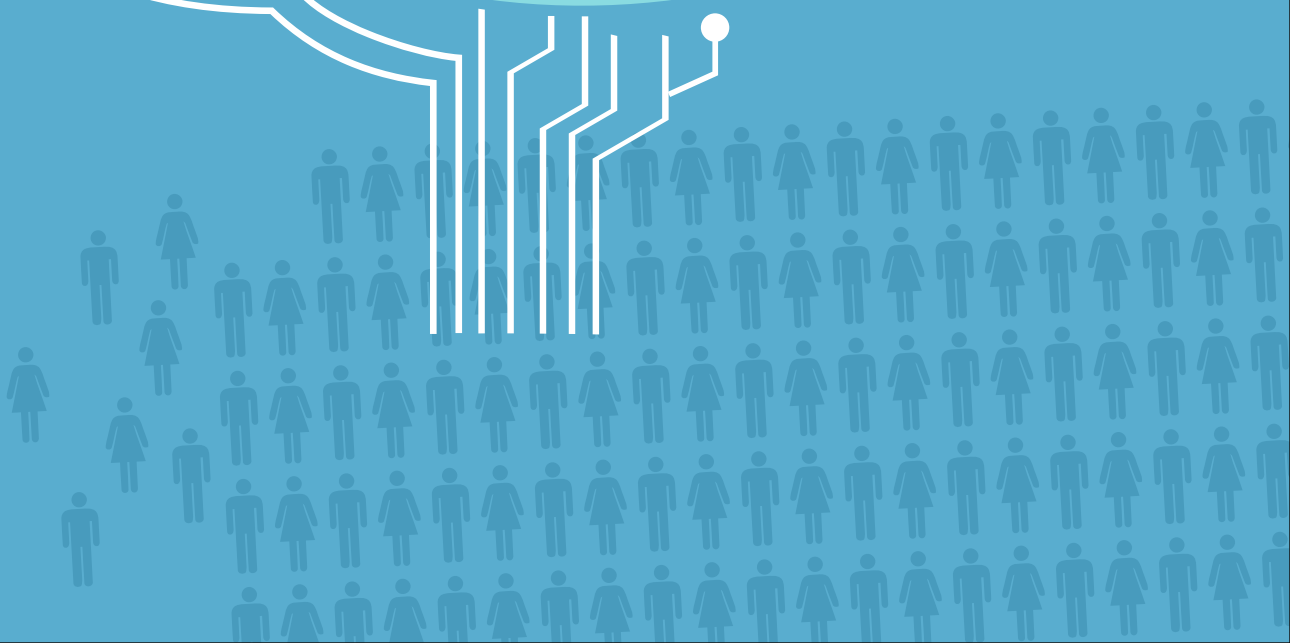
ISHA and its members organize activities all over Europe. At the core are the international conferences and seminars, which are held year-round in different university cities under varying academic topics. These events usually last a week, during which the participants present their own interests and research, hear lectures, take part in cultural visits and excursions, and enjoy a social program. The sections from all over Europe organize meetings on their own initiative. They can host a seminar, a large Annual Conference or any other Europe-wide event. Many sections also organize smaller events on the local (at their university/country) or regional (with neighboring countries) levels. The International Board coordinates the activities of the sections and also opens up possibilities to participate in varying projects with ISHA's international partner organizations. The organization produces various publications including, since 1999, an annual international journal Carnival.

ISHA will invite one person with interests in the field of Historical sciences to participate in a relevant conference and present their results.





# NATIONAL ORGANISERS



# NATIONAL ORGANISERS

The National Organisers are responsible for selecting projects, submitting applications, and for all communication with the Commission.

All contestants will be accompanied to the EU Contest by their National Organiser, or by an adult escort appointed by the National Organiser. The National Organiser, as the principal contact in all participating countries, will assure liaison between the contestants and the EU Contest in all matters concerning the Contest.

National Organisers and/or escort(s), together with their contestants, constitute their respective country's official delegation and are the only ones that can enjoy access to all public and private events associated with the Contest.

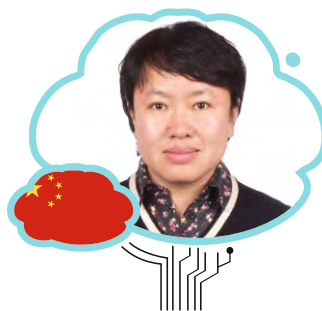
National Organisers assume responsibility for the well-being and behavior of their party.

They:

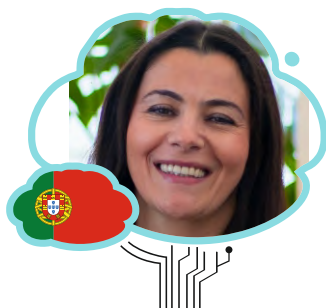
- ensure that their party travels with adequate health, accident and travel insurance that covers them for both the travel and duration of the Contest
- handle the linguistic or other problems that may arise during the Contest or in relation to associated activities
- ensure that they have their own measures in place to assure their party's behavior remains beyond reproach



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**Sharon B Snyder**  
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Fairs and Volunteer  
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Society for Science and  
the Public  
[ssnyder@societyforscience.org](mailto:ssnyder@societyforscience.org)

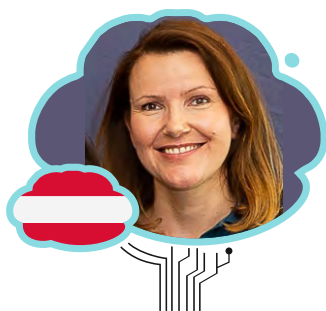


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Damynova**  
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# NATIONAL ORGANISERS



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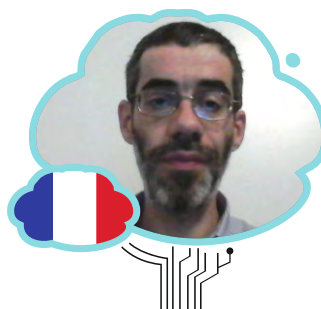


**Melanie Seiler**  
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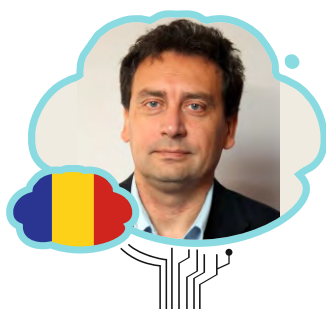
# NATIONAL ORGANISERS



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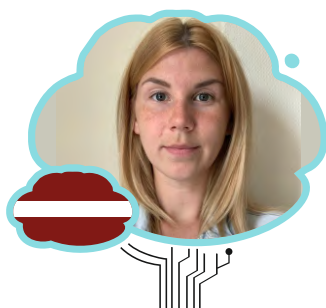
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# NATIONAL ORGANISERS



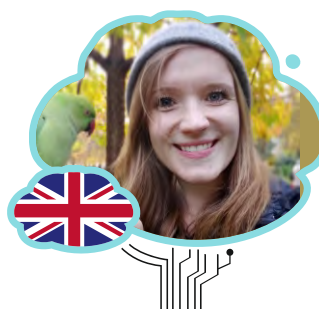
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**Amelia Lucy Perry**  
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[APerry@engineeringuk.com](mailto:APerry@engineeringuk.com)



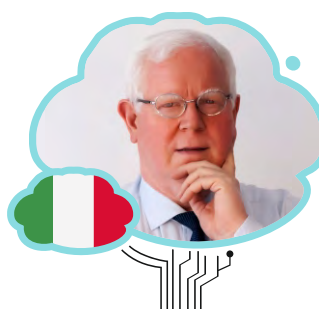
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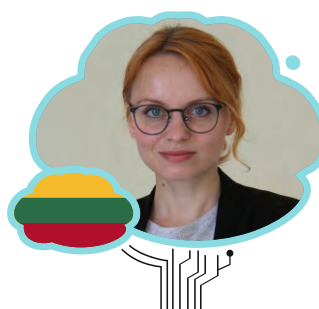
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# WINNERS



## 2018- 1989



# WINNERS 2018-1989

## DUBLIN 2018

### FIRST PRIZES

[Adrian Fleck](#), [Anna Amelie Fleck](#)

**Materials | Germany**

FleckProtec – Body Protection Made From Starch

[Nicolas Fedrigo](#)

**Medicine | Canada**

Improving Spinal Fusions: Redesigning the Pedicle Probe to Prevent Vertebral Breaches

[Brendon Matusch](#)

**Engineering | Canada**

Development of a Level 2 Autonomous Vehicle Using Convolutional Neural Networks and Reinforcement Learning

### SECOND PRIZES

[Alexandru Liviu BRATOSIN](#), [Petru MOLLA](#),  
[Mihnea Vlad BOJIAN](#)

**Biology | France**

DNADrive

[Karl Hendrik Tamkivi](#)

**Biology | Estonia**

Positioning of bat maternity roosts in relation to surrounding landscape complex in Western Saaremaa

[Francisco Miguel Araújo](#)

**Mathematics | Portugal**

Commutativity theorems for groups and semigroups

### THIRD PRIZES

[Marina Gudzhabidze](#), [Dea Ilarionova](#),  
[Shorena Gudzhabidze](#)

**Physics | Georgia**

Hand-Held Detector With Retroreflective Mosaic Screens To Visualize Optical Inhomogeneities

[Kyuhee Jo](#), [Chaeyoung Lee](#)

**Computing | South Korea**

Building a robust classification model for speech-based Parkinson's Disease diagnosis

[Sijia Zhang](#)

**Social sciences | China**

Investigation into the Verbal Conflict Problem in Middle School Students' Families

### HONORARY AWARDS

STOCKHOLM INTERNATIONAL YOUTH SCIENCE SEMINAR 2018

[Adrian Fleck](#)

**Materials | Germany**

FleckProtec – Body Protection Made From Starch

[Francisco Miguel Araújo](#)

**Mathematics | Portugal**

Commutativity theorems for groups and semigroups

LONDON INTERNATIONAL YOUTH SCIENCE FORUM 2019

[Anna Amelie Fleck](#)

**Materials | Germany**

FleckProtec – Body Protection Made From Starch

[Karl Hendrik Tamkivi](#)

**Biology | Estonia**

Positioning of bat maternity roosts in relation to surrounding landscape complex in Western Saaremaa

### SPECIAL DONATED PRIZES

**SPECIAL DONATED PRIZE JRC - JOINT RESEARCH CENTRE:**

3 prizes: two-day stays at the JRC's Institutes in Ispra, Italy

[Aleksandar Kostadinov Shopov](#), [Atanas Konstantinov Stefanov](#)

**Physics | Bulgaria**

Colour relations in young stellar objects

[Lisa BATTISTINI](#), [Thomas BOISSIN](#), [Léo-Nils BOISSIER](#)

**Engineering | France**

Eyeprint, give relief to your senses

[Stefan Gruber-Hofer](#), [Johannes Ortner](#),  
[Michael Eder](#)

**Engineering**

Development of a sampler for solid recycled materials

### SPECIAL DONATED PRIZE

**INTEL ISEF 2019 Prizes:**

3 prizes: participate at Intel ISEF 2019, Phoenix (AZ), USA

[Ivaylo Malinov Zhelev](#)

**Computing | Bulgaria**

Digital image denoising based on sphere-constrained total variation optimization with an additional noise component

[Ginés Marín Martínez](#)

**Social sciences | Spain**

Collaborative economy suspended, The Legal Challenge of Uber and BlaBlaCar: Job Precarity? Unfair Competition?

[Tobia Simon Ochsner](#)

**Computing | Switzerland**

Creating playlists with artificial intelligence

### SPECIAL DONATED PRIZES BY THE EIROFORUM

#### EIROFORUM PRIZES

**CERN - THE EUROPEAN LABORATORY FOR PARTICLE PHYSICS**

One week stay in Geneva, Switzerland

[Kasper Fredenslund](#)

**Physics | Denmark**

Neural Networks for Detecting Elementary Particles

#### EUROFUSION - JET

One week stay at Culham, United Kingdom

[Paraskevi-Marina Kandreli](#), [Nikolaos-Panagiotis Kalampokis](#), [Konstantinos Lolos](#)

**Engineering | Greece**

Algorithm Guided Modular Probe (AGMP)

**EMBL - THE EUROPEAN MOLECULAR BIOLOGY LABORATORY**

One week in Heidelberg, Germany

[Janka Motešická](#)

**Medicine | Slovakia**

Influence of PKC $\delta$  regulators on photodynamic therapy efficacy

**ESO - THE EUROPEAN SOUTHERN OBSERVATORY**

Visit to ESO site in Chile

[Sébastien Christophe Garmier](#)

**Physics | Switzerland**

cuRRay: CUDA ray tracer for light rays in relativistic Kerr-Newman spacetime



# WINNERS 2018-1989

## ESA - THE EUROPEAN SPACE AGENCY

Participate at a major European space science conference under the sponsorship of the European Space Agency, including coverage of their travel and accommodation costs.

[Max von Wolff](#)

**Physics | Germany**

A method for particulate raindrop analysis contributing to more accurate weather forecasts

## ESRF - THE EUROPEAN SYNCHROTRON RADIATION FACILITY

One week stay in Grenoble, France

[Emily Shao Ting Xu](#)

**Chemistry | United Kingdom**

Chiral separation of racemic mixtures using liquid phase separation techniques with homochiral metal organic frameworks

## ILL - THE INSTITUTE LAUE-LANGEVIN

One week stay in Grenoble, France

[Ittai Eden](#)

**Physics | Israel**

Paleomagnetic Dating of a Mud Brick Wall in Tel Megiddo

## XFEL - THE EUROPEAN X-RAY FREE-ELECTRON LASER FACILITY

One week stay in Hamburg, Germany

[Joshua Luke Mitchell](#)

**Engineering | United Kingdom**

The PlyBot - A Low-Cost Flatpack SCARA 3D Printer

## BIOECONOMY PRIZES

### BBI JU

Study trip to Belgium

[Gabija Imbrasaitė](#)

**Materials | Lithuania**

Bioplastic film with *Penicillium roqueforti* for pear preservation

## THE EUROPEAN FOOD AND DRINK INDUSTRY PRIZE

[Ioanna Karaiskaki, Anna Maria](#)

[Agathokleous, Pavlos Makrides](#)

**Environment | Cyprus**

Plastics in the marine environment of Cyprus: monitoring and potential bioremediation strategies

## THE CARGILL PRIZE

Visit to its state of the art R&D centre at Vilvoorde, Belgium

[João Maria Pinto Leite, Mário Jorge Queirós Ribeiro, Catarina Isabel Fonseca Brandão](#)

**Environment | Portugal**

ENTOFARM.PT

## THE KERRY PRIZE

Visit back to Dublin for winning team

[Blanka Novák](#)

**Biology | Hungary**

Innovative approach to the antibacterial and prebiotic *Lycium barbarum* extract

## THE TATE&LYLE PRIZE

Visit to either France or Germany laboratories

[Kārlis Emīls Vītols, Annija Kotova](#)

**Biology | Latvia**

The research of the feed base of Riga State German Grammar School's bee colonies

## EuCheMS

[Leandra Marie Viktoria Zinke, Katarina](#)

[Juhart, Sofia Quitter](#)

**Chemistry | European Schools**

Anti-Bacterial Silvernanoparticle Coating

## SWISS INTERNATIONAL TALENT FORUM

[Ivaylo Malinov Zhelev](#)

**Computing | Bulgaria**

Digital image denoising based on sphere-constrained total variation optimization with an additional noise component

## SALVETTI FOUNDATION AWARD

[Mariia Andreevna Soloveva](#)

**Chemistry | Russia**

Protection of metal from destructive corrosion

## PRACE

Visit to supercomputing center

[Filip Kučerák](#)

**Computing | Slovakia**

Trevo: Trees as a result of an algorithm

## BULGARIAN MATHEMATICS

### SUMMER SCHOOL AWARD

Visit to Summer School in Bulgaria

[Tobia Simon Ochsner](#)

**Computing | Switzerland**

Creating playlists with artificial intelligence

## EXPO SCIENCES LUXEMBOURG

Visit to Expo Sciences Luxembourg

[Simon Meehan](#)

**Biology | Ireland**

Investigation of antimicrobial effects of both aerial and sections parts of selected plants against *Staphylococcus aureus*

## WOLFRAM RESEARCH

All Mathematics, Physics and Computing projects receive a one year licence to Mathematica and WolframAlphaPro

## HOST ORGANIZER PRIZES

### SCIENCE FOUNDATION IRELAND (SFI) PRIZE

[Qingyang Wang](#)

**Physics | China**

The Study of Carbon Dots Synthesis and Fluorescence with Assistance of Microplasma Processing

## IRISH RESEARCH COUNCIL PRIZE

[Dahyeon Choi](#)

**Engineering | South Korea**

Development of an interactive and dynamic artificial intelligence storytelling system based on neural conversation models and speech recognition

## INSTITUTE OF PHYSICS PRIZE

[Daniel Zion Kang](#)

**Materials | USA**

Paintable Electronics - Novel Graphene Acrylic Thin Film

# WINNERS 2018-1989

## TALLINN 2017

### FIRST PRIZES

**Karina Movsesjan**  
**Biology | Czech Republic**

The role of RAD51 mutations in cancer development

**Adam Jan Alexander Ohnesorge**  
**Social sciences | Switzerland**

The forgotten prisoners – Civilian prisoners of the Great War in Corsica

**Danish Mahmood**  
**Engineering | Canada**

W.I.N.I.T.S. (Wireless Interconnected Non-Invasive Triage System)

### SECOND PRIZES

**Kamil Humański**  
**Environment | Poland**

Taxonomic diversity of the Middle Ordovician – early Silurian echinoderms from Siljansringen, Sweden

**Yana Zhabura**  
**Engineering | Ukraine**

Enhancement of technical capabilities of delta robot

**Colette Benko**  
**Medicine | Canada**

Novel Pediatric Cancer Therapy: Targeting Epigenetics to Induce Differentiation

### THIRD PRIZES

**Florian Cäsar**  
**Michael Plainer**  
**Mathematics | Austria**

Sigma – Learning how computers learn

**Chavdar Tsvetanov Lalov**  
**Mathematics | Bulgaria**

The structure of self-avoiding walks and the connective constant

**Arne Jakob Geipel**  
**Matthias Paul Grützner**  
**Julian Egbert**  
**Physics | Germany**

Liquid stream hits rough surfaces – showing an extraordinary and stable wave pattern

### HONORARY AWARD: STOCKHOLM INTERNATIONAL YOUTH SCIENCE SEMINAR 2017

**Kamil Humański**  
**Environment | Poland**

Taxonomic diversity of the Middle Ordovician – early Silurian echinoderms from Siljansringen, Sweden

**Yana Zhabur**  
**Engineering | Ukraine**

Enhancement of technical capabilities of delta robot

### HONORARY AWARD: LONDON INTERNATIONAL YOUTH SCIENCE FORUM 2018

**Karina Movsesjan**  
**Biology | Czech Republic**

The role of RAD51 mutations in cancer development

**Adam Jan Alexander Ohnesorge**  
**Social sciences | Switzerland**

The forgotten prisoners – Civilian prisoners of the Great War in Corsica

**Chavdar Tsvetanov Lalov**  
**Mathematics | Bulgaria**

The structure of self-avoiding walks and the connective constant

### SPECIAL DONATED PRIZES BY THE JOINT RESEARCH CENTRE (JRC)

**Domen Kulovec**  
**Uroš Prešern**  
**Tristan Kovačič**  
**Medicine | Slovenia**

Active targeting of cysteine cathepsins with liposomes conjugated with cystatin C

**Aleksander Paweł Kostrzewa**  
**Biology | Poland**

A comparison of primates' memory and learning skills, with use of an interactive platform in the Warsaw Zoological Garden

**Solène Noémie Dumas-Grolier**  
**Emma Marie-Christine Josette**  
**Jacqueline Robin**  
**Physics | France**

Les mystères de la Tasse (A mysterious cup)

### SPECIAL DONATED PRIZES THE INTEL ISEF 2018 PRIZES

**Juan Sánchez Mateos**  
**Claudia Rodríguez Rodríguez**  
**Biology | Spain**

On the structure and mechanics in vivo of the ostial cells and the aortic valve of the *Drosophila melanogaster* larva heart by analyzing high resolution microscopic images

**Gabriel Silva Silva**  
**Eduardo Teixeira Rocha Nogueira**  
**Francisca Santos Martins**  
**Environment | Portugal**  
ShealS - Sea Heals Soil

**Áron Molnár**  
**Engineering | Hungary**  
New high accuracy tilt sensor

### SPECIAL DONATED PRIZES BY THE EIROFORUM

### CERN - THE EUROPEAN LABORATORY FOR PARTICLE PHYSICS

**Florian Cäsar**  
**Michael Plainer**  
**Mathematics | Austria**

Sigma – Learning how computers learn

### EUROFUSION - JET

**Arne Jakob Geipel**  
**Matthias Paul Grützner**  
**Julian Egbert**  
**Physics | Germany**

Liquid stream hits rough surfaces – showing an extraordinary and stable wave pattern

# WINNERS 2018-1989

## EMBL - THE EUROPEAN MOLECULAR BIOLOGY LABORATORY

**Nina Chiara Kathe**  
Medicine | Switzerland

Small non-coding RNA induced gene silencing of tetracycline resistance gene in *E. coli*

## ESO - THE EUROPEAN SOUTHERN OBSERVATORY

**Can Pak**  
Physics | Turkey

Measuring the surface vibration frequency with laser diode

## ESA - THE EUROPEAN SPACE AGENCY

**Dávid Puskás**  
Materials | Hungary

3D printed Moonbase

## ESRF - THE EUROPEAN SYNCHROTRON RADIATION FACILITY

**Johannes Nicolas Waller**  
**Philipp Nikolas Kessler**  
Chemistry | Germany

Fehling's solution – Do we need a new interpretation?

## ILL - THE INSTITUTE LAUE-LANGEVIN

**Miroslav Kurka**  
Physics | Slovakia

Dynamic magnetization behavior in soft magnetic alloys of different structure

## XFEL - THE EUROPEAN X-RAY FREE-ELECTRON LASER FACILITY

**Mykola Veremchuk**  
Physics | Ukraine

The investigation of the distribution of the density in gases using the Schlieren photography

## BIOECONOMY PRIZES

### BBI JU

**Gal Levy**  
Environment | Israel

Production of biodiesel from organic wastes by the "black-soldier" fly larvae

## THE EUROPEAN FOOD AND DRINK INDUSTRY PRIZE

**Matas Aliuškevičius**  
Engineering | Lithuania

Honeybee Colony Sounds Reveal Secrets of Life in Hives

## THE DANONE PRIZE

**Kendra Zhang**  
Environment | USA

A paper-based microbial fuel cell for self-powered glucose monitoring in saliva

## THE DSM PRIZE

**Camilla Hurst**  
Materials | European Schools

The role of materials and surfaces in the transmission of bacteria in public places

## THE PEPSICO PRIZE

**Ayumi Rie Mayer**  
**Olivia Linnea Rygaard-Hjalsted**  
Environment | Denmark

Sound PoliSea

## EUCHEMS

**Songrui ZHAO**  
Chemistry | China

A Research on Synthesis, Characterization and CO<sub>2</sub> Absorptive Character of Pyridinium-based Ionic Liquids

## SWISS INTERNATIONAL TALENT FORUM

**Alexandr Jankov**  
Mathematics | Czech Republic

The Basel problem

## WOLFRAM RESEARCH

**Andrei Shvedau**  
**Nikolay Sheshko**  
Mathematics | Belarus

Any Heron Set can be Embedded in Z<sup>2</sup>

**Alexandr Jankov**  
Mathematics | Czech Republic

The Basel problem

**Aleksandrs Jakovlevs**  
**Edvards Janis Recickis**  
Mathematics | Latvia

Magic Polyiamonds

**Alena Igorevna Teselkina**  
Mathematics | Russia

Centered figurate numbers

**Tjaš Božič**  
**Miha Torkar**  
**Sara Maraž**

Mathematics | Slovenia

Origamics: Mathematical exploration of the equilateral triangle through paper folding

**Adam Piotr Klukowski**  
Mathematics | Poland

The floor-polynomials

**Gustav Møller Grimberg**  
Mathematics | Denmark

Use of comparative entropy analyses for dating and quantifying historical divergences between languages

**Florian Cäsar**  
**Michael Plainer**  
Mathematics | Austria

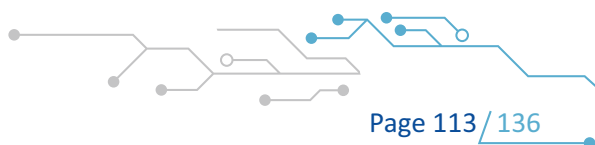
Sigma – Learning how computers learn

**Barry Philip Owiti**  
Mathematics | Finland

An Application of Queuing Theory On Relief Systems

**Chavdar Tsvetanov Lalov**  
Mathematics | Bulgaria

The structure of self-avoiding walks and the connective constant



# WINNERS 2018-1989

## SPECIAL DONATED PRIZES

### SALVETTI FOUNDATION AWARD

**Philipp Sinnewe**  
**Engineering | Germany**

A more energy-efficient aeroplane engine

### PRACE

**Adomas Paulauskas**  
**Computing | Lithuania**

Virtual Reality Games for Rehabilitation

## HOST ORGANISER PRIZES

### THE TALLINN CITY GOVERNMENT PRIZE

**Luís Miguel Afonso Pinto**  
**Beatriz Sampaio Bastião**  
**Olavo Filipe Estima Saraiva**  
**Engineering | Portugal**

EasyPark

### MINISTRY OF EDUCATION AND RESEARCH AWARD

**Gustav Møller Grimberg**  
**Mathematics | Denmark**

Use of comparative entropy analyses for dating and quantifying historical divergences between languages

## BRUSSELS 2016

### FIRST PRIZES

**Ane Kristine Espeseth**  
**Torstein Vik**  
**Mathematics | Norway**

Motivic Symbols and Classical Multiplicative Functions

**Valerio Pagliarino**  
**Computing | Italy**

LaserWAN: laser broadband internet connection

**River Connell Grace**  
**Biology | USA**

Shining a Light on the Blind: Evolutionary Regression and Adaptive Progression in the Micro-vertebrate *Ramphotyphlops braminus*, a Model for Understanding Brain Organization and Complex Neurological Disorders

### SECOND PRIZES

**Tassilo Constantin Schwarz**  
**Computing | Germany**

Drone detection system: Detection, tracking and classification of potentially dangerous flight objects for multicopter defence

**Kayley Noelle Ting**  
**Medicine | Canada**

Analysis of Electrodermal Activity to Quantify Stress Levels in Autism

**Ivo Zell**  
**Physics | Germany**

A wing is enough: An improved flying wing based on a bell-shaped lift distribution

## THIRD PRIZES

**Tomáš Heger**  
**Medicine | Czech Republic**

Biological activity of essential oils and extracts from narrow-leaved lavender (*Lavandula angustifolia* Mill.) flower

**Mari Louise Fufezan**  
**Diana Bura**  
**Environment | Ireland**

An Investigation into the Effects of Enzymes used in Animal Feed Additives on the Lifespan of *Caenorhabditis Elegans*

**Yunji Seo**  
**Yongchan Hong**  
**Environment | South Korea**

Agricultural application of halobacteria and their compatible solutes in enhancing plant salinity endurance

### HONORARY AWARD: LONDON INTERNATIONAL YOUTH SCIENCE FORUM 2016

**Torstein Vik**  
**Mathematics | Norway**

Motivic Symbols and Classical Multiplicative Functions

**Valerio Pagliarino**  
**Computing | Italy**

LaserWAN: laser broadband internet connection

### HONORARY AWARD: STOCKHOLM INTERNATIONAL YOUTH SCIENCE SEMINAR 2016

**Ane Kristine Espeseth**  
**Mathematics | Norway**

Motivic Symbols and Classical Multiplicative Functions

**Tomáš Heger**  
**Medicine | Czech Republic**

Biological activity of essential oils and extracts from narrow-leaved lavender (*Lavandula angustifolia* Mill.) flower

# WINNERS 2018-1989

**Ivo Zell**  
**Physics | Germany**

A wing is enough: An improved flying wing based on a bell-shaped lift distribution

## SPECIAL DONATED PRIZES BY THE EIROFORUM

### ESA: THE EUROPEAN SPACE AGENCY

**Kristjan Kongas**  
**Computing | Estonia**

Simulation of the collision of binary white dwarfs using a cubic grid - stability analysis by variation of diffusion constant and resolution

### CERN: THE EUROPEAN LABORATORY FOR PARTICLE PHYSICS

**Uladzislau Hadalau**  
**Computing | Belarus**

Geneces – Cloud EcoSystem  
EUROFusion - JET

**Jaime Redondo Yuste**  
**Physics | Spain**

A study of the interaction between a magnetic field and electrolytic ions

### ESRF: THE EUROPEAN SYNCHROTRON RADIATION FACILITY

**Eliška Bršlicová**  
**Environment | Czech Republic**

Subvolcanic intrusions in South Bohemia

### EMBL: THE EUROPEAN MOLECULAR BIOLOGY LABORATORY

**Rūta Prakapaitė**  
**Medicine | Lithuania**

Antimicrobial bacteriophage dressing in chronic wound treatment

### ESO: THE EUROPEAN SOUTHERN OBSERVATORY

**Tassilo Constantin Schwarz**  
**Computing | Germany**

Drone detection system: Detection, tracking and classification of potentially dangerous flight objects for multicopter defence

### ILL: THE INSTITUTE LAUE-LANGEVIN

**Balduin Dettling**  
**Engineering | Switzerland**

Development of a 3D Display

### XFEL: EUROPEAN X-RAY FREE-ELECTRON LASER FACILITY

**Péter Udvardi**  
**Physics | Hungary**

Microelectromechanical structure for sensing of low frequency sounds and vibrations

## SPECIAL DONATED PRIZES BY THE JOINT RESEARCH CENTRE (JRC)

**Daniel Andreas Höllerer**  
**Jonathan Reisinger**  
**Engineering | Austria**

Slackline Tensioning System

**Luc Régis Baudinaud**  
**Florent Alexis Baubet**  
**Alexis Nabil Bossard**  
**Physics | France**

Diffusion compensation by anticipation

**Sahar Roxanne El-Hady**  
**Chemistry | United Kingdom**

How extreme was climate change in South Wales at the end of the last glacial period?

## SPECIAL DONATED PRIZES THE INTEL ISEF 2016 PRIZES

**Amalya Ben Asher**  
**Yuval Feldman**  
**Tal Cohen**  
**Medicine | Israel**

Aggregated Drip Infusion System

**Naama Schor**  
**Social sciences | Israel**

The morality of larks and owls: relationship between the biological clock and morality in decision making.

**Zane Grēta Grants**  
**Daniela Gods-Romanovska**  
**Engineering | Latvia**

The textile-based tensoresistive sensors' operation and their usage in the innovative technologies

## SPECIAL DONATED PRIZES EUCHEMS

**Christian Schärf**  
**Paul Rathke**  
**Friedrich Wanierke**  
**Chemistry | Germany**

Alpha-aluminium oxide-based gemstones: Development of a chemical synthesis process prompted by current mining conditions

## SPECIAL DONATED PRIZES BBI

**Modestas Gudauskas**  
**Biology | Lithuania**

Acetobacter spp. bacteria producing biopolymers simultaneously

## SPECIAL DONATED PRIZES FOODDRINKEUROPE

**Daniel Vasilica Copil**  
**Sofia Onorato**  
**Biology | Italy**

Natural antimicrobial extracted from medicinal plants

## SPECIAL DONATED PRIZES DUPONT

**Mari Louise Fufezan**  
**Diana Bura**  
**Environment | Ireland**

An Investigation into the Effects of Enzymes used in Animal Feed Additives on the Lifespan of Caenorhabditis Elegans

# WINNERS 2018-1989

## SPECIAL DONATED PRIZES FERRERO

**Adam Andor Urmos**

**Chemistry | EuropeanSchools**

Multifunctional application of natural sensor arrays

## SPECIAL DONATED PRIZES NESTLE

**Ana Milovanović**

**Ana Halužan Vasle**

**Biology | Slovenia**

Designing Synthetic Gene Regulatory Networks

## SPECIAL DONATED PRIZES INNOVATION IN FOOD AND AGRICULTURE

**Ivan Hristov Ivanov**

**Vasilen Rosenov Tsvetkov**

**Engineering | Bulgaria**

Intelligent Planting

## SALVETTI FOUNDATION

**Ethan Lee Dunbar-Baker**

**Po Yin Chau**

**Rogan Colin Michael McGilp**

**Engineering | United Kingdom**

David's Wheels; a disability accessible and driveable hot rod for social and physical mobility

## PRACE

**Eero Valkama**

**Iiro Kumpulainen**

**Computing | Finland**

Digitalization of Chess Games using Computer Vision

## MILAN 2015

## FIRST PRIZES

**Sanath Kumar Devalapurkar**

**Mathematics | United States**

On the Stability and Algebraicity of Algebraic K-theory

**Michał Bączyk**

**Paweł Piotr Czyż**

**Physics | Poland**

The studies of behaviour of single and coupled on-off type oscillators on the example of bottle oscillators

**Lukas Stockner**

**Computing | Germany**

Statistical modeling of volumescattered light

## SECOND PRIZES

**Michael Bayrhammer**

**Florian Thaller**

**Medicine | Austria**

Tendon Tissue Engineering - Development of a Novel Tissue Bioreactor for Culturing Tendons

**Polina Vladislavovna Ledkova**

**Environment | Russia**

Successions of vegetation and recultivation of the anthropogenically changed landscapes in neighborhoods of the Krasnoye settlement and in the Nenets state nature reserve, 2013- 2014

**Dominika Katarzyna Bakalarz**

**Joanna Michalina Jurek**

**Medicine | Poland**

Origami BioBandage - mathematically described multipotential bioimplant based on polymeric nanomaterial modified by hydroxyapatite and stem cells

## THIRD PRIZES

**Timothy Matthew Logan**

**Environment | New Zealand**

To Graze or Not to Graze?

**Anselm von Wangenheim**

**Physics | Germany**

Monopod - Physics at the tipping point

**Katariina Kisand**

**Chemistry | Estonia**

Synthesis and biochemical characterization of covalent fluorescent probes targeting mitotic protein kinase Aurora A

## WARSAW 2014

## FIRST PRIZES

**Luboš Vozdecký**

**Physics | Czech Republic**

Rolling Friction

**Mariana de Pinho Garcia**

**Matilde Gonçalves Moreira da Silva**

**Biology | Portugal**

Smart Snails

**João Pedro Estácio Gaspar**

**Gonçalves de Araújo**

**Mathematic | Portugal**

A natural characterization of semilattices of rectangular bands and groups of exponent two

## SECOND PRIZES

**Paul Clarke**

**Mathematics | Ireland**

Contributions to cyclic graph theory

**Aleš Zupančič**

**Chemistry | Slovenia**

Self-cleaning fabrics based on nanocovers

**Petar Milkov Gaydarov**

**Mathematics | Bulgaria**

Hamming Distance of Polynomials over GF(2)

## THIRD PRIZES

**Philipp Mandler**

**Anselm Bernhard Peter Dewald**

**Robin Braun**

**Engineering | Germany**

Hexapod - Construction and Programming of a six-legged exploration robot

**Matas Navickas**

**Biology | Lithuania**

Flowering Apple Tree "Malus baccata x Malus prunifolia" in vitro

# WINNERS 2018-1989

**Ameeta Kumar**  
**Aneeta Kumar**  
**Medicine | United Kingdom**

pHLIP? Beacon of hope

## PRAGUE 2013

### FIRST PRIZES

**Perttu Pölönen**  
**Social Sciences | Finland**

Music A'Clock

**Ciara Judge, Emer Hickey**  
**Sophie Healy-Thow**  
**Biology | Ireland**

A statistical investigation of the effects of diazotroph bacteria on plant germination

**Frederick Turner**  
**Engineering | United Kingdom**

Genetics at home: Building a PCR machine and other equipment for setting up a home genetics lab

### SECOND PRIZES

**Thomas Steinlechner**  
**Dominik Kovacs, Yuki Trippel**  
**Engineering | Austria**

Anastomose Robot Tool - ART

**Lennart Kleinwort**  
**Computing | Germany**

FreeGeo – the world's first dynamic Android mathematics system app

**Jasmin Allenspach**  
**Mathematics | Switzerland**

LSLLSLSLLSLSLS – Modern Mathematics in Islamic Mosaics

### THIRD PRIZES

**Balázs Zsombori**  
**Computing | Hungary**

PiktoVerb – Giving Everyone a Voice

**Daniel Pflueger**  
**Physics | Germany**

Measuring water waves

**Maksim Bezrukov**  
**Aliaksandr Stadolni**  
**Mathematics | Belarus**

Percolation games on Cayley graphs of groups

## BRATISLAVA 2012

### FIRST PRIZES (€7000)

**Mark James Kelly**  
**Eric Doyle**  
**Physics | Ireland**

Simulation accuracy in the gravitational many-body problem

**Jakub Nagrodzki**  
**Chemistry | Poland**

Development of molecular patches therapy: trimethylguanosine cap analogues synthesis

**Philip Huprich**  
**Manuel Scheipner**  
**Daniel Zind**  
**Engineering | Austria**

Cam Guard

### SECOND PRIZES

**Nevzet Khasanov**  
**Physics | Switzerland**

Diffusion cloud chamber: the visible radioactivity

**Jan Michael Rapp**  
**Timo Schmetzer**  
**Computing | Germany**

Information technology for a feedback control

**Asbjørn Christian Nordentoft**  
**Mathematics | Denmark**

Applications of Dirichlet series

### THIRD PRIZES

**Anna Maria Punab**  
**Social Sciences | Estonia**

The relationships between academic achievements and happiness among students in secondary education

**Anna Julia Kuśnierczak**  
**Biology | Poland**

Alternative pollination: influence of different ecosystems on the reproduction of red mason bee (*Osmia rufa* L.) on the example of a meadow, an orchard, a forest and an arboretum

**Pavel Litvinka**  
**Computing | Belarus**

Development of hardware and software complex for the formation of three-dimensional image

## HELSINKI 2011

### FIRST PRIZES

**Alexander Amini**  
**Computing | Ireland**

Tennis Sensor Data Analysis: An Automated System for Macro Motion Refinement

**Pius Markus Theiler**  
**Engineering | Switzerland**

pi Cam - The Development of a Camming Device for Climbing

**Povilas Kavaliauskas**  
**Medicine | Lithuania**

The Role of Houseflies (*Musca domestica*) in Spreading Antibiotic Resistant Bacteria

### SECOND PRIZES

**Benjamin Walter**  
**Physics | Germany**

Scanning Tunnelling Microscopy of Coronene Molecules on Germanium (111)

**Natalie Mitchell**  
**Physics | United Kingdom**

Auto Focusing Methods for Digital Microscopy

**Georgi Atanasov**  
**Georgi Georgiev**  
**Kalina Petrova**  
**Computing | Bulgaria**

DriveFreeZ - Driving Simulator

# WINNERS 2018-1989

## THIRD PRIZES

**Alex Bergsaker**  
**Social Sciences | Norway**

Guanxi – the Significance of Relations and Social Networks in Chinese Business

**Michal Miskiewicz**  
**Mathematics | Poland**

The Charm of the 'mi' Set

**Holly Rees**  
**Biology | United Kingdom**

Investigation into Embryonic Stem Cell Differentiation

## LISBON 2010

## FIRST PRIZES

**Miroslav Rapcak**  
**Physics | Czech Republic**

Complete Phase Diagram Of CO<sub>2</sub> Nanoclusters

**David Pegrimék**  
**Lukasz Sokolowski**  
**Biology | Poland**

Foraging Strategy Of The Ant *Formica cinerea*

**Dávid Horváth**  
**Márton Balassi**  
**Social Sciences | Hungary**

Nature On Your Screen - Computer Based Modeling And Local Area Network In The Education Of Ecology

## SECOND PRIZES

**Justyna Slowiak**  
**Biology | Poland**

Biodiversity, Palaeoecology And Taxonomical Position Of Vertebrates In The Middle Triassic Sea Ecosystem In Silesia (sw Poland)

**Simon Schuldt**  
**Engineering | Germany**

Aircraft Of The Future - A Practise based School Project

**Luca Banszerus**  
**Michael Schmitz**  
**Physics | Germany**

Production And Characterization Of Graphene Devices

## THIRD PRIZES

**Aleksejs Sazonovs**  
**Computing | Latvia**

Applying Image Recognition Methods For Classification Of Astronomical Images

**Davide Giacinto Lucarelli**  
**Niccolò Pozzi**  
**Stefano Sanfilippo**  
**Mathematics | Italy**

An Analysis of the Network

**Inês Alexandra**  
**Costa Kristoffer de Sá Høg**  
**Environment | Portugal**

Rocks Of The Southwest - The Mysteries Written On The Stone

## PARIS 2009

## FIRST PRIZES

**Liam McCarthy**  
**John D. O'Callaghan**  
**Biology | Ireland**

The Development of a Convenient Test Method for Somatic Cell Count and it's Importance in Milk Production

**Fabian Gafner (19)**  
**Physics | Switzerland**

Dikranos – the airplane with reverse gear

**Aleksander Kubica**  
**Wiktor Pilewski**  
**Physics | Poland**

Spiral Zone Plates

## SECOND PRIZES

**Elodie Aubanel**  
**Jérémy Dargent**  
**Arnaud De Richecour**  
**Physics | France**

Pick Up a Cosmic Wink

**Philip Cardona**  
**Engineering | Malta**

Cappucino Logo Printer

**Sara Vima Grau**  
**Earth Science | Spain**

From mineral to Romanesque altarpiece: Identification of mineral pigments and reproduction of a Catalan Romanesque altarpiece

## THIRD PRIZES

**Áron Hunyadi**  
**Engineering | Hungary**

Walking through (a piece of) time with a timepiece

**Stefan Strobel**  
**Computing | Germany**

Development of a near-infrared vein imaging system

**Omri Lesser**  
**Physics | Israel**

The Complex Potential and Its Application to the Planning of Dams

## COPENHAGEN 2008

## FIRST PRIZES

**Magdalena Bojarska**  
**Mathematics | Poland**

Hamiltonian cycles in generalized

**Halin grap**  
**Martin Tkáč**  
**Engineering | Slovak Republic**

Tilting of bulk materials based on gravitation principle in cargo railway transport

**Elisabeth Muller**  
**Earth Science | United Kingdom**

From Microcosm to Magma Oceans: A Lunar Meteorite Perspective

## SECOND PRIZES

**Michael Mikát**  
**Biology | Czech Republic**

Ecology and Ethology of family Lestidae (Insecta: Odonata)



# WINNERS 2018-1989

**David Wittkowski**  
**Physics | Germany**

Polygonal structures on rotating fluid surfaces

.....  
**Émer Jones**

**Engineering | Ireland**

Research and Development of  
Emergency Sandbag Shelters

## THIRD PRIZES

**Aliaksandr Minets**  
**Mathematics | Belarus**

Orbital origamis and stabilizers of stair  
origamis

.....  
**Etienne Lalique**

**Axel Talon**

**Physics | France**

Phaethon, the solar balloon

.....  
**Eriks Zaharans**

**Janis Zaharans**

**Physics | Latvia**

Monitoring of cardiovascular system

**VALENCIA 2007**

## FIRST PRIZES

**Florian Ostermaier**  
**Henrike Wilms**  
**Physics | Germany**

Flashing Water Drops

.....  
**Márton Spohn**

**Chemistry | Hungary**

Examination of Plants' Self-Defence  
Against Pests

.....  
**Abdusalam Abubakar**

**Mathematics | Ireland**

An Extension of Wiener's Attack on RSA  
Encryption

## SECOND PRIZES

**Martina Hafner**  
**Environment | Austria**

Energy from maize straw

**Anne-Laure Delaye**  
**Aude Latrive**

**Astrid Verpeaux**  
**Physics | France**

Can we walk on water?

.....  
**Yael Amarilyo**

**Biology | Israel**

Molecular Identification and  
Characterization of Phytoplasma  
Bacteria in Grapevines – Another  
Milestone Saving the Wine Industry

## THIRD PRIZES

**Julian Glechner**  
**Werner Pollhammer**

**David Stockinger**  
**Engineering | Austria**

Latent heat storage system (Salt crystals  
as a new energy storage technology)

.....  
**Eva Černohorská**  
**Mathematics | Czech Republic**

Generalization of method of tiling in  
triangular and hexagonal grid

.....  
**Florian Schnös**  
**Engineering | Germany**

SmartCam – Development of a  
universal 3D-Camera

**STOCKHOLM 2006**

## FIRST PRIZES

**Michael Kaiser**  
**Johannes Kienl**  
**Engineering | Austria**

Development of a completely new  
electro-thermo-mechanical De-Icing  
system for aircraft

.....  
**Johannes Burkart**  
**Alexander Joos**  
**Physics | Germany**

Flight curves of table tennis balls

.....  
**Tomasz Wdowik**  
**Chemistry | Poland**

Synthesis of a potential  $\alpha$ -blocker

## SECOND PRIZES

**Thomas Gigl**  
**Earth Science | Germany**

Radial velocity measurement of  
spectroscopic binaries

.....  
**Michael Marcinkowski**  
**Mathematics | Poland**

On a geometric transformation relating  
the Euler and Nagel lines

.....  
**Zoltan Tarjanyi**  
**Csaba Vass (19)**  
**Biology | Hungary**

New diagnostic method to define the  
errors of the apoptosis program

## THIRD PRIZES

**Georgi Dyankov**  
**Physics | Bulgaria**

A method of measurement of refractive  
indices, birefringence and thickness of a  
thin anisotropic layer

.....  
**Aisling Judge**  
**Biology | Ireland**

The development and evaluation of a  
biological food spoilage indicator

**MOSCOW 2005**

## FIRST PRIZES

**Igor Gotlibovitch**  
**Renate Landig**  
**Physics | Germany**

Corners in water - unexpected  
symmetry breaking in fluid dynamics

.....  
**Javier Lopez Martinez Fortun**  
**Elicer Perez Robaina**  
**Carlos Machado Carvajal**  
**Biology | Spain**

Sonchus leptacaulis: a new species  
consolidation in Gran Canaria

.....  
**Silvana Konermann**  
**Medicine | Switzerland**

Development of a system for the local  
prevention of catheter associated  
urinary tract infection

# WINNERS 2018-1989

## SECOND PRIZES

**Zdenek Janovsky**  
**Environment | Czech Republic**

Vegetation dynamics of the small forest and open landscape ponds and its historical causes

**Stephen Schulz**  
**Chemistry | Germany**

Lab on the chip - new perspectives with electrons as universal reagent

**Patrick Collison**  
**Computer | Ireland**

Croma: a new dialect of lisp

## THIRD PRIZES

**Gitte Ahlquist Jonsson**  
**Medicine | Denmark**

Aid for putting on and taking off stockings for handicapped persons

**Margus NIITSOO**  
**Mathematics | Estonia**

Generalizations of the Fibonacci sequence

**Eric Deele, Pierre Haas**  
**Biology | Luxembourg**

Cartography of galls

## DUBLIN 2004

## FIRST PRIZES

**Martin Knobel, Gerhard Schony**  
**Florian Grossbacher**  
**Engineering | Austria**

Breakthrough in the manufacturing of condenser microphones

**Charlotte Stranvist**  
**Chemistry | Denmark**

Improving the method of synthesizing antidepressants

**Mario Chemnitz**  
**Physics | Germany**

Ultrasonic detector for gas chromatography

## SECOND PRIZES

**Marcel Kolodziejczyk**  
**Mathematics | Poland**

A counterfeit coin problem

**Roland Bauerschmidt**  
**Computer | Germany**

Internet access for guests

**Mehmet Halit Calayir**  
**Mehmet Cakan**  
**Physics | Turkey**

Construction of a seismograph

## THIRD PRIZES

**Ocan Sankur**  
**Computer | Turkey**

N-gram based language classification

**Artur Lewandowski**  
**Biology | Poland**

Ants learning process

**Laurynas Pliusky**  
**Environment | Lithuania**

Hydrochemical analysis of the lakes of Trakai

## BUDAPEST 2003

## FIRST PRIZES

**Jana Ivanidze**  
**Germany**

pH sensitive GFP mutant

**Uwe Treske**  
**Germany**

Low-cost scanning tunneling microscope

**Gábor Németh**  
**Hungary**

Efficiency enhancement of plasma loudspeakers

## SECOND PRIZES

**David Sehna**  
**Czech Republic**

Math studio - a computer algebra system

**László Nagy**  
**Hungary**

Phytocenology and environment protection of the central Hungarian plain

**Lukasz Jaremko**  
**Mariusz Jaremko**  
**Poland**

Design and synthesis of two new immuno-suppressants

## THIRD PRIZES

**Wim Cools**  
**Netherlands**

A new compact operating system

**Ksenia Rogova**  
**Russia**

The key to the mystery of the stone book

**Johannes Keller**  
**Switzerland**

The influence of the quill shape on the harpsichord sound

## VIENNA 2002

## FIRST PRIZES

**Pawel Piotrowski**  
**Germany**

Special wings and ground effect for efficient transportation

**Martin Etzrodt**  
**Martin von der Helm**  
**Germany**

The slime mold physarum as a model organism for biotesting

**Lauri Kauppila**  
**Finland**

Comparing the Oxidiser/Fuel ratio and heat released from Rocket Fuel Combustion

# WINNERS 2018-1989

## SECOND PRIZES

**Vincent Bougreau**  
**Solene Broner**  
**France**

Are there germs in the highest layers of the atmosphere?

**Arnhild Jacobsen**  
**Norway**

The Physics of a rolling soda can

**David Sahrla**  
**Slovenia**

Chemiluminescence

## THIRD PRIZES

**Maarten Vanhove**  
**Belgium**

Morphological diversity of cladoceran resting eggs in shallow lakes

**Piotr Garbacz**  
**Poland**

Influence of direction and intensity of gravity on plant growth

**Ozgur Paksoy**  
**Aslihan Akin Nuriye**  
**Turkey**

A general approach to the proof of inequalities

## SECOND PRIZES

**Bálint Pato**  
**Hungary**

Stress proteins as constituents of the Microtrabecular Lattice

**Zbigniew Lech Pianowski**  
**Poland**

New liquid crystal for holography

**Marcin Wojnarski**  
**Poland**

Neural network for solving classification problems

## THIRD PRIZES

**Jimi Lee Truelsen**  
**Denmark**

A new cryptographic algorithm

**Shane Browne**  
**Michael O'Toole**  
**Peter Taylor**  
**Ireland**

Symmetrical shapes formed by polygons

**Richard Hulme**  
**Yan Pugh-Jones**  
**United Kingdom**

Analysing the flight of Brazilian humming birds

## SECOND PRIZES

**Vaclav Rehak**  
**Czech Republic**

Prisoners dilemma: modelling of social phenomena using cellular automata

**Janez Langus**  
**Slovenia**

Theoretical and practical aerodynamics

**Jasmin Roya Djannatian**  
**Germany**

Cytotoxicity of different mistletoe preparations on leukaemic cells

## THIRD PRIZES

**Florent Durrey**  
**France**

Globular clusters around the Milky Way

**Gàbor Guta**  
**Hungary**

Simulator with ultra low noise

**Yevgen Nazarenko**  
**Ukraine**

The processing of aluminous manufacture after-product

## TRAVEL AWARD TO THE NOBEL PRIZE CEREMONY

**Jasmin Roya Djannatian**  
**Germany**

Cytotoxicity of different mistletoe preparations on leukemia cells

**Anastasiya Efimenko**  
**United Kingdom**

My challenge to children's mortality

**BERGEN 2001**

## FIRST PRIZES

**Thomas Aumeyr**  
**Thomas Morocutti**  
**Austria**

CURE - Controlled Ultraviolet Radiation Equipment

**Sebastian Abel**  
**Germany**

Cloud

**James Lee Mitchell**  
**United Kingdom**

Characteristics of Azole drug resistance in candida tropicalis

**AMSTERDAM 2000**

## FIRST PRIZES

**Grzegorz Niedzwiedzki**  
**Poland**

New Finds of dinosaur tracks in the Holy Cross Mountains

**Joanne Daniel**  
**Gemma Dawson**  
**Ally Wilkie**  
**United Kingdom**

Designing a disposable sample device

**Nickoloz Tchankoshvil**  
**Georgia**

The monitoring and protection of bats in Georgia

# WINNERS 2018-1989

## THESSALONIKI 1999

### FIRST PRIZES

**Sarah Flannery**  
**Ireland**

Cryptography: a new algorithm vs. the RSA

**Sverrir Gudmundsson**  
**Pall Melsted**  
**Tryggvi Thorgeirsson**  
**Iceland**

The galaxy cluster MS1621 +2640

**Michal Ksiazkiewicz**  
**Poland**

Estimation of urban pollution using Epiphytic Lichens

### SECOND PRIZES

**Sebastian Gschwende, Michael Rödel**  
**Germany**

FinoPro simulates mechanical events, using finite elements

**Lorraine Ruzié**  
**France**

Submarine volcano emergence forecasting device

**Jure Leskovec**  
**Slovenia**

Detection of human bodies from a sequence of images

### THIRD PRIZES

**Patrick Imper, Raphael Zulliger**  
**Switzerland**

Speedometer for roller blades

**Arlet Bellvehi Sampera**  
**Joan Munich Arranz**  
**Spain**

Reestablishment of amphibian population despite exotic fish threat

**Maciej Walczak**  
**Poland**

Chemical synthesis of amionalkyl nucleoside phosphates

## PORTO 1998

### FIRST PRIZES

**Gabor Bernath**  
**Hungary**

ScanGuru: the 3D scanner

**Paul Pak, Peter Weilenmann**  
**Austria**

The virtual blind man's cane

**Robert Carney**  
**Matthew Tomas**  
**United Kingdom**

Yellowing of alkyd-based paints in the dark

### SECOND PRIZES

**Karsten Weiss**  
**Germany**

Digi Cow: a completely new type of milking machine

**Arthur Baas**  
**Adrian de Groot**  
**Chris Weel**  
**Netherlands**

POSEIDON: the wave-motion power generator

**Dasa Suput**  
**Slovenia**

Sea anemones

### THIRD PRIZES

**Enrik Eriksen**  
**Denmark**

KOMBI-2: a novel approach soil preparation and sowing

**Juliane Richter**  
**Germany**

The phenomenon of fluctuation in concentration

**Montserrat Coll Lladó**  
**Mariona Picart Merino**  
**Spain**

Commercially viable sardine anchovy fish production

**Raphael Hurley**  
**Ireland**

The mathematics of monopoly

**Grzegorz Kapustka**  
**Michael Kapustka**  
**Poland**

Some properties of polygons

**Maxim Sergeev**  
**Russia**

A new method to process some production waste

## MILAN 1997

### FIRST PRIZES

**Eike Hübner**  
**Germany**

Permanent self-conducting polymers

**Fiona Fraser**  
**Ciara McGoldrick**  
**Emma McQuillan**  
**Ireland**

Unravelling the secrets of the preservation of Europe's bog bodies

**Christoph Lippuner**  
**Antoine Wüthrich**  
**Switzerland**

The digestive system of carnivorous plants

### SECOND PRIZES

**Sebastian Hauer**  
**Jan Nieberle**  
**Germany**

A circular saw active security-system

**Bernardo Silva e Carmo**  
**Portugal**

A control centre for school experiments

**Serguei Idiatoulin**  
**Russia**

The preparation of chromiferous coatings to absorb solar energy

# WINNERS 2018-1989

## THIRD PRIZES

**Álvaro Luis Maroto Conde**  
**Spain**

Paravision 1.0: window access for visually impaired

**Thierry Caramigeas**  
**Vivien Moliton**  
**Michael Pressigout**  
**France**

A microwaves controlled household management system

**Gábor Ivánka**  
**Hungary**

MATIKA: the game to solve your mathematical problems

**Erik van Alphen**  
**Tom van Diessen**  
**Netherlands**

Less waste with bricks

**Anni Könönen**  
**Finland**

Human impact on forest vegetation

**Daniel Atwood**  
**Andrew Teesdale**  
**United Kingdom**

How eucalyptus resins can prevent seeds from germination

## HELSINKI 1996

## FIRST PRIZES

**Tobias Kippenberg**  
**Germany**

A car ice-detection system based on electromagnetic waves

**Yann Ollivier**  
**France**

Flexibility of an articulate lattice

**Wouter Couzijn**  
**Netherlands**

"Locator", a self-positioning robot

## SECOND PRIZES

**Emil Laslo**  
**Hungary**

Braille display

**Maciej Kurowski**  
**Tomasz Osman**  
**Poland**

Common solution sets of real polynomials

**David Kelnar**  
**United Kingdom**

AMES, the accessible multimedia education system

## THIRD PRIZES

**Andreas Derr**  
**Germany**

MediNet: an intelligent system for medical diagnosis

**George Almpanis**  
**Despina Scholidou**  
**Greece**

Boundaries and stellar content of the LH52 and LH53 associations

**Patricia Lyne**  
**Rowena Mooney**  
**Elsie O'Sullivan**  
**Ireland**

Analysis of indigenous Irish strains of honeybee

**Radoslaw Skibinski**  
**Poland**

The Oligocene fish: discovery and reconstitution

**Thomas Bürg**  
**Switzerland**

An intelligent six-legged walking machine

**Justin Marston**  
**United Kingdom**

The dripping tap as a model chaotic system

## NEWCASTLE UPON-TYNE 1995

## FIRST PRIZES

**Sven Siegle**  
**Germany**

Natural pulping or paper from straw

**Brian Fitzpatrick**  
**Shane Markey**  
**Ireland**

Plants can tell us when they need a drink of water

**Christopher Mead**  
**Matthew Taylor**  
**United Kingdom**

Radio waves from comet Shoemaker-Levy 9

## SECOND PRIZES

**Tycho van Meeuwen**  
**Netherlands**

The witty wise writing writer

**Nina Fraefel**  
**Switzerland**

Biochemical control of salmonella in poultry feed

**Oliver Hantschel**  
**Kai Krüger**  
**Nicole Stroh**  
**Germany**

Is isoguanine selectively mutagenic during virus replication?

# WINNERS 2018-1989

## THIRD PRIZES

**Aldis Helga Egildsdottir  
Reynir Hjalmarsson  
Iceland**

The Icelandic capelin: a behaviour study

**Frank Ekpar, Erik Sos  
Hungary**

Mobile robots: motorless motion using shape memory alloy actuators

**Klaus Mazanti Soerensen  
Denmark**

Factorising factorials and Bertrand's postulate for primes  $4k+3$

**Marcin Kowalczyk  
Marcin Sawicki  
Poland**

The force of a set and the Euler characteristic

**Gergely Eberhardt  
Hungary**

A virus recognition programme to prevent computer infection

**Michael Vorburger  
Switzerland**

A fruity approach to memory management in C++

**Roddy Vann  
United Kingdom**

The manufacture of closed-cage molecules in electric arcs

**Alberto Lerena  
Ricardo Martín  
Víctor Sanz  
Spain**

A brake based on magnetically solidified fluid

**LUXEMBOURG 1994**

## FIRST PRIZES

**Oliver Krüger  
Germany**

The ecology of the common buzzard and goshawk

**Eike Lau  
Germany**

Internal addresses in the Mandelbrot set

**Jane Feehan  
Ireland**

The Calluna Case-Carrier

**Christian Krause  
Denmark**

Telephone break-in security

**Henrik Ström  
Norway**

An anti-boot virus program

**Samuel Schaer  
Switzerland**

Supersonic plasma rings

## SECOND PRIZES

**Ivan Labanca  
Italy**

A diffusion cloud chamber with magnetic field

**Gijs van Oort  
Netherlands**

A computer controlled flute

**Jan Ivar Oeyulvstad  
Norway**

Flood prevention in the river Otra in Southern Norway

**Nuno Alves da Silva  
Hugo Macedo  
Portugal**

Image processing using a neural network

**Stefan Serefoglou  
Greece**

The two-to-one way rotation converter

**Fernando Toro Chicano  
Ricardo Peñafiel Gil  
Santiago Hervás Morales  
Spain**

A new age plotter

## THIRD PRIZES

**Amina Azami, Chemseddine Bega  
Belgium**

Bio-indicators

**Kai Eberspächer  
Dominik Zayer  
Andreas Gorbach  
Germany**

Computer-controlled waste-water purification

**Padelis Ermilios  
Greece**

Using computers in physics experiments

**Vagelis Papadopoulos  
Greece**

Extension of the integral calculus

**Guillermo Guerrero Guerrero  
Javier Villegas  
Javier Rodríguez  
Spain**

Beewax recovery using solar energy

**Eduardo Moling González  
Ruth Morena  
José Manuel Brell  
Spain**

Water rocket

**Séverine Meynieux  
Catherine Khamphan  
Marie Montanard  
France**

Peat bogs fossils: unmasking the past

**Nicolas Rebierre  
Olivier Rebierre  
Olivier Pesle  
France**

Real speed

**Stéphan Fidanza, Olivier Pesc  
France**

Space-time theory

**Sara Azimonti  
Elena Porazzi  
Giovanni Colombo Bolle  
Italy**

Asbestos: properties, manufacturing, applications, legislation

# WINNERS 2018-1989

**Patrick Neuberg**  
**Luxembourg**

Improved cell sectioning

**Necibe Gezer**  
**Netherlands**

Teenage restlessness in a Dutch town

**Jorgen Carling**  
**Norway**

Examining voting patterns

**Martin Franz Waldmann**  
**Johannes Lackner**

**Josef Schmidbauer**

**Austria**

Solar energy to ecological fuel

**Jürgen Hintermayer, Attila Agoston**  
**Austria**

Brain waves and artificial intelligence

**Michael Schachinger**

**Thomas Wetzlmaier**

**Jürgen Zauner**

**Austria**

Telephoning via computer networks

**Paulo Alexandre Machado**

**Portugal**

A real time digital spectrograph

**Ana Simoes das Neves**

**Portugal**

The pharmacology of medicinal plants

**Kaarlo Väisänen**

**Finland**

Production of fullerenes by  
Draetschmer-Huffman's method

**Magnus Viström**

**Pontus Forslund**

**Robert Hagglund**

**Sweden**

A car hand brake: a potential life saver?

**Annika Nyström**

**Sweden**

From Salix Alba to modern medicine

**Johanna Larnhed**

**Sweden**

Antifouling

**Caroline Turner**

**United Kingdom**

A time interval analyser

**Samantha Haines**

**United Kingdom**

An electornic physiotherapy aid

**Rebecca Anderton**

**Aaron Weller**

**Morgan Jones**

**United Kingdom**

Delayed failure in ultra-high strength  
steels

**Michael P. Germeyer-Petyke**

**Alexander Pohl**

**EU Schools**

Vitamin C synthesis in germinating cress  
seedlings

**Tamas Nagy, Sandor Mezei**

**Hungary**

A Braille printer and school notebook  
for the blind

**Daniel Kiss**

**Agnes Majoros**

**Lajos Kovacs**

**Hungary**

Universal clamping head for industrial  
robots

**Robert Varga**

**Hungary**

Computerised navigation

**Roman Evtushenko**

**Evgueni Milioutine**

**Evgueni Chelkovo**

**Ukraine**

Biohumus production by the red  
Californian worm

**Serguei Semeniouk**

**Alla Atepalikhina**

**Karim Naser**

**Ukraine**

The role of the thiamine in neutrophil  
phagocytic activity in smokers and non-  
smokers

**Kenna Mills, Diego Figueroa**

**USA**

Water detoxification using duckweed

## BERLIN 1993

### FIRST PRIZES

**Henrik Mouritsen**

**Denmark**

Abiological expedition to the rainforests  
of the Philippines

**Lars Knudsen, Peter Andersen**

**Denmark**

Droppy, the computer controlled  
intravenous drip feed

**Albert Barmettler**

**Günther Ederer**

**Austria**

An alarm processing system

**Jan Haugland**

**Norway**

The minimum overlap problem of Paul  
Erdős

**Rodger Toner**

**Donal Keane**

**Ireland**

Mate selection by a male crustacean

**María Salvany González**

**Antoni Camprubí I Cano**

**Fidel Costa Rodríguez**

**Spain**

The geological mapping of a Neolithic  
mine

### SECOND PRIZES

**Jan-Cristoph Puchta**

**Germany**

Fermat's last theorem

**Pierre Oger**

**Belgium**

Oil (hydrocarbon) recovery from water

**Eleonora Bonanomi**

**Stefano Consonni**

**Mircko Signorelli**

**Italy**

Use of biogas in a photosynthetic  
culture

# WINNERS 2018-1989

**Daniel Morton**  
**Tim Mullis**  
**United Kingdom**

A palletiser improvement

**Peter Seidel**  
**Germany**

Ball lightning, an investigation

**Jürgen Scherschmidt**  
**Jochen Scherschmidt**  
**Germany**

A user-friendly video recorder

## SEVILLE 1992

### FIRST PRIZES

**Hendrik Küpper**  
**Frithjof Küpper**  
**Martin Spiller**  
**Germany**

Environmental relevance of heavy metal substituted chlorophylls

**Oliver Trapp**  
**Germany**

Study on the effect of a chelator on yeast

**Anders Skov**  
**Denmark**

The bent perspective

**Martin Hesselsoe**  
**Denmark**

Green toad (*Bufo Viridis*) in the great belt

**Jean Byrne (deceased)**  
**Elizabeth Dowling**  
**Ireland**

Population dynamics of a thistle predator: *Terellia Serratulae*

**Dominik Zeiter**  
**Ewald Amherd**  
**Reinhard Fubber**  
**Switzerland**

Graphical plants varieties of trees

### SECOND PRIZES

**Ingolf Zies**  
**Germany**

New global lighting model based on radiosity

**Raoul Urlings**  
**Belgium**

10 channel vocoder

**Clement Stefanutti**  
**Aurélie Vidal**  
**Julie Morere**  
**France**

Palynology - Historic botany

**Panagiotis Theofanidis**  
**Nick K. Tsagourias**  
**Greece**

Research and development of a traffic light system

**Luis Bellot Rubio**  
**Antonio Román Reche**  
**Gustavo Román Reche**  
**Spain**

Analysis of visual observations of the comet Levy

**Jochen Erhard**  
**Cristoph Herbst**  
**Austria**

Electronical regeneration of FeC12/ FeC13 compounds in metal etching processes with an environmental and economic focus

## ZURICH 1991

### FIRST PRIZES

**Robert Nitzschmann**  
**Germany**

Development and construction of a scanning tunnelling microscope

**Barry O'Doherty**  
**Daniel Dundas**  
**Ireland**

The dynamics of a two-well potential oscillator

**Paul Hoffmann**  
**Luxembourg**

Computer assisted text conversion to Braille

**Angus Filshie**  
**United Kingdom**

Clearway: a mucus extractor

**Christian Tost**  
**Sabine Zangl**  
**Austria**

Catalytic converter restoration

**Torkild Jensen**  
**Norway**

Birdlife in Oslofjord

**Hans Jacob Feder**  
**Norway**

Earthquakes as a self-organised critical process

### SECOND PRIZES

**Tanja Hindrichs**  
**Hussein Morsy**  
**Axel Conrad**  
**Germany**

The knight's Hamiltonian path problem

**Nicolas Bouche**  
**Olivier van der Aa**  
**Belgium**

Flight study of a micro-rocket

**Valerio Arnáiz**  
**José Mora**  
**Alexandre Girone**  
**Spain**

Astrometry: the measurement of comet positions

**Henk Hoekstra**  
**Christian Kok**  
**Netherlands**

Oscillating systems of chemical reactions

**Edwin Thaller**  
**Friedrich Pfluegelmeier**  
**Austria**

Intelligent testing probe



# WINNERS 2018-1989

**Christof Teuscher**  
**Flavio Stragiotti**  
**Switzerland**

Aiolos II: development of a wind measuring computer system

## COPENHAGEN 1990

### FIRST PRIZES

**Paul Vauterin**  
**Bruno Callens**  
**Belgium**

Automated meteor observation station

**Waltraud Schulze**  
**Germany**

The effect of assimilatory starch for the growth of Arabidopsis

**Annagh Dalton (née Minchin)**  
**Ireland**

Colpomenia Peregrina, an immigrant alga to Europe

**Donatella Manganelli**  
**Italy**

Silence, micro-organisms at work

**Brian Dolan**  
**Lee Kiera**

**Ann Marie Malon**  
**United Kingdom**

A study of the transition to turbulence in Reynold's experiment

**Marco Ziegler**  
**Switzerland**

Drinking water examination with special consideration of corrosional aspects

### SECOND PRIZES

**Morten Larsen**  
**Denmark**

Hand reader

**Jan Lichtenberg**  
**Germany**

Unilyser, a universal computer system for chemical analysis

**Stefan Scheller**  
**Germany**

Computer-aided holography for optical and acoustical reconstruction

**Beatriz Pias**  
**Mercedes Pias**  
**Ana Riveiro**  
**Spain**

The Atlantic brushwood as a natural resource

**Gianni Insacco**  
**Italy**

Fossil remains in vertebrates in continental Pleistocene deposits in the region of Comiso, South-East Italy

**Ian Thompson**  
**Graham Miller**  
**United Kingdom**

Investigation of oils used in soap manufacture

**Geraldine Brossard**  
**Switzerland**

Toxocara Canis or the "grande vadrouille" of a parasite

## BRUSSELS 1989

### FIRST PRIZES

**Mogens Markussen**  
**Denmark**

Eyewriter, an eye operated control unit

**Stephan Schlitter**  
**Germany**

Conducting polymers in batteries

**Grace O'Connor**  
**Sinead Finn**  
**Ireland**

A crop fractionation industry

**Lina Tomasella**  
**Italy**

Toxicity of colour dyes used as tracers

**Nicola Kirk**  
**United Kingdom**

Walking aid for a disabled person

**Jean-Pierre Wyss**  
**Matthias Zimmermann**  
**Elmar Artho**  
**Switzerland**

Recognition of handwritten signs

### SECOND PRIZES

**Serge van der Velde**  
**Olivier Camberlin**  
**Belgium**

Computer-guided solar furnace

**Charles Courtin**  
**Pierre Betsch**  
**Hugues Nodet**  
**France**

A Doppler rocket

**Menno Bolt**  
**Eric Toonen**  
**Pascal Stevelmans**  
**Netherlands**

Wind energy project

**Mark Mathieson**  
**United Kingdom**

Voice intensity feedback for speech handicapped

**Halldor Fossa**  
**Norway**

Expert systems in cancer treatment

**Anouk Thommen**  
**Switzerland**

Comparative study of two composts

### THIRD PRIZES

**Samuel Delaere**  
**Belgium**

Electromagnetic radiation

**Dimitri Hautot**  
**Belgium**

Studies on the Kelvin generator

# WINNERS 2018-1989

**Stephan Røntved**  
**Søren Chyltoft**  
**Denmark**

LISSI, an I. C. Test Computer

**Matthias Büger**  
**Germany**

Axiomatic theory of mean values

**Walter Georg Veeck**  
**Jens Schneider**  
**Germany**

Construction of a diffusion cloud chamber

**Dimitri Theocharidis**  
**Paul Magoulas**  
**Greece**

New Dimension 2000, an automation system with computer

**Fermín Tabar**  
**Luis Rodríguez**  
**Antonio Sánchez**  
**Spain**

Multi-use interface applied in a greenhouse

**Juan Navas**  
**José Ortega**  
**José Navas**  
**Spain**

Computer-based sound synthesis system

**Benoît Landeos**  
**Bertrand Dubois**  
**Alain Crusoe**  
**France**

Wheelchair adapted for racing

**Patrick Mora**  
**Jean-François López**  
**France**

Meteorological imaging

**Enrico Corsini**  
**Italy**

Solar spots

**Valerio Emma**  
**Italy**

The rhopaloceros insect

**Marc Pauly**  
**Gérard Milmeister**  
**Luxembourg**

The fantastic world of fractals

**Yves Thill**  
**Serge Remesch**  
**Luxembourg**

Mapograph, a computer-aided writer

**Manuel van den Bergh**  
**Lauren Smit**  
**Mathieu van Geffen**  
**Netherlands**

CHIP, a computer hardware instruction project

**Paulo Ribeiro**  
**Portugal**

Diving patterns of the bottlenose dolphin

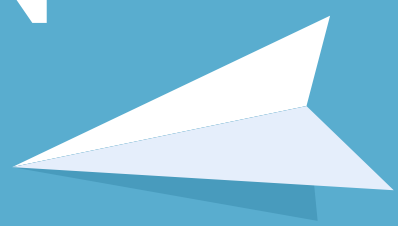
**Reinhard Herzog**  
**Austria**

An electronic plotter

**Stein Ringnes**  
**Ingvar Apeland**  
**Jarand Felland**  
**Norway**

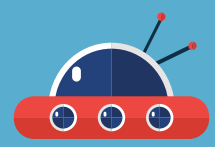
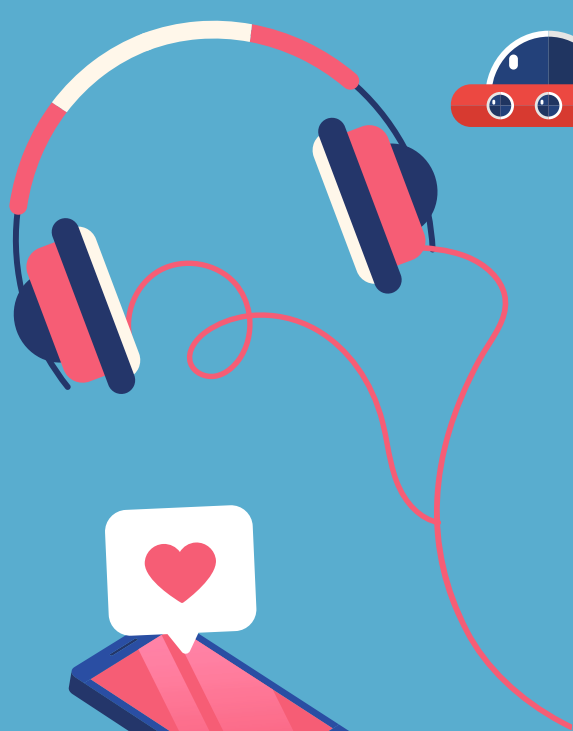
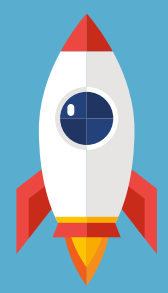
Solar energy project

EUROPEAN  
UNION



INITIATIVES

FOR RESEARCH  
AND YOUTH



# EUROPEAN UNION INITIATIVES FOR RESEARCH AND YOUTH

Nurturing a new generation of highly qualified scientists is essential to ensure knowledge and growth, and to stimulate sustainable competitiveness and welfare in Europe.

For more than two decades, the European Union, via its Framework Programmes for research and technological development, has had a policy of supporting science and technology aimed essentially at fostering European research activities with those carried out at the level of the Member States. The Framework Programmes have played a lead role in multidisciplinary research and cooperative activities in Europe and beyond.

At present, Horizon 2020 which is the biggest Research and Innovation programme ever, has a budget of nearly €80 billion available to research during the period 2014 – 2020. The EU Framework Programme for Research and Innovation will be complemented further by the existence of the European Research Area. These measures endeavour to break down barriers to create a genuine single market for knowledge, research and innovation. The European Union also recognises the need to start the process of integration at grass roots level. The Commission is actively promoting European cooperation in the fields of science education, training and careers, as well as in trying to stimulate young people's interest in science outside formal education.

In addition to the EU Contest for Young Scientists, the Directorate- General for Research has introduced several other initiatives to encourage young people to consider careers in science.

## MARIE CURIE ACTIONS

The Marie Curie Actions provide research training, career development and mobility schemes allowing researchers to be truly mobile both internationally and between commercial and non-commercial sectors. There are opportunities for researchers at any career stage and of any nationality.

In particular, the Initial Training Networks (ITN) offer early-stage researchers the opportunity to broaden their scientific and generic skills, including those related to technology transfer and entrepreneurship, to join established research teams and enhance their career prospects in both public and private sectors, thereby making research careers more attractive to young people. This is being achieved through a transnational networking mechanism, aimed at structuring the existing high quality initial research training capacity throughout EU Member States and Associated Countries. Calls for ITN proposals are announced on the Research & Innovation Participant Portal.

**Web site:** <http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020>

Furthermore, the Marie Curie Intra-European Fellowships (IEF) are open to researchers holding a doctoral degree or with at least four years' research experience. The purpose is to give them the financial means to undertake advanced training through research or to acquire complementary skills at a European organisation most suited to their professional needs. These fellowships are to encourage young researchers to spend time outside their own country to acquire new research skills or experience working in other sectors.

**More information about Marie Curie Actions can be found at:** <http://ec.europa.eu/research/mariecurieactions>

## EURAXESS

### Researchers in Motion

The European Commission has launched a user-friendly web portal for researchers called "EURAXESS – Researchers in Motion" with the aim of improving career development and mobility of researchers.

The objective of the portal is to provide a single access point to information and support services which help researchers and their families when moving to and pursuing careers in another country.

### EURAXESS hosts the following four initiatives:

- EURAXESS Jobs (formerly European Researcher's Mobility Portal) is a recruitment tool with constantly updated job vacancies for researchers throughout Europe;
- EURAXESS Services (formerly ERA-MORE Network) is a network created to assist researchers and their families in organizing their stay in another country;
- EURAXESS Rights (European Charter for Researchers & Code of Conduct for the Recruitment of Researchers) sets out the rights and obligations of researchers and their employers;
- EURAXESS Links (formerly ERA-Link) is a networking tool for European researchers working in the US or Japan.

**EURAXESS portal address:** <http://ec.europa.eu/euraxess/>

## ERC STARTING GRANTS

The European Research Council (ERC) is a special funding component of Horizon 2020 which promotes investigator-driven frontier research. Its main aim is to stimulate scientific excellence in Europe by supporting and encouraging the very best, truly creative scientists, scholars and engineers to go beyond established frontiers of knowledge and the boundaries of disciplines. ERC grants are awarded through open competition to projects in any field of research.



The ERC has launched a Starting Independent Researcher Grant scheme (ERC Starting Grants) with the objective to support excellent researchers with leadership potential, located in or moving to the EU and Associated Countries, who are about to establish their first research team or to start conducting an independent research programme.

The calls for proposals are published annually. **Full information, including the Guide for Applicants, can be found at:** <http://erc.europa.eu>

## OTHER INITIATIVES FOR STUDENTS AND YOUNG PEOPLE

In a more general sense, the European Commission provides information, training, non-formal education and mobility opportunities for young people through a variety of programmes and activities.

The European Youth Portal was developed as a direct result of the European Commission's 2001 White Paper "A new impetus for European Youth", and is a means of giving access to information specifically targeted at young people who are living, learning and working in Europe.

The portal is a gateway to European and national information on 33 countries in 27 languages. It allows young people to have their views heard through online discussion forums, and their questions answered through the Eurodesk Network.

**The web address of the Portal is:** <http://europa.eu/youth/>

The original Youth in Action was a 2007-2013 EU Programme for young people aged 15-28 (in some cases 13-30). It aimed to inspire a sense of active citizenship, solidarity and tolerance among young Europeans and to involve them in shaping the Union's future. It promoted mobility within and beyond the EU borders, non-formal learning and intercultural dialogue, and encouraged the inclusion of all young people, regardless of their educational, social and cultural background.

The activities of the Youth in Action programme will continue under the new Erasmus+ programme, scheduled to last from 2014-2020.

Moreover, the European Commission has integrated its various educational and training initiatives under a single umbrella entitled the Lifelong Learning Programme. The programme enables individuals at all stages of their lives to pursue stimulating learning opportunities across Europe. There are four sub-programmes focusing on different stages of education and training and continuing previous programmes:

- Comenius for schools
- Erasmus for higher education
- Leonardo da Vinci for vocational education and training
- Grundtvig for adult education.

A cross cutting programme aims to ensure that they achieve the best results possible via four key activities: policy co-operation, languages, information and communication technologies, and effective dissemination and exploitation of project results. In addition, the Jean Monnet Programme aims for a geographical reach beyond Europe's borders by stimulating teaching, reflection and debate on the European integration process at higher education institutions worldwide.

## TRAINEESHIPS IN THE EUROPEAN INSTITUTIONS

In-service trainings are organised each year to provide young university graduates with a unique first-hand practical experience and knowledge of the day-to-day work in the EU Institutions. The European Parliament, the Council, the Commission, Court of Justice, the Social and Economic Committee, the Committee of the Regions and the European Ombudsman offer such traineeships, each lasting from 3 to 5 months. The trainings also aim to provide an understanding of the objectives and goals of the EU integration processes and policies. It is an opportunity to work in a multicultural and multilingual environment, contributing to the development of mutual understanding, trust and tolerance.

**Details for each institution can be found at:**  
[http://europa.eu/epso/discover/useful\\_links/](http://europa.eu/epso/discover/useful_links/)

## GENERAL INFORMATION ABOUT THE EU

European integration has delivered half a century of stability, peace and economic prosperity. It has helped to raise standards of living, built an internal market, launched the euro and strengthened the Union's voice in the world.

The process started shortly after the devastation of World War II, and was launched on 18 April 1951 with the signing of the Paris Treaty which established the European Coal and Steel Community (ECSC) involving six countries: Belgium, France, Germany, Italy, Luxembourg and the Netherlands. On 25 March 1957, the Treaty of Rome was signed to establish the European Economic Community (EEC) in order to promote the free movement of people, goods and services, and capital. A major revision of the Treaty of Rome was signed on 17 February 2003 in Maastricht, which would lead to the strengthening of the economic and monetary ties between the members and define what we now call today the European Union.

Over the years membership grew. In 1973, Denmark, Ireland and the United Kingdom joined. Greece followed in 1981, and Spain and Portugal, in 1986. In 1995, Austria, Finland and Sweden brought the membership up to 15 Member States. The entry of eight central and eastern European countries together with Cyprus and Malta into the European Union on 1 May 2004 was a historic



achievement, ending centuries of East-West division. More recently, the number of members has grown to 28 with the entry of Bulgaria and Romania in 2007 and of Croatia in 2013.

The European Union is based on the rules of law and democracy. It is neither a new State replacing existing ones nor is it comparable to other international organizations. Its Member States delegate sovereignty to common institutions representing the interests of the Union as a whole on questions of joint interest. All decisions and procedures are derived from the basic treaties ratified by the Member States.

#### The principal objectives of the Union are:

- Establish European citizenship
- Ensure freedom, security and justice
- Promote economic and social progress
- Assert Europe's role in the world

To know more about the EU, please visit the EUROPA portal at: <http://europa.eu>

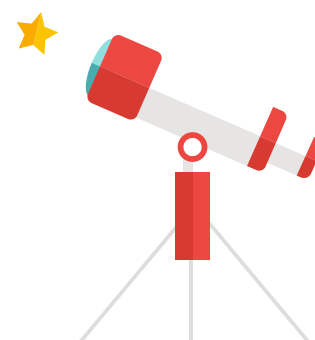
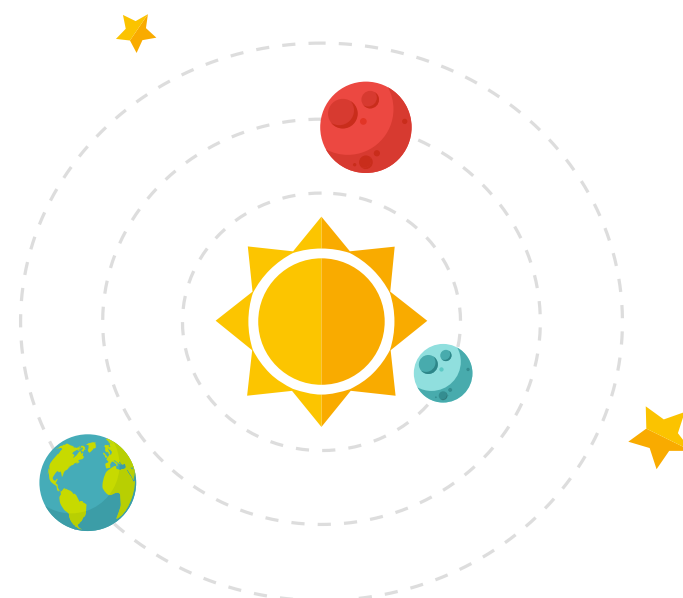
### FOR SCHOOLS

The European Commission supports formal and informal science education in schools as well as science centres and museums, through the Science in Society programme. Several projects have been supported via EU funding in this area through collaborative and coordination and support actions. During the last few years, special attention has been paid with respect to research on the use and development of formative and summative assessment methodologies and their role in teaching STEM, including Inquiry Based Science Education techniques, and disseminating results to the society as a whole. The overall aim is to raise the interest of both youth and young people in science and mathematics. Projects such as S-TEAM, FIBONACCI, PRIMAS, ESTABLISH, SAILS, INQUIRE, KidsINNscience, contribute to this purpose.

As part of the dissemination strategy and with the aim to improve, through the results and materials produced by the projects, the European Commission launched SCIENTIX - the Community for Science Education in Europe ([www.scientix.eu](http://www.scientix.eu)). SCIENTIX is a web-based community for Science Education targeted not only to teachers and researchers, but also to policy makers, parents and anyone interested in science education. It has been created to provide a user-friendly information platform to encourage dialogue and facilitate sharing of progress, know-how and best practices in science education across EU Member States and Associated Countries.

The European Commission also supports research projects on science education as well as initiatives for reinforcing the link between science education and S&T careers in the private sector through reinforcing the partnership between industry and education.

Providing members of the European educational community, current and future scientists, researchers and innovators with the necessary knowledge and tools, as well as skills and qualifications is a main priority of the European Commission. This shall contribute to having science literate and responsible citizens and stimulating young people to embark on research careers. Science education is the vehicle to meet current and future societal challenges.





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## DRAFT PROGRAMME

### THURSDAY, SEPTEMBER 17th

- All day. Setting up of stands by USAL.

### FRIDAY, SEPTEMBER 18th

- All day. Transportation of participants to Salamanca.
- All day. Setting up of stands by participants.
- 21.00. Dinner.

### SATURDAY, SEPTEMBER 19th

- 9.00 – 11.00. Setting up of stands by participants.
- 11.30. Opening ceremony.
- 13.30. Lunch.
- 15.00 – 18.00. First round of judging.
- 18.30 – 20.30. Visit to Salamanca.
- 21.00. Welcome dinner.

### SUNDAY, SEPTEMBER 20th

- 10.00 – 14.00. Second round of judging.
- 14.00. Lunch.
- 16.00 – 18.00. Third round of judging.
- 18.00 – 20.00. Outreach / Cultural activities.
- 21.00. Dinner.

### MONDAY, SEPTEMBER 21st

- 10.00 – 14.00. Fourth round of judging / Visit of high schools to the venue
- 14.00. Lunch.
- 16.00 – 18.00. Fifth round of judging.
- 18.00 – 20.00. Dismantling stands by the participants.
- 21.00. Dinner.

### TUESDAY, SEPTEMBER 22nd

- All day. Dismantling stands by USAL
- 9.00 – 12.00. Cultural activities.
- 12.30 – 16.00. Awards Ceremony / Lunch.
- 17.00 – 18.00. Winners Press Conference.
- 20.00. Farewell Party.

### WEDNESDAY, SEPTEMBER 23rd

- All day. Transportation of participants back home.





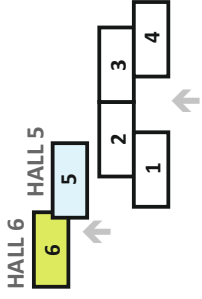




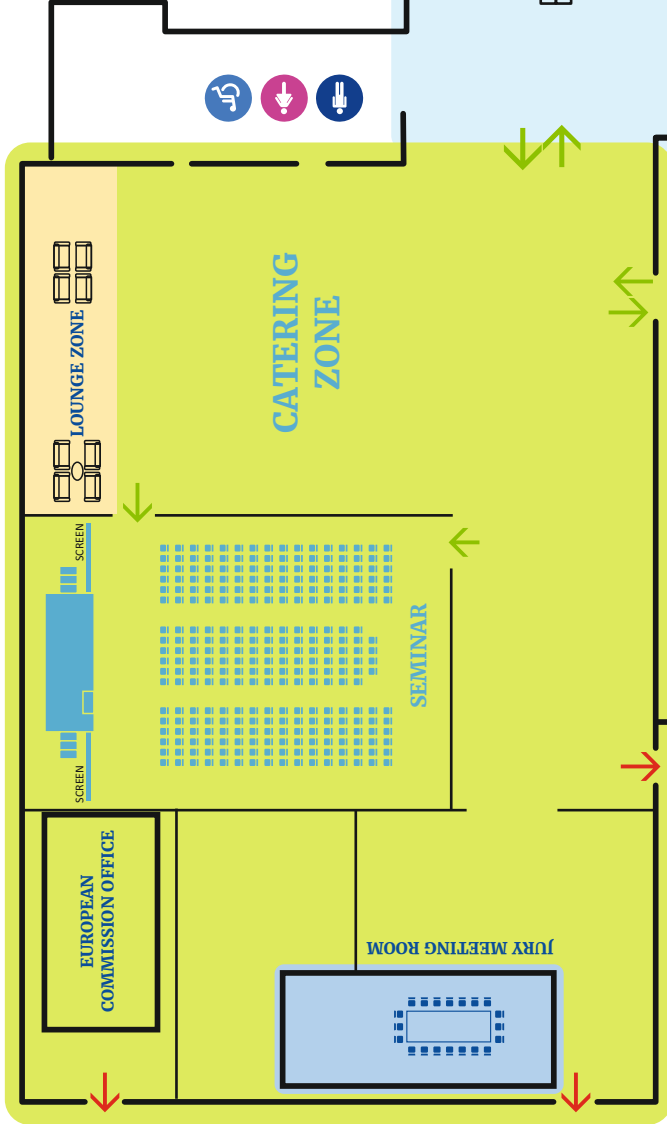
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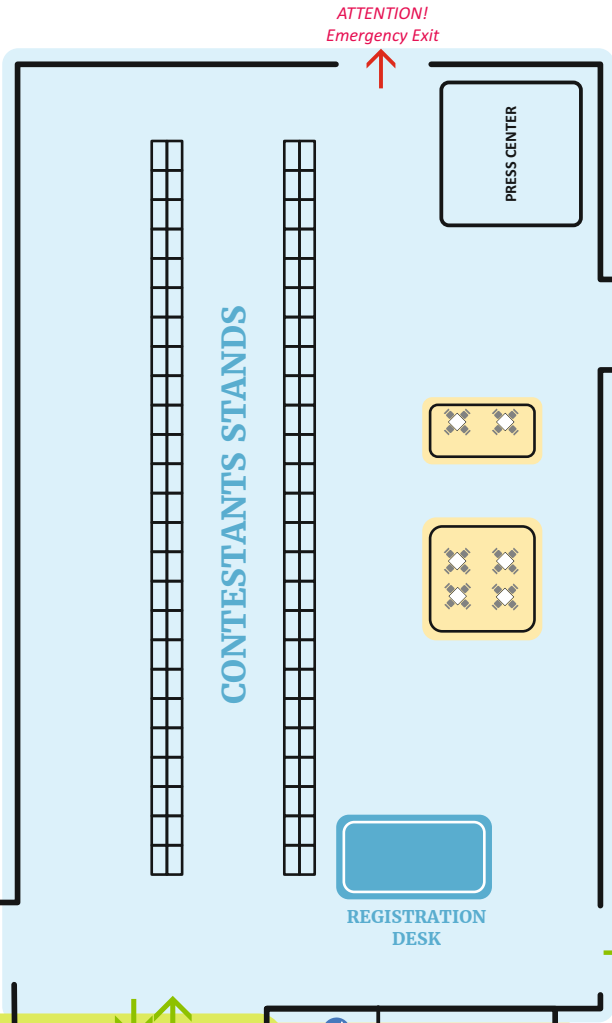
# HALL 6



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ENTRANCE

ENTRANCE

HALL 5



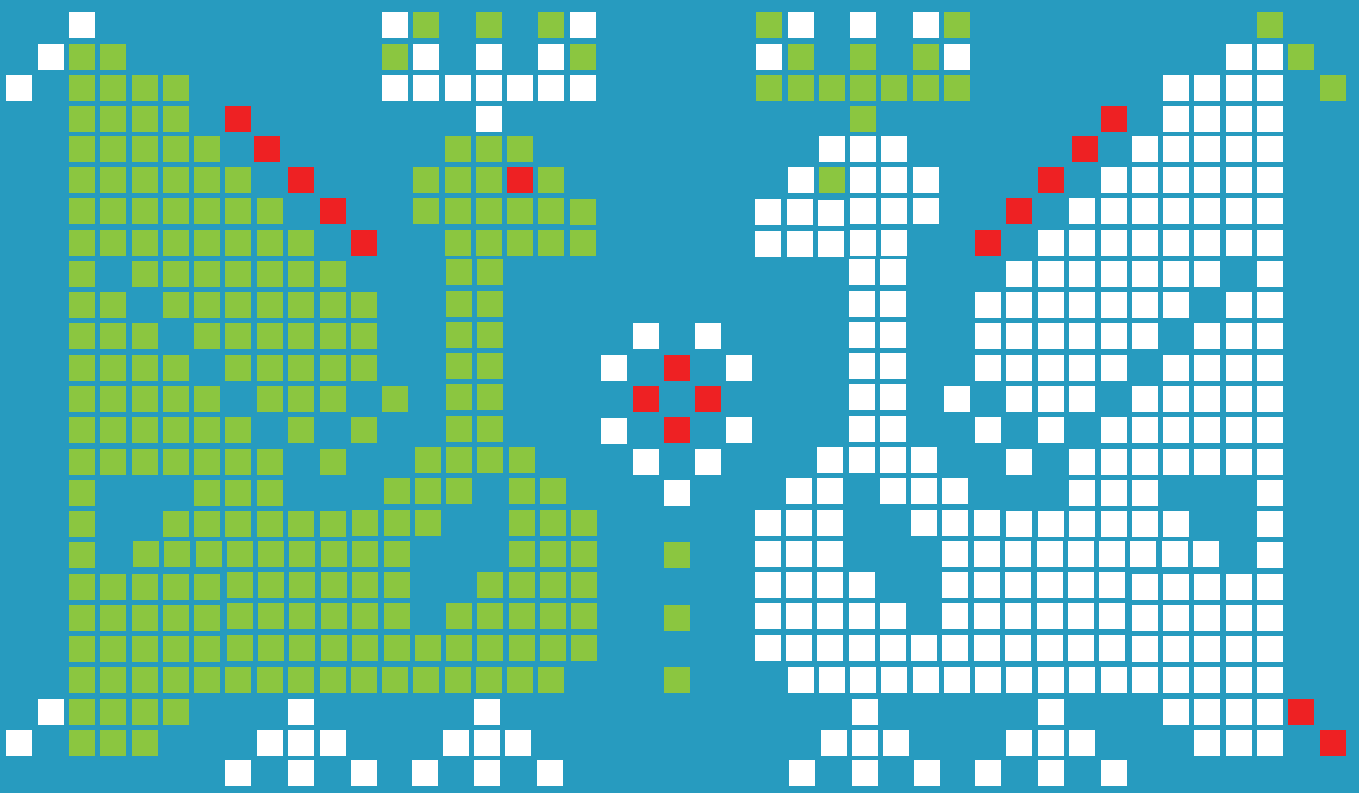
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