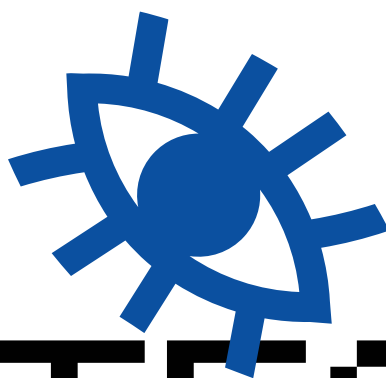




EU Contest for  
Young Scientists  
Leiden2022



# CONTEST CATALOG



Funded by  
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# COLOFON

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# EU Contest for Young Scientists Leiden2022



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# DARE TO TAKE THE LEAP



## MARIYA GÄBRIEL

Commissioner for Innovation, Research, Culture, Education and Youth



DEAR YOUNG SCIENTISTS,

Welcome to the 33rd edition of the European Union Contest for Young Scientists in Leiden! It is great to be back with a physical contest this year. Last year EUCYS took place virtually and the year before it was postponed, due to the COVID 19 pandemic.

You are here because you won first prize at your national science competition and you are now representing your country at this prestigious contest. This is a fantastic achievement and you should be very proud! Congratulations! I wish you a wonderful time in Leiden and a great contest.

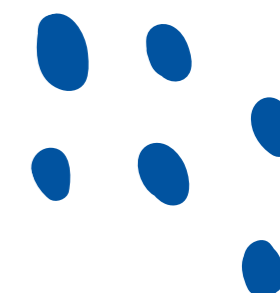
As you all know, the corona virus dominated our lives for over two years. Europe came to a standstill; workers moved home to work and homes became classrooms for students. The world became very small again; planes stopped flying and airports stood still. However, thanks to evolving technology, we continued to work and to communicate virtually, via Zoom, Teams, webinars and on-line conferences, demonstrating the importance of advancing technology in our lives.

I have been greatly impressed also with the work of our health services and scientists during this time. They faced huge challenges with this worldwide pandemic, but within a year had come up with vaccines to make us all safe again. If the last two years taught us anything, it taught us the importance of investing in education, science, technology, research and innovation.

EUCYS is about growing your talents. It is about encouraging you and helping you pursue careers in science, research and innovation. Incredible things happen when great minds meet. 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 EU invests millions of euros in young scientists and science education through its Horizon Europe research and innovation programmes and the ERASMUS programme.

2022 is also the European Year of Youth, shining a light on the importance of European youth to build a better future – greener, inclusive and digital. There are plenty of opportunities to learn, share your vision, meet people and engage in activities all over Europe. It is the moment to move forward with confidence and hope in a post-pandemic perspective.

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





# META KNOL

Director Leiden European City of Science 2022



*‘Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it’s the only thing that ever has.’*

Margaret Mead

We are living in turbulent times. This year’s Earth Overshoot Day, when humanity has consumed more natural resources than the Earth can regenerate in one year, took place on the 209th day: July 28. As the Western world’s collective growth addiction places a time bomb beneath our economic system, our social, political, and cultural systems are already severely cracking. Inequality is increasing. Nature is under intense strain. And as the calls for change become louder and louder, there can be no doubt that we are moving towards a new era. But what is the role of science in this? And how can you contribute?

All too often, watchful eyes are on the younger generations. The idea being, that Bright Young Minds like yourself are going to change the world. This is a heavy burden nor it shouldn’t be a responsibility that one simply hands over. My idea is that all generations should collaborate in a model of joint stewardship because only within that intergenerational long-term perspective can the ideal of a healthy future for everyone be effectively shaped and righteously balanced. Therefore, this year, when Leiden is the European City of Science, we are paying a great deal of attention to developing new ways of public engagement with science. With a 365-day programme packed with science, knowledge, art, and expertise, we are connecting academics with citizens every single day in creative and innovative ways. We aim to reach everyone with a curious mind and in doing so we will always have a vigilant eye on the future. This is important. Because science never stands alone. We believe that connecting science with society should be the ultimate goal for all current and future academics. That is why we are so very proud and happy to welcome you to our beautiful city and share our vision with you.

It is a great honour to stage the 33rd edition of EUCYS, Europe’s largest youth science competition. We are looking forward to meeting you, learning from you, and discovering more about your worldview. We are ready to offer you an exciting and inspirational EUCYS program. But there’s a lot more to discover. This week you will also meet the participants of the EU TalentOn, the brand-new EU Missions-based hackathon for scientific talents aged 21 to 35. You can also visit the special ArtScience programme initiated by Brave New World, and enjoy the festive Night of Discoveries at the Hortus Botanicus. Our exciting Bright Young Minds week will be concluded by a seminar with Prof. Yuval Noah Harari. In Leiden’s Naturalis Biodiversity Center, he will converse with a group of 100 children aged 10 to 18 about their future. Of course, all our activities will be as carbon neutral as possible, which is why we challenge you to explore the program using public transport or by foot and enjoy our vegetarian meals. Sounds like a plan, right?

This week, in Leiden, we will shape the future together. Together with you.

We wish you an inspiring and successful EUCYS experience



# MARCEL LEVI

President, Dutch Research Council



Without any doubt, the future of Europe is in the hands of bright young Europeans. They will shape a community where people will be living in peace, prosperity, good health, sparkling social interactions, a culturally stimulating environment, strong societies and a clean and sustainable environment.

I am convinced that in particular young scientists will massively contribute to this future and will find solutions for a myriad of societal challenges that need to be addressed. Researchers are driven by curiosity and want to shift the boundary between the known and what was not known before. In addition, they are fascinated by a research topic and related scientific questions. But besides curiosity and fascination another strong motive to do research is that scientific results will eventually contribute to a better world. A more balanced climate, improved health for all, a fair and equitable society, a strong economy, flourishing communities, and so many other goals for the future that are all within reach by the progress that science and knowledge can offer to us. As European top-talents I hope you will be proud to be part of that future for Europe.

Science and knowledge are increasingly generated by researchers who collaborate beyond boundaries and beyond traditional disciplines. Hence, bringing together so many different talented young scientists from many countries and providing the opportunity to exchange ideas from all areas of science, innovation and knowledge is likely to generate a lot of inspiration, energy, and new plans.

I am extremely pleased to welcome you to this very prestigious European Union Contest for Young Scientists (EUCYS) and we are very proud to host you in the vibrant university town Leiden, this year’s European City of Science. I want to congratulate you with your selection to be part of this final round of EUCYS, where you will be joined by 132 young colleagues from 32 countries. I wish you the best of luck and –even more important- a lot of fun and inspiration while presenting your work, making new connections, and exchanging ideas and dreams with many other European bright minds.

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# THE EUROPEAN UNION CONTEST FOR YOUNG SCIENTISTS IN LEIDEN



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. 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 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 33rd edition of the contest. We are delighted that it will be a physical event!

The 32nd edition was due to take place in Salamanca in 2020 but due to the worldwide COVID 19 pandemic, the European Commission took the necessary but difficult decision to postpone. The University of Salamanca kindly agreed to host the contest in 2021 instead. Thus, the 32nd edition of the contest was unusual in many ways: it combined two contests 2020 and 2021, and was a hybrid event for the first time. We are pleased to be back in situ this year!

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

Only projects that have won a first prize at a national science competition can 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 participating 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; Copenhagen again for the 20th anniversary of the Contest; Paris, Lisbon, Helsinki, Bratislava, Prague, Warsaw, Brussels again in 2016, Tallinn, Dublin again in 2018, Sofia and Salamanca. Next year, the contest will return to Brussels for a third time.

This year the European Union Contest for Young Scientists is taking place in Leiden and we are pleased to be in the Netherlands for a second 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)  
<http://www.eucys2019.com>

**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. The EUCYS National Organiser for each country is responsible for completing the registration process for the participants. The NO 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. The projects must be carried out before the contestants enter university. Competing in the contest for 2022 are 133 contestants with 85 projects.

**The Jury**

This year, the Jury is composed of 22 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 EC appoints the Jury annually basing its selection on the scientific needs of the contest. They are drawn from both academia and industry. The jury base their 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, 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 respec-

tive 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 for the project. These include for 2022 contestants:

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

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;
- participation at the Stockholm International Youth Science Symposium (SIYSS);
- a two day stay at the Joint Research Centre at Ispra in Italy;
- visits organised by the Bioeconomy CBE undertaking and Food industries;
- visit to the International Swiss Talent Forum;
- visit to Expo-sciences Luzembourg.

EuChemS kindly offers a prize to the best chemistry project.

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**

The following countries will participate at EUCYS on a competitive basis: Austria, Belgium, Bulgaria, Canada, China, Cyprus, Czechia, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, United States of America and Ukraine. The European Schools are also represented. Tunisia, Serbia and Malta have not sent teams this year. The EC is negotiating with Croatia, North Macedonia and Moldova to welcome them at future contests.

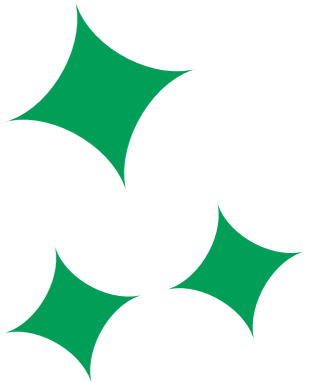
The European Commission is delighted to welcome Dutch students back to the contest after an absence of many years. We are also very pleased to have the opportunity to welcome Ukrainian students again this year.

**Contact**

For more information on the European Union Contest for Young Scientists (EUCYS), please contact:

**Karen Slavin**

European Commission  
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B - 1049 Brussels, Belgium  
[RTD-A2-Unit-Support@ec.europa.eu](mailto:RTD-A2-Unit-Support@ec.europa.eu)



# PROGRAMME

# CONTESTANTS

## TUE 13 SEP

<b>Arrivals, check-in &amp; Setting up Stands</b> Local Tourist Office, Hotel & Hooglandse Kerk	10:00 - 16:30
<b>Lunch</b> Hooglandse Kerk	12:00 - 14:30
<b>Wandering Through the City Centre</b>	16:30 - 18:00
<b>Silent Disco City Tour</b> Departure: Church Square Hooglandse Kerk	16:30 - 18:00
<b>Welcome Dinner</b> Pesthuis	18:00 - 21:00

## WE 14 SEP

<b>Breakfast (in two shifts)</b> Hotels	07:00 - 08:30
<b>Setting up Stands</b> Hooglandse Kerk	08:30 - 10:00
<b>Walk-in Opening Ceremony</b> Hooglandse Kerk	10:00 - 10:30
<b>Opening Ceremony</b> Hooglands Kerk	10:30 - 11:30
<b>Contestants at their stands for invitees</b> Hooglands Kerk	11:30 - 12:30
<b>Lunch</b> Hooglandse Kerk	12:30 - 13:30
<b>Judging Round 1/5</b> Hooglandse Kerk	13:30 - 16:30
<b>National Organisers Only - Silent Disco City Tour</b> Departure: Hooglandse Kerk - Churchsquare	14:00 - 15:00
<b>Wandering Through the City Centre</b>	16:30 - 18:00
<b>Silent Disco City Tour</b> Departure: Church Square Hooglandse Kerk	16:30 - 18:00
<b>Dinner</b> Pesthuis	18:00 - 21:00

## LEGEND

	EUCYS Main Programme
	Food & Evening
	Optional

## TH 15 SEP

<b>Breakfast (in two shifts)</b> Hotels	07:00 - 08:30
<b>Judging Round 2/5</b> Hooglandse Kerk	09:00 - 12:30
<b>Exhibition open to public/local schools</b>	09:30 - 16:30
<b>National Organisers Meeting</b> Weeshuis	10:20 - 12:00
<b>Lunch</b> Hooglandse Kerk	12:30 - 13:30
<b>Judging round 3/5</b> Hooglandse Kerk	13:30 - 16:30
<b>Silent Disco City Tour</b> Departure: Church Square Hooglandse Kerk	16:30 - 18:00
<b>Outreach Programme: Site Visits to BioSciencePark</b> Departure: behind the church	16:30 - 18:00
<b>Wandering Through the City Centre</b>	16:30 - 18:00
<b>Dinner</b> Pesthuis	18:00 - 21:00

## FR 16 SEP

<b>Breakfast (in two shifts)</b> Hotels	07:00 - 08:30
<b>Judging Round 4/5</b> Hooglandse Kerk	09:00 - 12:30
<b>Exhibition open to public/local schools</b>	09:30 - 16:00
<b>Lunch</b> Hooglandse Kerk	12:30 - 13:30
<b>Judging Round 5/5</b> Hooglandse Kerk	13:30 - 16:30

## FR 16 SEP

<b>Dismantling stands / bring projects back to hotel</b>	16:00 - 17:30
<b>Dinner &amp; Movienight</b> Pesthuis	18:00 - 22:00

## SA 17 SEP

<b>Breakfast (in two shifts)</b> Hotels	07:00 - 08:30
<b>Canal Boat Tour</b> Departure: Aalmarkt 4, Leiden	09:45 - 10:45
<b>Canal Boat Tour</b> Departure: Aalmarkt 4, Leiden	11:00 - 12:00
<b>Walking Lunch</b> Stadsgehoorzaal	12:00 - 12:45
<b>Awards Ceremony EUCYS</b> Stadsgehoorzaal	13:00 - 14:30
<b>Reception</b> Stadsgehoorzaal	14:30 - 15:30
<b>Press Conference (for winners only)</b> Stadsgehoorzaal	15:30 - 17:00
<b>Farewell Dinner</b> Hooglandse Kerk	18:30 - 21:00
<b>Farewell Festival: Night of Discoveries</b> Leiden Observatory	21:15 - 01:00

## SU 16 SEP

<b>Breakfast</b> Hotels	07:00 - 08:30
<b>Departure of participants</b> Hotels & Leiden central train station	07:00 - 18:00

# PROGRAMME

## JURY

### TUE 13 SEP

<b>Arrival of jury members</b> Local Tourist Office, Hotel & Hooglandse Kerk	08:00 - 17:00
<b>Lunch</b> Several places	12:00 - 14:00
<b>Welcome Dinner</b> Prentenkabinet	18:30 - 20:30

### WE 14 SEP

<b>Breakfast</b> Hotels	07:00 - 09:00
<b>Opening Ceremony</b> Hooglandse kerk	10:30 - 11:30
<b>Lunch</b> Several places	12:30 - 13:30
<b>Judging round</b> Hooglandse kerk	13:30 - 16:30
<b>Jury Meeting</b> Hooglandse kerk	17:00 - 18:00
<b>Leiden University invites: Jury Dinner</b> Hortus Botanicus Leiden	18:30 - 20:30

### LEGEND

	EUCYS Main Programme
	Food & Evening
	Optional

### TH 15 SEP

<b>Breakfast</b> Hotels	07:00 - 09:00
<b>Judging round</b> Hooglandse kerk	09:00 - 12:30
<b>Lunch</b> Several places	12:30 - 13:30
<b>Judging round</b> Hooglandse kerk	13:30 - 16:30
<b>Jury Meeting</b> Hooglandse kerk	17:00 - 18:00
<b>Dinner</b> Koetshuis de Burcht	18:30 - 20:30

### SA 17 SEP

<b>Breakfast</b> Hotel	07:00 - 10:00
<b>Walking Lunch</b> Stadsgehoorzaal	12:00 - 12:45
<b>Awards Ceremony EUCYS</b> Stadsgehoorzaal	13:00 - 14:30
<b>Reception</b> Stadsgehoorzaal	14:30 - 15:30
<b>Canal Boat Tour</b> Departure: Aalmarkt 4, Leiden	15:30 - 16:30
<b>Press conference + Reception with EUTalentOn</b> Stadsgehoorzaal	17:15 - 18:00
<b>Farewell Dinner</b> Hooglandse kerk	18:30 - 21:00
<b>Night of Discoveries afterparty</b> Leiden Observatory	21:15 - 01:00

### FR 16 SEP

<b>Breakfast</b> Hotels	07:00 - 09:00
<b>Judging round</b> Hooglandse kerk	09:00 - 12:30
<b>Lunch</b> Several places	12:30 - 13:30
<b>Judging round</b> Hooglandse kerk	13:30 - 16:30
<b>Jury Deliberations</b> Weeshuis	16:30 - 20:00
<b>Dinner</b> Bistro Bord'o	20:30 - 22:00

### SU 16 SEP

<b>Breakfast</b> Hotel	07:00 - 08:30
<b>Departure of Jury Members</b> Hotels & Leiden central train station	07:00 - 18:00

# CITY OF DISCOVERIES

## LEIDEN EUROPEAN CITY OF SCIENCE 2022

Leiden truly is a City of Discoveries. With more than 35 courtyards, 28 kilometres of canals, many monuments, 13 museums and, last but not least, the oldest university of the Netherlands there is always something happening in the city. And EuroScience in Strasbourg named Leiden 'European City of Science' in 2022. So throughout 2022, Leiden will be the Dutch stage of the European scientific world where the major issues of our time will be discussed during countless conferences and special meetings. Moreover, there will be a 365-day long programme celebrating science for anyone with a curious mind! Everyone is welcome to participate, from leading international scientists to curious kids — as well as artists, companies, students, community centres and museums. The ultimate goal of Leiden European City of Science is to connect science and society.

## THE HISTORY OF LEIDEN AND SCIENCE

On 8 February 1575, Leiden was given the first university in the Netherlands. This was a reward from William of Orange for resisting the Spanish siege and marked the start of many discoveries made in Leiden — a city where freedom of speech, science, and culture have come together to form a true City of Discoveries. Over the last 75 years, Leiden University has grown to become a 'Wonder of Europe', one of the most respected universities.

Even as little as three decades ago, the city has yet again undergone a radical transformation for the better. From an impoverished manufacturing city in the 1960s and the departure of industry in the 1980s, Leiden has now become a true City of Knowledge and Culture. In this City of Discoveries, new innovations are still being made on a daily basis. Leiden University remains one of the most prestigious universities throughout Europe. There is also a research university, a university of applied sciences, and a senior secondary vocational training institution, where more than 32,000 students study.

A perfect example of the importance of science, innovation, and market forces is the Leiden Bio Science Park (LBSP), the Netherlands' largest innovation district in the field of life sciences and health. And the perfect example that demonstrates the relevance of a place like the Leiden Bio Science Park is the development of the Janssen vaccine for Covid-19 at the LBSP. Given the uncertainty that we will face in the future, science will be increasingly relevant and important. Therefore, it is paramount that we continue to strengthen scientific endeavors so we have the tools to refute misinformation with well-founded research facts.

## LEIDEN, SCIENCE AND THE FUTURE: LEIDEN BIO SCIENCE PARK

Leiden is a prominent university city in the Netherlands, but it's even more important for the Province of South Holland. Science has always been a crucial industry for the Province of South Holland with Leiden University and Erasmus University in Rotterdam and TU Delft ensuring that innovation and development thrive. The presence of investors and unique market forces creates a competitive market that endlessly drives improvements throughout the region. While innovative entrepreneurs, leading knowledge institutions, and top sectors work together within the province to create next-generation innovations that will make a difference.

A perfect example of the importance of science, innovation, and market forces is the Leiden Bio Science Park (LBSP), the Netherlands' largest innovation district in the field of life sciences and health. A good example that demonstrates the relevance of a place like the Leiden Bio Science Park is the development of the Janssen vaccine for Covid-19 at the LBSP. In view of the large and complex tasks that await us in the near future, the importance of science will only increase. Sam van der Schaaf, Connector/Directors Instrumentarium Innovation at the Province of South Holland, says it best: "Due to the increasing pressure on science, in which well-founded facts are questioned, among other things, it is crucial to continue to strengthen science. That is why the Province of South Holland is awarding a subsidy to Leiden European City of Science."

# LEIDEN BIO SCIENCE PARK

## A GREAT PLACE TO KICKSTART YOUR CAREER



Leiden Bio Science Park (LBSP) is bursting with creativity in the field of Life Sciences & Health. Many of the businesses on the LBSP owe their success to the fruitful cooperation between science, government, and entrepreneurship. The companies, united in the entrepreneurial association OVBSP, offer internships and inspiring careers to young academics. Thousands of scientists from hundreds of universities around the world find their "job of a lifetime" here. At LBSP, dreams and ambitions are turned into concrete and meaningful products. That is why the entrepreneur's association is the proud sponsor of EUSYS. Meet your (future) fellow researchers, or start building your professional network now.

For more information: [www.leidenbiosciencepark.nl](http://www.leidenbiosciencepark.nl)

### About the OVBSP

The entrepreneur's association of Leiden Bio Science Park (OVBSP) looks after the interests of companies and institutions in the Leiden Bio Science Park. In addition, the OVBSP promotes cooperation and connection between members.

*Promoting entrepreneurship and helping start-ups is one of the spearheads in this regard.*

[www.ovbsp.nl](http://www.ovbsp.nl)



# Bright Young Minds



The year 2022 is proclaimed by the European Commission as European Year of Youth. An appealing moment, especially for the city of Leiden. Not only proudly being titled the European City of Science of 2022, but also given the composition of its population. Leiden is characterized as a real youth city: half(!) of its residents is under 36 years of age. No surprise there that Leiden is partnering up with the European Year of Youth and will propose a dedicated Bright Young Minds program as part of Leiden2022.www

It is in this vivid and dynamic entourage that Leiden will give stage to even more young bright minds. More than hundred young gifted talents in the age of 14-20 years, originating from 30 different countries, will gather for the European final of EUCYS and bring their brilliant projects to life. They are the happy few selected from over 60.000 national participants. Simultaneously more than hundred young academics in the age of 21-35 years are joining in for the first ever EU TalentOn. A pressurecooker-event in which these peer-selected geniuses will enter teamwise the mission arena's based on the five big challenges of the moment. The ideas they will come up with will have the potential to become real

gamechangers. Hundred young curious minds aged 10-18 years are invited to ask clever questions to a special international guest: these Brave Young Minds will meet & greet with writer, historian and philosopher Professor Yuval Noah Harari. Last but not least: a special edition of the Night of Discoveries - the scenery for the after party for all Bright Young Minds - will fully focus on young artists and scientists. They will come up with more than 100 breathtaking performances and thrilling lectures.

It is with great great pleasure that we have been working on such a wonderful program, that meets the need of the young... and the curious!

Viceversa, we are looking forward to learn from you all as well. You as a Bright Young Mind!



**LUCIEN GEELHOED**  
Intendant Leiden2022, initiator of EUCYS2022  
& initiator and designer of the very first EU TalentOn.

# EUROPEAN YEAR OF YOUTH 2022



The year 2022 is the European Year of Youth. After the pandemic, it is time to shine a light on the importance of engaging European youth to build a better future – one that is greener, more inclusive and more digital.

The year was created to renew the positive perspectives for

young people, to support young people and to encourage the inclusion of their ideas and visions. The year also brings more and better opportunities for young people. Nine months, the year is booming and full of life. Find out what is happening, how you can get involved and make your voice heard!

## 1

### IT'S TIME TO UNMUTE!

European Year of Youth means that all young people should unmute themselves and speak up for what they believe in! The new Voices Platform allows you to record your vision of Europe in your voice. You can share your opinion in 29 languages and under 9 categories: European Values, Arts & Culture, Digital, Education and Learning Mobility, Employment, Green, Health, Well-being and Sport, Inclusion and Youth and the World. Check out the Voices Platform: <https://youthvoices.eu/>

## 2

### JOIN THE EUROPEAN YEAR OF YOUTH ONLINE COMMUNITY

Join Discord, a virtual environment where you can be part of the European Year of Youth community. Here you can debate topics, share ideas and speak directly to other young people from across Europe.

- Create your free Discord Profile at <https://discord.com>
- Join the European Youth server at <https://discord.gg/DwxPhPZVvKZ>

## 3 MORE THAN 3.400 ACTIVITIES WORLDWIDE

The European Year of Youth is following a bottom-up approach with thousands of activities and events taking place across Europe and beyond. The activities vary from debates to exhibitions and artistic performances, making the year interesting for everyone.

Want to find activities? Check out the interactive Activities Map at [https://europa.eu/youth/year-of-youth/activities\\_en](https://europa.eu/youth/year-of-youth/activities_en)

## 4 EXCITING COMPETITIONS

European Year of Youth also means exciting competitions for young people. These range from naming the new 'EU space-based secure connectivity system' to publishing a video on social media and winning a free trip in Brussels to discuss the future of finance with Commissioner McGuinness. Check out European Youth Portal at [https://europa.eu/youth/year-of-youth\\_en#news](https://europa.eu/youth/year-of-youth_en#news) to stay up to date on competitions and opportunities in store for you!

## 5 CHECK OUT THE LATEST FLASH EUROBAROMETER

In light of the European Year of Youth, the flash Eurobarometer survey collected the opinions of young people. It made clear that the engagement and participation of young people is growing every year. The most important expectation of the European Year of Youth is that society and decision-makers listen to the opinions of young people, and include them in decision-making process. Learn more about the results at <https://europa.eu/eurobarometer/surveys/detail/2282>

## 6 LISTEN TO THE VIEWS OF YOUNG PEOPLE

Many young people have already expressed their views on the future of Europe through the Youth Talks and the Policy Dialogues. Youth Talks showcase inspiring conversations with young people, for young people, with 20-minute talks on topics that matter for youth

The Policy Dialogues include a meaningful conversation and exchange of views between a European Commissioner and young people on topics of their interest and concern, such as youth participation, employment, climate change and many more. Find out more here at [https://europa.eu/youth/year-of-youth\\_en](https://europa.eu/youth/year-of-youth_en)

## 7 GET TO KNOW THE OPPORTUNITIES FOR YOUNG PEOPLE

Want to learn how you can make use of the opportunities the European Union provides for young people? Check out all the programmes and funded opportunities at [https://europa.eu/youth/year-of-youth\\_en#eu-policies](https://europa.eu/youth/year-of-youth_en#eu-policies), such as the European Solidarity Corps, Discover EU, Erasmus+ and many more.

The European Year of Youth carries with it a momentum to bring youth into the spotlight. The second half of the year will be a continuation of these efforts, but will also include large events such as a big event on democracy, with the collaboration of the European Youth Forum, that will bring people from across Europe to Brussels for two exciting, enriching days.

Importantly, we will continue to put youth high on the agenda beyond 2022. The initiatives and frameworks for youth engagement set up during the year will live on. This will be the legacy of the year.



# THE VENUES



KEES HUMMEL

## HOOGLANDSE KERK

EUCYS 2022 will be hosted in the Hooglandse Kerk, located in the heart of the historical part of Leiden and a ten-minute walk from Leiden Central Station. It is a beautiful and impressive church, with large gothic windows shining like a medieval painting. The total floor area of the church is 2800 m<sup>2</sup>, it can easily host up to 1500 people in a theatre setting. Originally it was a wooden chapel dedicated to St. Pancras, but in the end of the 14th century it was replaced by a gothic church with a stone structure in the same location.

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

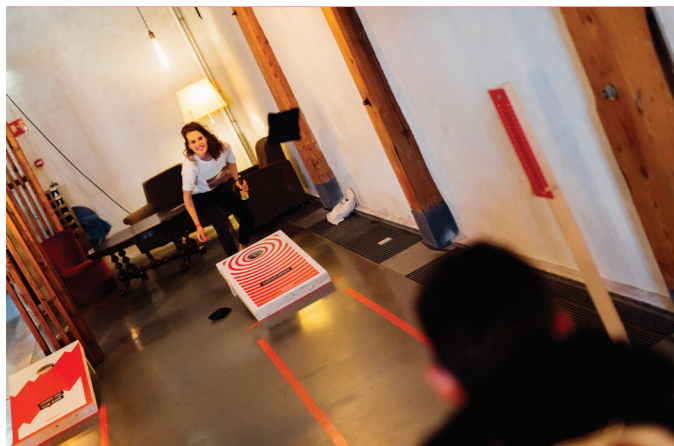


## STADSGEHOORZAAL

The Stadsgehoorzaal is a historical city auditorium that is located at the Breestraat 60 in Leiden. It was built in 1826 and it has had a rough start. For instance, there was a grand fire that burned down a big part of the building in 1889. Luckily, they were able to rebuild the building. The Stadsgehoorzaal has had more renovations done that all gave the building the look it has today. The venue has three halls of different sizes. Here you can visit concerts such as classical or pop concerts and a variety of performances. But the halls are also an unique place to host conferences and business meetings.

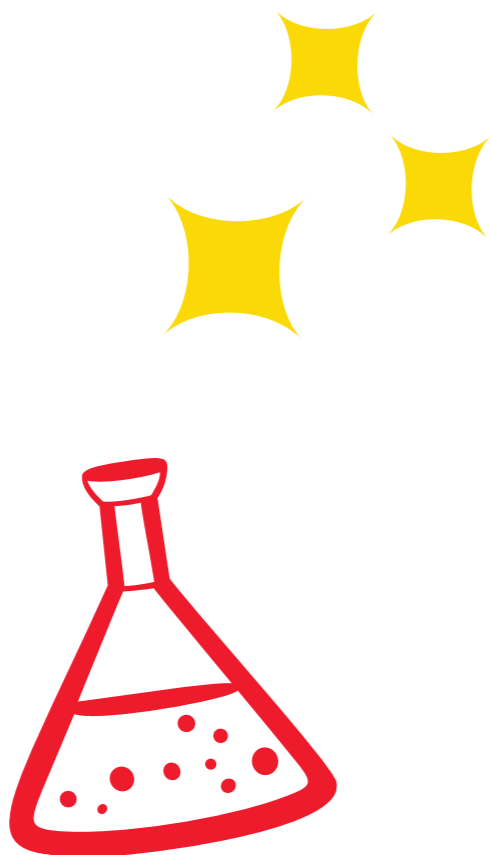
Within the program of the Stadsgehoorzaal and the Leidse Schouwburg there are several performances labelled with the tag 'language no problem'. These performances contain few to no spoken words and/or the spoken language is English. Take a look on the website to check if there's a performance you would like to see.

[www.leidseschouwburg-stadsgehoorzaal.nl](http://www.leidseschouwburg-stadsgehoorzaal.nl)

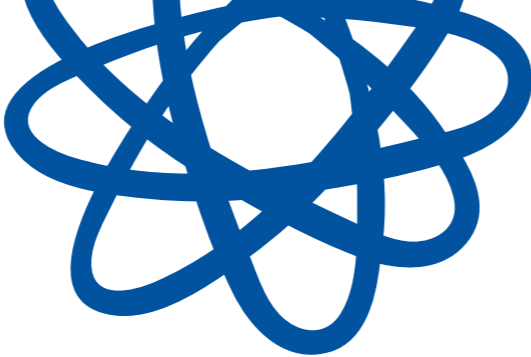


# PESTHUIS

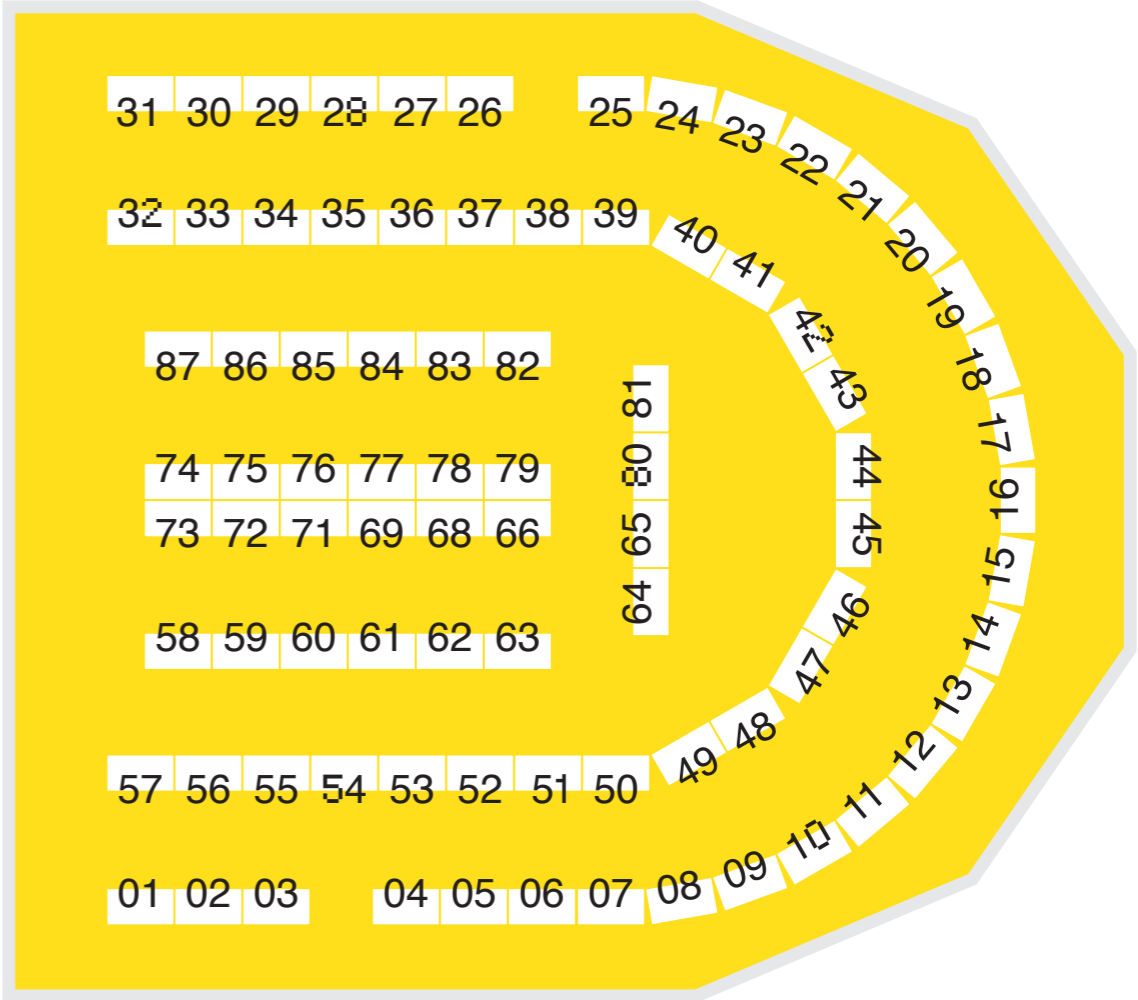
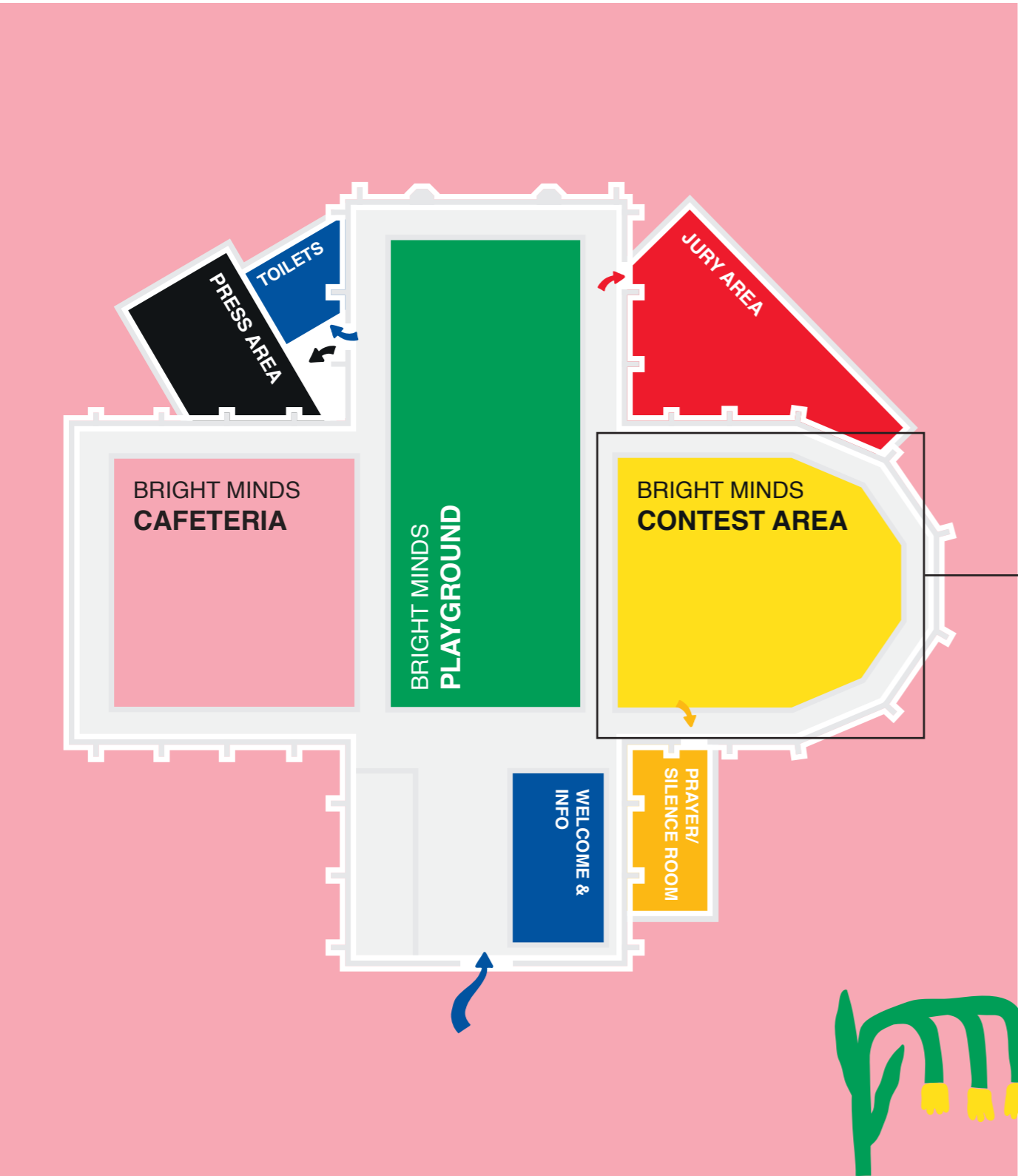
The monumental Pesthuis building will serve as the EUCYS home base during the evenings. This is the place to meet up with other participants and grab a drink, play a game of table tennis together or attend interesting presentations. And of course here you can share a hot meal together every night.



# VENUE LAYOUT

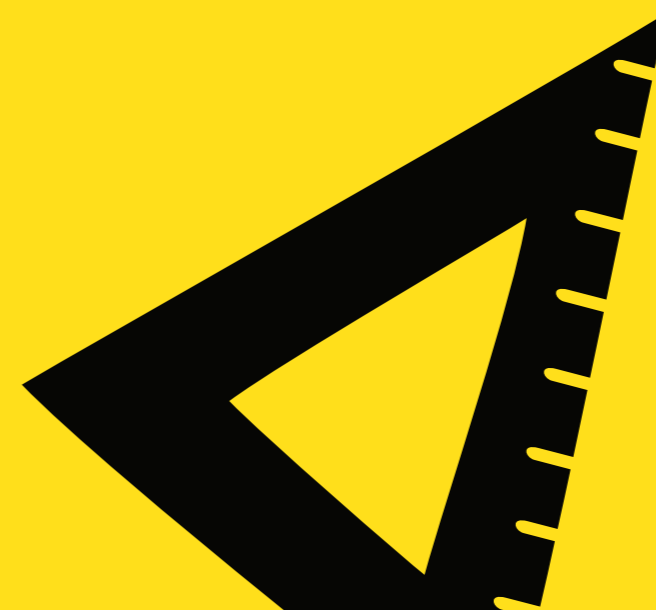


# BRIGHT MINDS CONTEST AREA





# PROJECTS



## DEVELOPING A NOVEL, INEXPENSIVE METHOD TO DETECT SMALL RNAS IN BIOLOGICAL SAMPLES

VIKTÓRIA KOVÁCS, REGINA TÓTH

## THE ANALYSIS OF A POST-RESTORATION STATUS OF LAELATU WOODED MEADOW

KULLA SAATMÄE

## SORTING OF SPERM CELLS TO OBTAIN OFFSPRING WITH THE DESIRED SEX IN DOMESTIC SHEEP (OVIS ARIES)

PETAR STOILOV ZHOTEV

## THE INFLUENCE OF LANDSCAPE ON NEST PREFERENCES AND BEHAVIOR OF TWIG NESTING HYMENOPTERA

JITKA WALDHAUSEROVÁ

## OPTIMISING UV EXPOSURE TO INHIBIT ESCHERICHIA COLI GROWTH

ESHA GOENKA

## FINDING A SPECIFIC AGENT AND ITS DOSAGE AGAINST AMERICAN FOULBROOD

JASMIN SCHALLI, LORENZ PAUL HINTERPLATTNER, MARKUS BOLLWEIN

## ANTIBIOTIC-INDUCED RELEASE OF LIPOPOLYSACCHARIDE FROM ESCHERICHIA COLI

ALEXANDER MARKS, AUGUST ANDRE LUKKASSEN MARTIN THORMODSRUD

## INTEGRATION OF DSUP IN NANNOCHLOROPSIS OCEANICA

KONRAD BASSE FISHER

## NICOTINE EXPOSURE DRIVES SEXUALLY DIMORPHIC BEHAVIOR

ALON LAVI

## SWISS SALMON ROE: FROM A BY-PRODUCT TO A CULINARY PRODUCT RICH IN POLYUNSATURATED FATTY ACIDS

AKI GIULIA BÜCHER

## LICHENS AS BIOINDICATORS OF AIR QUALITY IN BENAVENTE Y LOS VALLES (SPAIN)

ESTEFANÍA CONDE TORANZO, MARTA RODRÍGUEZ VEGA

## PHYSARUM POLYCEPHALUM, THE CELL ON A QUEST

EMA TOPOLNJAK

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## DEVELOPING A NOVEL, INEXPENSIVE METHOD TO DETECT SMALL RNAS IN BIOLOGICAL SAMPLES

Our team aims to create an entirely new way of RNA detection. This method can serve as an alternative for the expensive rtPCR method in miRNA- or other small RNA-detection in research or medicine. It is based on the unique idea of using an RNA amplification loop. We used magnetic beads coated with single-stranded probe DNAs, on which the target RNA acts as a primer for second-strand synthesis. The resulting dsDNA is the starting point of a transcription process in the same medium. The newly synthesised RNAs start the process again and again, thus producing a high amount of dsDNA -what we detected by the increased SYBR Green fluorescence in the test tube. We calibrated a simple fluorimeter and proposed a self-designed adaptor for PCR tubes as inexpensive hardware for qualitative analysis.



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## THE ANALYSIS OF A POST-RESTORATION STATUS OF LAELATU WOODED MEADOW

Wooded meadows are regularly mown areas with sparse trees. They originated from forest clearings followed by mowing and are one of the most species-rich habitats in the world. Due to the socio-economic changes, such areas have constantly decreased. Therefore the study of the wooded meadows, as well as the recovery of the vegetation characteristic of these habitats have become a very urgent matter both from practical and scientific aspect. In July 2021, on a restored parcel of the Laelatu wooded meadow in West Estonia, 40 1 x 1 m plots were recorded for data on the species composition and richness. In this study, the relationship between the obtained results and additional measured characteristics is analysed.



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# SORTING OF SPERM CELLS TO OBTAIN OFFSPRING WITH THE DESIRED SEX IN DOMESTIC SHEEP (OVIS ARIES))

The aim of this project is to assess a method for sex-selective animal breeding. Ram sperm were sorted into two fractions, based on their sex chromosome. This was achieved by activating the TLR7/8 receptors on X chromosome carrying sperm with the ligand resiquimod, which causes the cells to precipitate. Real-time PCR was used to determine the fraction purity after sorting and the results were an average of 64% purity for X chromosome sperm and a 77% for Y chromosomes. Before and after sorting, spermograms were obtained, which showed high cell motility, decreasing slightly after sorting. The results indicate that sperm can be successfully sex-sorted using a simple and reliable protocol.



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# THE INFLUENCE OF LANDSCAPE ON NEST PREFERENCES AND BEHAVIOR OF TWIG NESTING HYMENOPTERA

The occurrence and behavior of insects is significantly affected by the environment they live in. In this thesis, I dealt with the influence of structure of landscape on nesting preferences of Hymenoptera. For this comparison I had chosen to work with twig-nesting Hymenoptera, for which I have placed artificial nest opportunities into four biotopes – heath, edge of a heath, country lanes between fields and field. The studied location is located south of Znojmo near Podyjí national park. Particularly, I have focused on small carpenter bees of genus Ceratina. My results show that there is a big difference in the species distribution between the habitats of field and heath. The habitats of edge of a heath and country lanes make up a gradient between these two biotopes.



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# OPTIMISING UV EXPOSURE TO INHIBIT ESCHERICHIA COLI GROWTH

Escherichia Coli is a pathogenic bacteria which secretes Shiga toxins which can cause neurological complications and acute liver failure. Its outer lipid layer may act as a barrier to permeation of antibiotics, making it increasingly resistant to treatment. Therefore, methods of inhibiting bacterial growth are crucial to processes like water treatment. Ultraviolet light, specifically UVA, inhibits E. coli growth by creating reactive oxygen species which react with protein membranes and DNA leading to cell death. This investigation looks at optimizing bacterial inhibition by varying duration of exposure and light intensity. The results of this investigation may be used as an alternate method of water treatment in rural areas.



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# FINDING A SPECIFIC AGENT AND ITS DOSAGE AGAINST AMERICAN FOULBROOD

American foulbrood is a worldwide problem in beekeeping. The disease mainly affects the brood and later the gut of the adult bees. The disease is absolutely fatal for the infected colony and there is no natural cure. All effective measures that can be taken against the disease are based on technical measures. However, these technical measures are very time and cost intensive and do not lead to lasting success in all cases. In recent years, our team has developed a plant-based active ingredient which kills the bacterium and strongly stimulates the bees to remove infectious material from the colony. Furthermore, the bees are stimulated to build a larger brood nest.



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STAND: 05  
PROJECT: BIOLOGY-05  
COUNTRY: LUXEMBOURG

STAND: 06  
PROJECT: BIOLOGY-06  
COUNTRY: AUSTRIA



# ANTIBIOTIC-INDUCED RELEASE OF LIPO- POLYSACCHARIDE FROM ESCHERICHIA COLI

According to WHO, sepsis is one of the most significant threats to global health. Antibiotic-induced release of lipopolysaccharide (LPS) from the outer membrane of Gram-negative bacteria contributes to the high mortality rate of sepsis. Furthermore, the quantity of LPS released may depend on the class of antibiotics. This study examined the amount of LPS released by exposing E. coli to twelve antibiotics from eight different classes. The results showed that chloramphenicol, spectinomycin, tetracycline, and zeocin gave higher values



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# INTEGRATION OF DSUP IN NANNOCHLOROPSIS OCEANICA

The Damage Suppressor Protein (Dsup), identified in the tardigrade R. varieornatus, has shown to reduce the effects of harmful radiation in human and plant cell cultures. On Mars, the equivalent radiation level is around 50 times higher than here on earth, and in connection with NASA's and SpaceX's visions of a human visit to Mars within the next ten years, a stable food source that can withstand a higher level of radiation would be an advantageous invention and economical improvement. For this purpose, microalgae farming would be a super nutritious and highly productive food source on Mars. Thus, this project will explore the prospect of allowing the microalgae N. oceanica to express the Dsup protein and its ability to withstand radiation, compared to non-transgenic N. oceanica relatives.



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# NICOTINE EXPOSURE DRIVES SEXUALLY DIMORPHIC BEHAVIOR

Nicotine affects the sexes differently. However, the molecular-neural mechanisms underlying these differences have not been fully elucidated. This study examined the effects of acute nicotine exposure on the nervous system and behavior between the sexes in C.elegans. We used a WT and a mutant strain for the dopaminergic receptor Dop-R to examine the effects of nicotine. In males, but not in hermaphrodites, we found a significant difference after exposure to nicotine. In addition, this effect found in the WT strain was not observed in dop-1 mutant males. These results confirm a difference between the sexes in response to nicotine. In addition, these results also demonstrate that in C. elegans, dopamine receptors have a differential role in the mediation of motor hyperactivity in both sexes.



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# SWISS SALMON ROE: FROM A BY-PRODUCT TO A CULINARY PRODUCT RICH IN POLYUNSATURATED FATTY ACIDS

The preparation of a food product source of fatty acids using the salmon roe, which is rich in essential polyunsaturated fatty acids such as EPA and DHA, but are often thrown away. The oven-drying was set at below 50°C to avoid oxidation of fatty acids. Nutritional values analyses were carried out by a laboratory and daily product shelf-life tests were conducted. The best conservation method was in a dry environment in a container. Analysis showed the presence of various fatty acids in the product; EPA and DHA were able to be maintained, even though vulnerable to heat. However, the temperature has to be raised to prevent microbial growth and to have a good digestibility of the product. It was proved that a food by-product can be reused and can contribute to a complete nutritional diet.



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PROJECT: BIOLOGY-08  
COUNTRY: DENMARK

STAND: 09  
PROJECT: BIOLOGY-09  
COUNTRY: ISRAEL

STAND: 10  
PROJECT: BIOLOGY-10  
COUNTRY: SWITZERLAND

# LICHENS AS BIOINDICATORS OF AIR QUALITY IN BENAVENTE Y LOS VALLES (SPAIN)

This project is based on the study of lichen in the region of Benavente y los Valles, pointing out the correlation between lichen and the quality of the air in different regions. The biological indicators of pollution or bio-indicators are based on the analysis of the sensitivity presented by some species of living beings to determine atmospheric gaseous pollutants, which effects allow us to identify the presence and observe the evolution of the atmospheric pollution. The lichens are symbiotic associations between an algae, a yeast and a fungus. These interactions originate a stable thallus with a specific structure and physiology. makes these living beings excellent bio-indicators, (the best ones regarding the quality of the air).



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# PHYSARUM POLYCEPHALUM, THE CELL ON A QUEST

I investigated the ability of a slime mould *Physarum polycephalum* to find food in a complex environment and compared it with random search. For this, I created a maze with the starting point and three different routes leading to the end point. At these points, we placed oat flakes as the source of energy and reward, respectively. I examined whether *P. polycephalum* can reach the end point successfully (via the shortest route) and efficiently (minimum distance and time in suboptimal paths). Analysis showed that *Physarum* had a 89% success rate which outperformed 46% random search by a computer algorithm. However, its efficiency in time (34%) and energy use (54%) was limited. These show that *P. polycephalum* outperforms random search suggesting it may be a candidate for biological computing.



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# CHEMISTRY

**OPTIMIZATION OF THE SYNTHESIS OF THE FLUORESCENT DYE "NILE RED"**  
MEDA SURDOKAITĖ

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**REARRANGEMENTS OF N-ARYL HYDROXAMIC ACID METHANESULFONATES**  
VERONIKA MARTINKOVÁ

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**BEST PRACTICE IN WASTEWATER TECHNOLOGY: PHOSPHORUS RECYCLING BY ELECTROFLOTATION**  
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**A LINEAR STRUCTURE NOTATION FOR COMPOUNDS FOR THE BLIND IN CHEMISTRY**  
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MIRELA-ELENA COMȘA, DAVID-IONUȚ BOTEZAT

19

STAND: 11  
PROJECT: BIOLOGY-11  
COUNTRY: SPAIN

STAND: 12  
PROJECT: BIOLOGY-12  
COUNTRY: NETHERLANDS

# OPTIMIZATION OF THE SYNTHESIS OF THE FLUORESCENT DYE “NILE RED”

Products of organic chemistry are widely used, they can protect oceans from microplastics, treat serious diseases and create a greener daily life. “Nile Red” is an organic dye that is used for detection of microplastics, staining of cells and proteins in medical research etc. The aim of my work is to develop a safe method to produce Nile Red by replacing toxic solvent previously used in synthesis. With this research, I want to contribute to a safer environment, cleaner and healthier world.



MEDA SURDOKAITĖ

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# REARRANGEMENTS OF N-ARYL HYDROXAMIC ACID METHANESULFONATES

N-Aryl hydroxamic acids represent a group of valuable synthetic intermediates. Their N-OH modification, by appending good leaving group (LG), triggers intramolecular rearrangement leading to the N-O bond cleavage and migration of the O-LG moiety into the aromatic ring. The developed reaction sequence is straightforward and affords variety of new organic molecules, otherwise inaccessible. Overall, thirty derivatives were synthesized, of which fourteen are completely new organic substances. Perspective applications of these novel organic substances is seen as valuable starting materials for organic synthesis, pharmacochemistry, biochemistry, materials chemistry, catalysis, drugs, polymers, etc.



VERONIKA MARTINKOVÁ

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# SYNTHESIS OF A CURCUMIN ANALOGUE AND ANTIOXIDANT ACTIVITY ASSAY

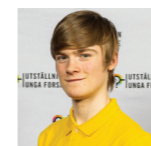
Curcumin is a substance originally found in turmeric with many interesting properties. In this study, curcumin and the analogue 3,5-dimethoxycurcumin were synthesized. The antioxidant activity of the two substances was compared in vitro, and it was found to be lower for the analogue. The purpose of the study was to investigate the potential medical use of 3,5-dimethoxycurcumin as an antioxidant against cancer and Alzheimer's disease. In general, the results from clinical trials where antioxidants have been tested against those diseases have not been promising. Thus, the probability that 3,5-dimethoxycurcumin will be used as an antioxidant against age-related diseases is low. However, it might still have other properties that makes it a useful treatment.



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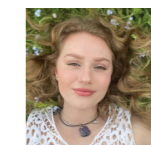
LOVE SUNDIN

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# COMPUTATIONAL DESIGN AND EXPERIMENTAL CONSTRUCTION OF STABLE ENZYMES

Proteins represent an essential component of all living organisms, where they play numerous roles. Nowadays, there is a deep interest in the improvement of various protein characteristics due to their wide use. However, those proteins are exposed to harsh environmental conditions that can lead to their aggregation, denaturation or the loss of their biological function. The main goal of this work was to design and measure variants of the protein DhaA, more specifically new variants based on the enzyme DhaA115, that was designed by Loschmidt Laboratories with the use of the bioinformatics tool FireProt. Improved variants of this protein are used in biotechnology, mostly for the elimination of toxic compounds from the environment. This research was focused on the comparison of six variants.



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PROJECT: CHEMISTRY-03  
COUNTRY: SWEDEN

STAND: 16  
PROJECT: CHEMISTRY-04  
COUNTRY: SLOVAKIA

# BEST PRACTICE IN WASTEWATER TECHNOLOGY: PHOSPHORUS RECYCLING BY ELECTROFLOTATION

Hannah Amrhein, Lena Fries, and Hanna Fries have found a new approach to recovering the valuable plant nutrient phosphorus from waste water. For this, they used electroflotation, a process in which tiny flakes bind phosphates and transport them to the surface when voltage is applied to sheet metals. In the laboratory, they were able to bind nearly all the phosphate from a sample solution. The phosphate can then be converted into phosphoric acid or phosphates that are once again available for plants. Electroflotation is more effective than conventional precipitation processes. Waste water treatment plants recover only 40–60% of the phosphorus with common precipitation – but over 80% with electroflotation. The method still has to prove itself under waste water treatment plant conditions.



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17 years

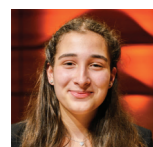
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# A LINEAR STRUCTURE NOTATION FOR COMPOUNDS FOR THE BLIND IN CHEMISTRY

The research paper presents the process of how a blind person can follow the content of science subjects with the help of a linear notation of the structure of compounds, which we have developed. The process of determining the notation of the structure of compounds for the blind was performed in the following stages: firstly, a draft notation was written, which was reviewed by a chemistry teacher, then the record was read by a blind person in braille. Based on the reading and the teacher's explanation, the blind person suggested possible corrections. The linear notation of the structure of compounds will be easily used by blind primary school, high school, and undergraduate chemistry and biology students to write down chemical formulas and chemical reactions.



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STAND: 17  
PROJECT: CHEMISTRY-05  
COUNTRY: GERMANY

STAND: 18  
PROJECT: CHEMISTRY-06  
COUNTRY: SLOVENIA

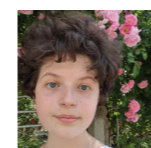
# COVID-19 AND VARIOUS DRUG INTERACTIONS

The objectives of our project were the study of drugs used in the treatment of coronavirus infection, the study of drug combinations used with dexamethasone in the treatment of Covid-19.

We studied the interactions of dexamethasone with other drugs and amino acids by applying specialized softwares HyperChem 8.0 and Avogadro 1.2. As the volume is higher in the case of the Dexamethasone-Homocysteine-Zinc complex than in the case of Dexamethasone-Cysteine-Zinc, this complex is more difficult to penetrate at the cellular level.

Analysing the differences between the treatments applied to women and those applied to men and through statistical calculations, we found that they are not significant.

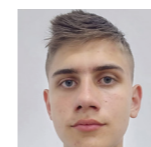
Also, the spike protein that grafts the virus was studied was practically analysed.



MIRELA-ELENA COMȘA

15 years

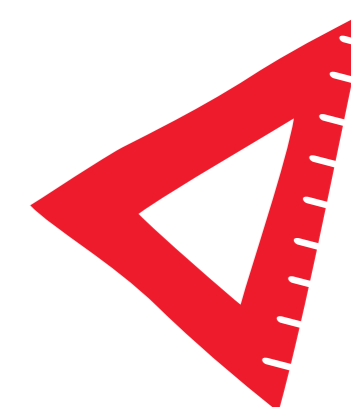
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PROJECT: CHEMISTRY-07  
COUNTRY: ROMANIA



# COMPUTING

## THE GATEDTABTRANSFORMER. AN ATTENTION-BASED DEEP LEARNING ARCHITECTURE FOR TABULAR MODELING.

RADOSTIN LOZANOV CHOLAKOV

20

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PIERRE ATES

21

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ANGELOS-MICHAIL CHOUVARDAS, ALEANDRO KURTIDHIS

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## BIPOLARITY AND INSTABILITIES IN NEURONAL NETWORKS

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## OPTIMIZED CNN IMPLEMENTED ON TPU CAMERA ON AUTONOMOUS ROBOT AND OPEN-SOURCE ANALOGUE NEURAL NETWORK ACCELERATOR WITH A PARALLEL PIPELINE

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## FROM EXPERIMENTAL APPROXIMATION TO THE ORDER OF MAGNITUDE OF THEORETICAL PROBABILITY

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## ALGORITHMIC TRADING – INVESTIGATING DIFFERENT TRADING STRATEGIES

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# THE GATEDTAB-TRANSFORMER. AN ATTENTION-BASED DEEP LEARNING ARCHITECTURE FOR TABULAR MODELING.

Some of the most common machine learning pipelines involve manipulation of tabular data. The current state-of-the-art solution for tabular modeling is the TabTransformer by Amazon from 2020. It incorporates a Transformer block to track relationships between categorical features and makes use of a standard multilayer perceptron to output its final logits. We propose modifications outperforming it on binary classification tasks for three benchmark datasets with more than 1% AUROC gains. We process categorical embeddings with an attention mechanism and then concatenate them with continuous values to be fed through multiple layers of gated MLP - a neural network originally introduced for language tasks. We also evaluate the importance of specific hyper parameters during training.



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# 3D CALLS : MAKE THEM COME OUT OF THE SCREEN

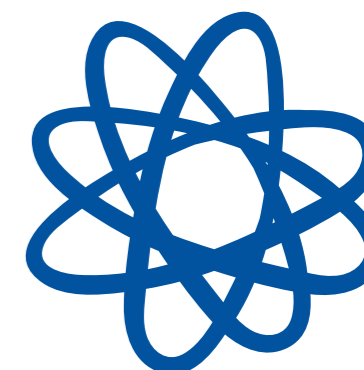
The project transform 2-dimensional images into 3-dimensional shapes. Electromagnetism was chosen in this purpose and especially electromagnets that are used to levitate magnets. Over the years, numerous project with the goal of improving our communication interfaces were carried out. This project is distinct from the others because it takes a different approach. Instead of restricting space on a 2 dimensions screen, it makes use of all 3 dimensions in a new way.



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PROJECT: COMPUTING-01  
COUNTRY: BULGARIA

STAND: 21  
PROJECT: COMPUTING-02  
COUNTRY: BELGIUM

# E-AIMODOTES/ INFORMATION SYSTEM AND IMMEDIATE NOTIFICATION OF BLOOD DONATION NEEDS

e-Aimodotes has the ability to record the emergency blood donation needs, as well as the planned blood donation events organized by hospitals of various regions.

The main innovation of e-Aimodotes is the ability that it offers to the society to be immediately informed about both the emergency needs for blood donations and the planned blood collection events. Furthermore, e-Aimodotes facilitates the Blood Donation Services of hospitals, in the “smart” planning of blood donations, which is considered particularly important as the lifespan of the blood is finite (30 days).

It also aims to raise awareness of the value of voluntary blood donation, platelet removal and bone marrow donation. Until today, e-Aimodotes is successfully used by Blood Donation Services of 13 Public Hospitals in Greece



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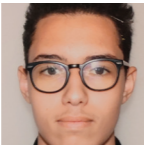


ALEANDRO KURTIDHIS

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# BIPOLARITY AND INSTABILITIES IN NEURONAL NETWORKS

It has been shown that mood in some psychiatric disorders like bipolarity can show a chaotic behaviour. The reasons of this chaos are still unknown. Our project aims at testing whether chaotic behaviour can arise from the structure itself of the human neural network, by modelling it by computation, and studying the instabilities in a human-mimicking neural networks. The states phase diagram allowed us to identify some structural features and parameters of the network facilitating instabilities.



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# OPTIMIZED CNN IMPLEMENTED ON TPU CAMERA ON AUTONOMOUS ROBOT AND OPEN- SOURCE ANALOGUE NEURAL NETWORK ACCELERATOR WITH A PARALLEL PIPELINE

Our research started as a vision system for a RoboCup competition robot. There we faced many real-life problems such as creating a robust and high-speed system which would also be power efficient. We developed our own architecture optimized for a TPU accelerator and constructed a compact camera containing coral edge TPU together with CM4 capable of running the ubuntu operating system allowing fast image processing with great connectivity, which already brings results in multiple projects. During development, we found many problems such as proprietary documentation, communication bottlenecks and so on. Therefore we created our own fully parallel analogue camera from discreet components with analogue neural network implementation for computer vision which is low cost and fully opensourced.



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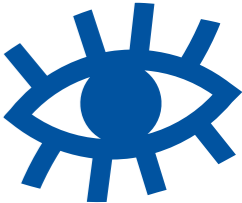
# CLASSIFICATION OF MGMT METHYLATION STATUS OF GLIOBLASTOMA IN MRI IMAGES WITH AI

MGMT methylation status is an important criterion in decision making process of GBM treatment. MGMT methylated tumors benefit from a drug called “Temozolomide” which may double survival time. Currently the only definitive diagnosis can be achieved by tissue analysis which is obtained by invasive procedures. Furthermore, it is an epigenetic property which implies spatial and temporal heterogeneity which may require additional surgeries during treatment. We proposed a classifier model which can make that diagnosis using MRI and deep learning. The model makes its prediction with confidence scores and gradient based explanations. We reached high accuracy scores in our experimental model and locally deployed our application in some of the hospitals to observe experimental results in real life.



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STAND:

22

PROJECT:

COMPUTING-03

COUNTRY:

GREECE

STAND:

23

PROJECT:

COMPUTING-04

COUNTRY:

FRANCE

STAND:

24

PROJECT:

COMPUTING-05

COUNTRY:

SLOVAKIA

STAND:

25

PROJECT:

COMPUTING-06

COUNTRY:

TÜRKIYE

# RECONSTRUCTION OF THE IMAGE SPACE DEPICTED IN PAINTINGS

In the paper, the image space depicted on paintings is analyzed utilizing computer vision. The aim is to reconstruct the painting's spatial organization based on face detection. The data sets included 43 and 3356 paintings. 3D coordinates of faces were determined; then, a plane was fitted to the faces on every painting — images were described by the angle between the fitted plane and the plane representing the surface of the painting. The bigger the angle, the deeper the image space depicted. Additionally, clustering was conducted based on the fitted planes and paraboloids. The clusters rarely completely corresponded to the conventional boundaries of art periods, but the paintings were often grouped based on the intuitive similarity of the geometric representation of depicted space.



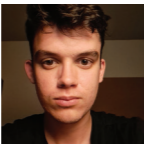
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# FROM EXPERIMENTAL APPROXIMATION TO THE ORDER OF MAGNITUDE OF THEORETICAL PROBABILITY

There are problems where it is impossible to determine the theoretical probability of an event and is only possible through a huge number of simulations to obtain an experimental one. In this project we try to find a mathematical relationship between the magnitude of the theoretical probability of an event and the number of Monte Carlo simulations needed to obtain a close experimental probability. The investigation was carried out by doing simulations of tosses of various dice (2 to 5), and analyzing the behavior of the experimental probability, varying the number of simulations of throws (up to one thousand million), to verify in how many simulations the experimental probability of rolling out 1 on all dice is within a 5% deviation from the theoretical one, for each number of dice.



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STAND:

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PROJECT:

COMPUTING-07

COUNTRY:

SLOVENIA

STAND:

27

PROJECT:

COMPUTING-08

COUNTRY:

PORTUGAL

# ALGORITHMIC TRADING – INVESTIGATING DIFFERENT TRADING STRATEGIES

This project investigated different algorithmic trading strategies. Algorithmic trading is a method to automate trading by using computers programmed to follow a defined set of instructions for placing trades to generate profits at a speed, frequency and volume which are beyond a human trader's capability. The aim was to backtest the strategies on historical data to gauge how they will work in current conditions, optimise, evaluate and combine different strategies to create safe and profitable strategies. During the parameter optimisation, different theories and myths about strategy parameters or the strategy itself could be accepted or rejected. A simple and effective way of combining strategies was found to reduce volatility in the VAMI (Value Added Monthly Index) and the monthly return.



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# COMPOSER CLASSIFICATION: NEURAL NETWORKS AND HARMONIC ANALYSES

This project offers a new approach to the task of computationally predicting which composer wrote a piece of music. For this task, two types of neural networks are tested: an LSTM network and a GRU network. Previous studies approached this task using either digital sheet music or audio recordings as input. This project introduces the use of harmonic analyses (chord progressions). My hypothesis was that this information as input would be sufficient for this task. Three composers (Bach, Beethoven & Monteverdi) are represented by 45 pieces each. This is split into two collections: a large collection (80%) to train on, and one that remains 'hidden' during training to test the model afterwards. All of these new pieces are classified correctly by my model, outperforming previous techniques.



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STAND:

28

PROJECT:

COMPUTING-09

COUNTRY:

SWITZERLAND

STAND:

29

PROJECT:

COMPUTING-10

COUNTRY:

NETHERLANDS

<b>DEVELOPING A MOTORIZED UV ILLUMINATOR DEVICE FOR PHOTOCHEMICAL LIGAND-BINDING</b> BENEDEK LÁSZLÓ BARNA	30
<b>BATHYMETRIC ANALYSIS OF GEOREFERENCED DATA VIA AQUATIC DRONE</b> DOMINICK RIZ, DAVIDE FRANCESCO FRENA, GIANMARIA GROTTA	31
<b>CONSCIOUS BRAIN MIND-CONTROLLED CYBONTHITIC CYBORG BIONIC-LEG - V2</b> MOHAMMED SABRY ABD EL-SAMEE LASHEEN, AHMED AYMAN MOHAMMED ABD EL-MONSEF, MOAZ MOSTAFA ALLAM	32
<b>AUTOMATED DARTS ROBOT</b> GAETAN BARETTE	33
<b>POP2SEE SMART CLASS</b> KONSTANTINOS MAZARAKIS, ALIKI RANGOUL	34
<b>SMART SUIT NBSG – NITINOL BASED SMART GADGETS</b> DEMETRE SAZONOV, SANDRO GLONTI	35
<b>AD3N</b> FILIP MARTH, MICHEL SPEICHER, NIELS MICHEL HUBERTY	36
<b>VERTICAL AXIS WIND TURBINE WITH INTEGRATED CENTRIFUGAL FLAPS</b> ANDREAS STROMMER, MICHAEL LUKAS STRUDLER	37
<b>3D-PRINTED SENSORS ON TEXTILE SURFACES</b> STEVEN GURGEL, JOHANN ELIAS STOETZER	38
<b>LIGHT GUARDIAN</b> SABIN VASILE VAȘCOVICI, RAUL GABRIEL MIHUȚĂ, RĂZVAN NICOARĂ	39
<b>SOFT ORIGAMI INSPIRED 3D PRINT-IN-PLACE ARTIFICIAL INTELLIGENCE ROBOTS</b> SAAN CERN YONG, SHENG ZE YEOH	40
<b>SIPSAFE</b> NATASIA SEIERUP MIKKELSEN, JACOB FRITSDAL PEDERSEN, NOAH WILLUM NYGÅRD	41
<b>3D PRINTING A GEOMETRY OPTIMIZED BMX SIZED BIKE FRAME AT HOME</b> MAXIMILIAN PETER THEIMER	42
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## DEVELOPING A MOTORIZED UV ILLUMINATOR DEVICE FOR PHOTOCHEMICAL LIGAND-BINDING

In physiological processes proteins are involved within a complex network of interactions. Moreover, almost all clinical drugs exert their effects via the modulation of proteins. In order to fully understand the function of proteins and develop improved medications, proteins must be studied with imaging techniques. Ligand based labeling can be used, if a protein-specific ligand exists. The unstable ligand-protein bond can be stabilized by supplementing the ligand with an additional molecule which forms a covalent bond with the protein upon exposure to 365 nm UV light. The developed UV-Covbel device can illuminate samples in multiwell cell culture plate with adjustable power and time pattern of 365 nm UV light for a stable, covalent ligand based labeling for life science research.



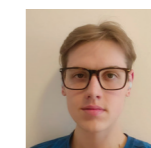
**BENEDEK LÁSZLÓ BARNA**  
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## BATHYMETRIC ANALYSIS OF GEOREFERENCED DATA VIA AQUATIC DRONE

B.A.G.D.A.D. is the name of our aquatic drone, developed to improve the monitoring process of artificial water reservoirs, which is fundamental in order to grant their efficiency and avoid accidents and environmental risks.

Our drone is provided with a self-developed bathymetric sensor, able to measure the depth of the lake and create a three-dimensional bathymetric map with GPS reference of the seabed. Our sensor is significantly cheaper in comparison to an industrial model.

The boat is also capable of moving and taking the measurements autonomously.



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**STAND:** 30  
**PROJECT:** ENGINEERING-01  
**COUNTRY:** HUNGARY

**STAND:** 31  
**PROJECT:** ENGINEERING-02  
**COUNTRY:** ITALY

# CONSCIOUS BRAIN MIND-CONTROLLED CYBONTHITIC CYBORG BIONIC- LEG - V2

Lower limb amputations affect about 28.9 million people world-wide, influencing normal human functions. we developed a mind-controlled bionic-leg to provide a professional solution for amputees, which is classified as restricted knee movement, long-term solution, High pressure bearing, specific analog reading of Electromyography (EMG). Because the output voltage measured in nano-volts resulting in unspecific knee movement, and the functionality of these modern gadgets is still limited due to a lack of neuromuscular control (i.e. For movement creation, control relies on human efferent neural signals to peripheral muscles). We Amplified the EMG output from Nano-Voltage to Milli-Voltage using customized instrumentation amplifiers (operational amplifiers).



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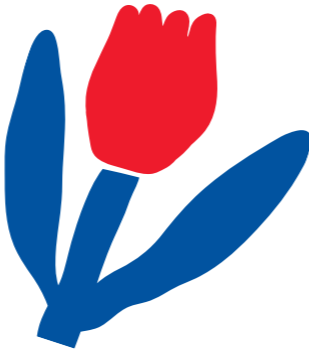
# AUTOMATED DARTS ROBOT

Is it possible to build a robot that can play darts better than my family (average human) ? They are all better than me in darts. I didn't like that, so I decided to build a robot that automatically plays darts. I decided to work with Lego for the frame of the robot while using Arduino for the electronic part. I tried many launch techniques and finally chose a type of catapult with elastics. After some months of work on different prototypes, the robot was finally looking good. The question was then to know if the robot was better than my relatives or not. After an entire statistical analysis I could conclude that yes the robot was better than my relatives.

More content about it on:  
<https://getgetstechno.github.io/ThunderCode.io/>



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STAND:

PROJECT:

COUNTRY:

32

ENGINEERING-03

EGYPT

STAND:

PROJECT:

COUNTRY:

33

ENGINEERING-04

BELGIUM

# POP2SEE SMART CLASS

Inspired by: Alice broke her pair of glasses at school resulting in reduced visibility. The team got inspired to start this project  
Designed for: Blind students at schools and universities, experiencing obstacles while educating  
Our R&D & Testing: 5 blind students, 4 Parents, 9 Teachers, and 7 organizations  
Our value: Autonomy, Inclusivity, Interaction, aligned with UN's SDGs 4, 7, 8 & 17  
Our solution: 2 portable devices:

- 1st: Braille Keyboard and Reading System (English, Enhanced communication with the teachers)
- 2nd: Camera with MicroComputer (Image to Text, Text to Speech, Speech to Text)
- Communication via Bluetooth, WiFi, and SD card, App for teachers and parents

Who is it for: 197K students, 394K parents, 985K families, Ministries of Education, schools and universities



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STAND:

PROJECT:

COUNTRY:

34

ENGINEERING-05

GREECE

# SMART SUIT NBSG – NITINOL BASED SMART GADGETS

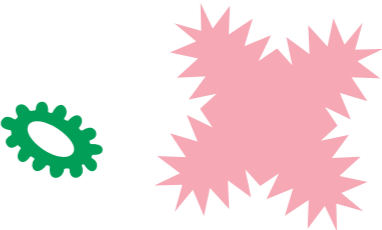
Many people around the world require physical assistance to overcome Obstacles posed by their own physical condition. In general, Rehabilitation involves a complex and lengthy process that requires great physical effort and energy. For solution, we invented a new type of multifunctional exo-skeleton "Smart suit NBSG - Nitinol Based Smart Gadgets", based on the unique property of smart material Nitinol - shape memory effect. The presented Invention also will fulfill many other purposes like Fitness, where NBSG will be compact wearable training machine/gadget, and Virtual Reality. When the user touches a virtual object, NBSG VR glove will apply force in fingers to give you the feel of VR world. In conclusion, NBSG has a big potential to make a huge impact on many other spheres' development.



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STAND:

PROJECT:

COUNTRY:

35

ENGINEERING-06

GEORGIA

# AD3N

AD3N aims to use drones as a fast network for defibrillators. This means that, if necessary, a defibrillator can be summoned by means of an app. A national callcenter automatically send out the drone positioned the nearest to the callers coordinations sent out by their mobile phone. The AD3N prototype is a proof of concept whose goal it is to demonstrate the feasibility of a drone based defibrillator delivery system to support existing infrastructure with minimal reaction time.



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# VERTICAL AXIS WIND TURBINE WITH INTEGRATED CENTRIFUGAL FLAPS

This hybrid is using the resistance and buoyancy principle. It is characterized by aerofoils with integrated split flaps, which are opened by repelling magnets at low wind speeds. The result: the rotor starts up much easier and at lower wind speeds. As the rotation speed increases the magnetic opening effect is overcome by the centrifugal forces, which act on the flaps. As a consequence, the flaps fold in automatically. By doing this the wind turbine works at low speeds as a drag-based and at higher speeds as a lift-based wind turbine. Without any complex mechanics and cybernetics, the turbine always works in the optimum operating range. Due to further improvements on the inside of the profile, our wind turbine with centrifugal flaps is able to generate up to 600% more starting torque.



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STAND:

36

PROJECT:

ENGINEERING-07

COUNTRY:

LUXEMBOURG

STAND:

37

PROJECT:

ENGINEERING-08

COUNTRY:

AUSTRIA

# 3D-PRINTED SENSORS ON TEXTILE SURFACES

3D printers continue to gain in importance: the devices are becoming more and more common and can produce a vast range of objects from housings to custom-made prostheses. Johann Elias Stoetzer and Steven Gurgel expanded this spectrum significantly by using flexible, conductive filament to develop sensors that specifically utilise the possibilities of additive manufacturing processes. The sensors can measure forces, contact or bending processes. The young researchers were even able to print their 3-D sensors on textile, which facilitates fascinating applications: Touch sensors on outdoor clothing can, for example, support bike couriers to control smartphone navigation or a music app. And pressure and bending sensors applied to protective clothing could warn of excessive load on joints.



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STAND:

38

PROJECT:

ENGINEERING-09

COUNTRY:

GERMANY

# LIGHT GUARDIAN

As the continuous development of building architecture favors the use of glass ceilings or walls, the problem of the greenhouse effect produced by incident rays, which in turn have a magnifying glass effect, is spreading. Our project aims to solve this problem by studying and testing various possible solutions that could potentially be accessible to anyone. The study resulted in using a dissipative foil, which we named “Light Guardian Foil (LGF)” that works on physical and chemical principles that reduce the light flux without leading to loss of natural light in seasons when the sun is not prominent in the sky. In fact, our LGF films are made of spherical anti-transmission particles that can be used on vertical, horizontal or angled glass at any angle of the sun and any time of year.



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PROJECT:

ENGINEERING-10

COUNTRY:

ROMANIA

# SOFT ORIGAMI INSPIRED 3D PRINT- IN-PLACE ARTIFICIAL INTELLIGENCE ROBOTS

The food industry faced challenges in food handling amid the pandemic and thus required more automation using soft robotics. We developed 3D print-in-place, easy assembled, under-actuated soft origami inspired grippers and a legged robot with artificial intelligence capability to grasp various objects under different conditions. The compliance behaviour and object classification aided by artificial intelligence enhanced the grasping performance of soft origami zigzag gripper. The novel design of 3D print-in-place soft origami legged robot is capable of fluid motion and surviving drop test. It is durable, flexible and safe to work alongside humans. We combined robots with soft origami structures, 3D print-in-place technique and artificial intelligence to improve automation in food handling.



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# SIPSAFE

Numerous young adults have experienced getting pills in their drinks involuntarily. The reason why drugs is placed in young people's drinks is many, but most often is to drug rape or rob a person, as a joke or as an act of jealousy. The unwanted drugs can lead to blackouts, fatal overdoses, lack of self-control, and long-term mental difficulties. This problem is complicated and extremely relevant, it was found that in 6 years, 608 people reported that they had found drugs in their drinks. The number is large, and the problem is even bigger than what is possible to document, since a big quantity of the victims, chooses not to report it. We made a lid for beer glasses, which will prevent young adults from being drugged involuntarily.



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# 3D PRINTING A GEOMETRY OPTIMIZED BMX SIZED BIKE FRAME AT HOME

Additive manufacturing, namely filament 3D printing, is becoming a widely used technology in the consumer space. But how far can 3D printing with consumer materials at home go? This thesis sets out to answer this question by 3D printing a BMX sized bike frame. The design of the frame had to balance rigidity and weight while ensuring sufficient strength to be rideable. Generative design was the optimum method to achieve this. Furthermore, 3D printing techniques like nozzle diameter, print orientation and filament types were analysed, so that the strongest combination of part geometry and 3D printing technique could be developed. As large form factor 3d printers are not available in the consumer space, a CNC mill was modified into a 3D printer large enough to produce a small bike frame.



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# THE NEWEST SMART CHARGING STATION “AKER”

Main innovative component of the developed Smart Charging Station “Aker” is modularity, which significantly increases maintainability and expands the range of its capabilities. The device implements fast charging technologies and a TFT SPI (TFT – thin-film transistor; SPI – serial peripheral interface) display, which allows it to display all charging parameters in a convenient mode. The device supports the function of wireless charging and has a removable battery (which can be a separate powerbank) of 28800 mAh. By using thermistors (to control the temperature of the batteries and the “Battery Management System”), it is possible to significantly increase the safety of operation and transportation.



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STAND:

40

PROJECT:

ENGINEERING-11

COUNTRY:

USA

STAND:

41

PROJECT:

ENGINEERING-12

COUNTRY:

DENMARK

STAND:

42

PROJECT:

ENGINEERING-13

COUNTRY:

SWITZERLAND

STAND:

43

PROJECT:

ENGINEERING-14

COUNTRY:

UKRAINE



# ENVIRONMENT

## RUSTY, THE SOCIAL MIRROR TECHNOLOGY

NÓRA-ANNA KOVÁCS

## REMOTE CONTROL SYSTEM OF BEES

FILIPPO CAZZOLA, LUCA BINCOLETT, MARCO CARNEVALE

## THE GREEN GOLD

ESLAM MOHAMED AMEN NASR MOSTAFA

## EXPOSURE TO FINE AND ULTRAFINE PARTICLES IN THE STOCKHOLM SUBWAY

ALICE LOUISE HEIMAN, ALICIA HEDVIG HELENA LARSEN

## MEASUREMENT AND MONITORING SYSTEM OF SEAWATER QUALITY.

DIMITRIOS DELIAKIDIS

## PENETRATION FIELD PREFERENCE OF POLLINATORS

GABRIELA SZCZEPANIK

## DECARBONISATION OF EMISSION GASES BY INJECTION OF SODIUM HYDROXIDE

MAREK ČERVEN, MARTIN PECKO

## PLANKTON WARS: AN INNOVATIVE ANALYSIS OF DAPHNIA GENOTYPE BIOMANIPULATION FOR ALGAE BLOOM PREVENTION

ANNABELLE RAYSON

## PERFORMANCE OF MACHINE LEARNING ALGORITHMS FOR PREDICTING AIR POLLUTION PARAMETERS

BRIANNA ALEXANDRA STAN

## YEAR 5: DEVELOPING A NOVEL MULTIPLE LINEAR REGRESSION MODEL TO OPTIMIZE HONEY BEE GUT IMMUNITY USING A LACTIC ACID BACTERIA PROBIOTIC MIXTURE

VARUN RAJ MADAN

## USE OF BANANA TREE CELLULOSE PULP FOR THE REMOVAL OF MICROPLASTICS FROM CONTAMINATED WATER

LUCAS JOAQUIM SOUSA DÓRIA, JOSÉ TIAGO FERNANDES VIEIRA

## EVALUATION OF EXOGENOUS APPLICATION OF HYDROGEN PEROXIDE (H<sub>2</sub>O<sub>2</sub>) FOR THE CONTROL OF AQUATIC WEED IN RICE FIELDS LEMNA MINOR L.

GEMMA MUÑOZ GARCÍA, JULIA VALLEJO CARRASCO, RAQUEL JIMÉNEZ PÉREZ

## FOREST DAMAGE – BARK BEETLE IDENTIFICATION USING REMOTE SENSING IN LATVIAN TERRITORIES

LUKASS ROBERTS KELLIJS

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## RUSTY, THE SOCIAL MIRROR TECHNOLOGY

Walking through the streets of Cambridge, Kolozsvár, and Budapest, we can notice a common issue: we have failed to develop and sustain an accurate waste management system. Behind the scenes, the most relevant source of this environmental burden is the lack of human awareness. This observation led me to start a new chapter in waste systems and social education by providing AI-driven digitalized solutions. Therefore, I launched the Social Mirror Technologies, and my first prototype, Rusty, seeks to strengthen self-reflection for the cleanliness of public spaces by being able to recognize trash, providing monitoring, and then trying to grab people's attention to pick up trash. 4.2 billion people live in cities, and the garbage not only damages their health but also damages the ecosystems.



NÓRA-ANNA KOVÁCS

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## REMOTE CONTROL SYSTEM OF BEES

Our interest in bees as pollinators and bioindicators motivated us to develop a remote control system of the hives that can make management of apiaries more efficient.

Our electronic device allows us to record the values of internal and external temperature and humidity of the hive, the concentration of CO<sub>2</sub> and the total weight of the hive. The data collected at regular intervals are sent to a web page that stores them in an online-searchable database.

With our system we have successfully verified the bees' survivability throughout the year and, through the measured weight, obtained useful information for choosing the timing of an emergency food supply or harvesting the honey produced.



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STAND: 45  
PROJECT: ENVIRONMENT-02  
COUNTRY: ITALY

# THE GREEN GOLD

I chose biodiesel production as an alternative energy source. The biodiesel was produced from *M. oleifera* (MO) seeds and co-culture of acetyl-coA carboxylase (ACCase) transformed *R. glutinis* with *C. vulgaris*. Directed evolution was applied by adding sethoxymim, an ACCase inhibitor, to obtain high lipid productive co-culture via natural selection. The effect of nitrogen depletion on the co-culture lipid productivity was assessed for enhanced biodiesel production. Residual MO biomass was mixed with *S. fusiforme* powder to test its wastewater treatment ability on turbidity; bacterial load; and Cd, Cu, Fe, Hg, Pb removal. The water was then treated by co-immobilized *C. vulgaris* and *A. brasilense*, and immobilized *B. subtilis* with *B. licheniformis*.



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# EXPOSURE TO FINE AND ULTRAFINE PARTICLES IN THE STOCKHOLM SUBWAY

High concentrations of particulate matter have been measured in several subway networks worldwide. This study examined micro- and nanoparticles on 20 metro platforms in the Stockholm Subway. Measurements were taken using sensors mounted on custom-built boards and were later analyzed with code. The results indicate significant differences in both particle concentration and size distribution between stations, especially when comparing indoor and outdoor platforms. It is also probable that some stations exceed the recommended guidelines. The experiment is one of the most extensive measuring campaigns in Stockholm regarding the number of platforms examined. These findings highlight the importance of investigating subway air quality and could aid future research into this relevant topic.



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# MEASUREMENT AND MONITORING SYSTEM OF SEAWATER QUALITY.

Sea water quality is an important factor as it affects the ecological balance of ecosystems. My project's goal is to monitor sea water quality in real time by creating a device which is sealed in a container below the sea surface for a long period of time, responsible for gathering data and remotely transmitting them to another device which acts as a ground station that publishes the collected data to everyone. The quantities measured are the temperature, pH and turbidity because they are inextricably linked to many harmful phenomena in marine waters. The importance of this project lies in the fact that the monitoring of the measured parameters and especially their variation, evaluates the water quality but also timely identifies hazards or pollution at any aquatic system.



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# PENETRATION FIELD PREFERENCE OF POLLINATORS

The extinction of pollinators is a global problem. The motivation of the study was to find out what kind of benefits will be a long-lasting and effective feeding base for pollinators. The project presents the characteristics of preferences for penetration of plots depending on their species diversity by selected representatives of types of pollinators. It analyses the activity of insects in terms of living and acquiring food in the areas of the investigated plots. The study demonstrates the limited role of monocultures as a feeding base in the context of the timing of food availability and the exclusionary effect on the presence of some types of pollinators. The results of this study allow us to present possible solutions to the revitalization of urban green spaces and agriculture.



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STAND: 46  
PROJECT: ENVIRONMENT-03  
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STAND: 47  
PROJECT: ENVIRONMENT-04  
COUNTRY: SWEDEN

STAND: 48  
PROJECT: ENVIRONMENT-05  
COUNTRY: GREECE

STAND: 49  
PROJECT: ENVIRONMENT-06  
COUNTRY: POLAND

# DECARBONISATION OF EMISSION GASES BY INJECTION OF SODIUM HYDROXIDE

Carbon dioxide is one of the major pollutants in the atmosphere of our planet. Its emission into the air in various ways, such as the burning of fossil fuels, contributes the most to the greenhouse effect and global warming. The initial purpose of the project was to find an effective way of capturing and subsequently processing carbon dioxide before its entry into the atmosphere, using injected sodium hydroxide solution. The next steps were to improve the given system, which is ultimately cheaper, more efficient, and more modular than the conventional carbon capture methods.



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COUNTRY:

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ENVIRONMENT-07

SLOVAKIA

# PLANKTON WARS: AN INNOVATIVE ANALYSIS OF DAPHNIA GENOTYPE BIOMANIPULATION FOR ALGAE BLOOM PREVENTION

Harmful algae blooms plague aquatic ecosystems around the world. They impact water quality and ecosystem diversity, cause dead zones, and cost the fishing and tourism industries millions of dollars. In this project, different genotypes of Daphnia magna were compared for algae consumption. The most effective genotype was then tested under different environmental conditions to see which factors helped or hindered their success at harmful algae bloom treatment and prevention. It was determined that genotype 4 is the ideal genotype of D. magna to biomanipulate to treat and prevent harmful algae blooms, they can effectively do this in nutrient and plastic polluted environments, and their health and success can be improved with calcium carbonate and naturally occurring aquatic microbes.



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STAND:

PROJECT:

COUNTRY:

51

ENVIRONMENT-08

CANADA

# PERFORMANCE OF MACHINE LEARNING ALGORITHMS FOR PREDICTING AIR POLLUTION PARAMETERS

One of the world's most critical challenges we face today is air pollution, generating numerous health issues and negatively impacting the environment. This study compares machine learning models like LSTM, ARIMA, SARIMAX, BVAR, VAR, GRU, and Prophet for 24 hours predictions of NO2 and PM2.5 concentrations. The project's goal was to test the performance of machine learning algorithms and develop a methodology for identifying the most accurate one aiming to integrate it with urban air monitoring station networks for live prediction. The analysis of the forecasting results of the models used MAPE, RMSE, MSE, and MAE as evaluation methods for the algorithms' accuracy. The LSTM algorithm resulted in the best-performing model, providing an accuracy of 81,63 % for NO2 and 76.79% for PM2.5.



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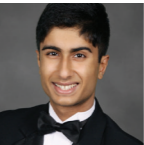
52

ENVIRONMENT-09

ROMANIA

# YEAR 5: DEVELOPING A NOVEL MULTIPLE LINEAR REGRESSION MODEL TO OPTIMIZE HONEY BEE GUT IMMUNITY USING A LACTIC ACID BACTERIA PROBIOTIC MIXTURE

In response to the rapid global honeybee decline, a novel lactic acid bacteria probiotic mixture was developed five years ago. Although an existing multiple linear regression (MLR) model was used to determine this mixture's optimal dosage last year, a major problem was that the model would not minimize the sum of the residuals unless explicit training commands were given, which is why a novel MLR model was developed with continual-learning algorithms. After training, there was an insignificant difference between the novel MLR model's predictions and experimental values. Additionally, the MLR was significantly more accurate (peak of 92.8%) than existing ML alternatives. The combination of this novel MLR and probiotic mixture can potentially reverse this alarming decline of our pollinators.



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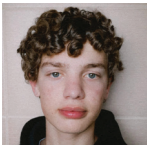
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ENVIRONMENT-10

USA

# USE OF BANANA TREE CELLULOSE PULP FOR THE REMOVAL OF MICROPLASTICS FROM CONTAMINATED WATER

In our society, with progressively marked ecological and sustainability values, there is a growing concern about the increase in plastic production, which every year tends to accumulate in the environment in the form of nano or microplastics (MPs), who have an impact on especially marine ecosystems, putting many species at risk due to bioaccumulation processes. In this project, simple biofilters were produced from banana pulp and nanomodified biofilters with exopolymers from microalgae and bacteria, and their efficiency for the PM retention was tested. This eco-technology has shown very promising results, minimizing the release of PMs into the environment, and valuing a very abundant waste on the island of Madeira, thus contributing to the 2030 Agenda for Sustainable Development.



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# EVALUATION OF EXOGENOUS APPLICATION OF HYDROGEN PEROXIDE (H2O2) FOR THE CONTROL OF AQUATIC WEED IN RICE FIELDS LEMNA MINOR L.

The present work has evaluated the possible use of the exogenous application, of different concentrations of hydrogen peroxide (H2O2) in relation to its efficacy with respect to the control of the aquatic weed of rice fields Lemna minor L. The application of H2O2 at a concentration of 4.5% by volume has achieved a reduction of more than 70% in the green surface of the vegetation cover, reaching a reduction in mass of 40%; all this without significantly altering the pH of the water.



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54

PROJECT:

ENVIRONMENT-11

COUNTRY:

PORTUGAL

STAND:

55

PROJECT:

ENVIRONMENT-12

COUNTRY:

SPAIN

# FOREST DAMAGE – BARK BEETLE IDENTIFICATION USING REMOTE SENSING IN LATVIAN TERRITORIES

The European spruce bark beetle is considered to be the most critical disturbance agent in European forest ecosystems. To identify individual infested trees and thus minimize the risk of outbreak a random forest model was developed and validated using for shadow and forest clearing masked ortophotos, which were manually classified by foliage color, using known infestation areas. The model was able to discriminate between healthy and red-attacked trees on a pixel by pixel basis with an accuracy of 99%. This study highlights the potential use of such imagery as an effective tool for red-attack stage identification, as well as the necessity of increased temporal resolution of this data and more detailed in-situ data for future implementation and augmentation of this method in Latvia.



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STAND:

56

PROJECT:

ENVIRONMENT-13

COUNTRY:

LATVIA



# MATHEMATICS

<b>BIDIAGONAL DECOMPOSITIONS OF (SINGULAR) VANDERMONDE-TYPE MATRICES</b> STEVEN OGNYANOV SPASOV	57
<b>A COMPARATIVE ANALYSIS BETWEEN TOMOSYNTHESIS AND CONVENTIONAL X-RAY MODALITIES IN MAMMOGRAPHY</b> ARVIN KIARMIN VILHELM BJÖRKGREN	58
<b>SOME FINITE INDEX SUBGROUPS OF THE BRAID GROUP <math>B_3</math></b> BARTŁOMIEJ BYCHAWSKI	59
<b>RATIO OF SURFACE AREAS FOR <math>n</math> IDENTICAL POLYGONS AND A LINE INTERSECTING WITH THEM</b> AHMET ÇAĞDAŞ GİRİT	60
<b>A NEW METHOD OF SOLVING THE BERNOULLI QUADRISECTION PROBLEM</b> ADITYA KUMAR, ADITYA JOSHI	61
<b>NEW CONJECTURES OF PRIMES DISTRIBUTION IN NATURAL NUMBERS SEQUENCE</b> ALFRĚDS SAROČINSKIS, PETR GABUNIA	62
<b>NUMBER, SUM AND PRODUCT OF DIVISORS OF POSITIVE INTEGER</b> NIKITA ARSKYI	63

## BIDIAGONAL DECOMPOSITIONS OF (SINGULAR) VANDERMONDE-TYPE MATRICES

In this project, new formulas for computing the bidiagonal decompositions of the Vandermonde,  $(q, h)$ -Bernstein-Vandermonde, and other matrices, are presented. The new formulas allow for accurate computations to be made with the matrices, even when they are singular, which happens when two of their parameters are equal. They were obtained by factoring the diagonal matrices of the standard decompositions into many and grouping them with the lower bidiagonal matrices, cancelling the denominators which could possibly equal 0. Matlab programs were created as well, and they compute the decompositions at a quadratic computational cost.



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## A COMPARATIVE ANALYSIS BETWEEN TOMOSYNTHESIS AND CONVENTIONAL X-RAY MODALITIES IN MAMMOGRAPHY

According to the World Health Organization, breast cancer is the most prevalent cancer in the world. This metaanalysis has the purpose of answering what the advantages and disadvantages of Projectional Mammography (PM), Digital Breast Tomosynthesis (DBT) and Breast Computed Tomography (BCT). The conclusion of the project is that DBT and BCT, by means of their three dimensional reconstructions, can solve the problem with tissue superposition that PM. This increases the possibilities of finding cancer, and is done without a significant increase in absorbed dose. However, BCT has critical problems such as invisible microcalcifications in the breast, as well as the bad visibility of the axillary lymph nodes.



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STAND: 58  
PROJECT: MATHEMATICS-02  
COUNTRY: SWEDEN

# SOME FINITE INDEX SUBGROUIPS OF THE BRAID GROUP $B_3$

The subject of my paper belongs to the field of mathematics, specifically group theory. I study a fundamental group of some three-dimensional manifold, which is a space similar to our 3D space with three perpendicular axis, however more complicated. This group is the group of all the braids on three strands. It can be studied purely algebraically. The braid group is rather complicated, so proving properties of this group directly can also be quite complex. We can therefore study a reasonably large subgroups of this group in order to get the properties of the whole group in the sequel. The most important subgroup of this type is given by considering only braids, that does not change the order of strands.



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# RATIO OF SURFACE AREAS FOR N IDENTICAL POLYGONS AND A LINE INTERSECTING WITH THEM

In this Project; we put  $n$  identical polygons, draw a line between the lower left most point and upper right most point then calculate the ratio between surface area above said line and surface area below said line. We started with triangles, then expanded it to trapezoids. Then we calculated it for regular pentagons by using the fact that a regular pentagon is an isosceles triangle sitting on an isosceles trapezoid. Then we calculated a similar ratio for  $n$  identical pyramids with a convex base and a plane intersecting with said pyramids.



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# A NEW METHOD OF SOLVING THE BERNOULLI QUADRISECTION PROBLEM

The Bernoulli Quadrisection Problem requires us to divide the area of a given triangle into four equal areas using two perpendicular straight lines. One of the areas must be a triangle, and the other three must be quadrilaterals. We have solved this old, but difficult problem using Particle Swarm Optimisation (PSO), an algorithm that was devised in 1995. We also used PSO to solve a very modern problem arising in the design of electronic circuits using Very Large Scale Integration (VLSI). Our solution of this VLSI problem required us to develop a modified PSO algorithm involving the use of multiple particle swarms. This experience encouraged us to develop a number of new, very efficient particle swarm algorithms.



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# NEW CONJECTURES OF PRIMES DISTRIBUTION IN NATURAL NUMBERS SEQUENCE

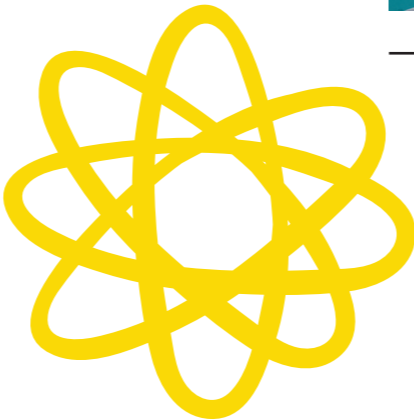
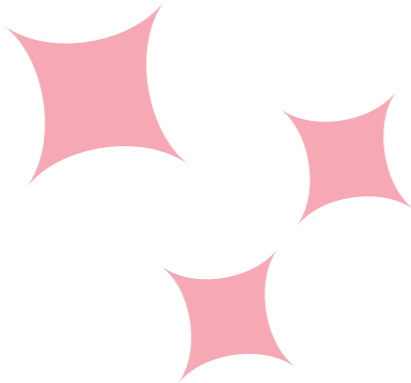
This work suggests hypotheses about number intervals, containing at least one or more primes. To check each hypothesis, a Python programming language-based code was created. Research has shown that conjectures suggested in this work, are unique strengthening for already set conjectures about the research topic. Addendums contain codes, that are used to check set conjecture in defined number range. The scientific research has been written in Latvian. It consists of 16 pages, 4 picture, 2 addendums, 5 tables. 7 references have been used. Key words: primes, prime-counting function, Legendre's conjecture (3rd Landau problem), Desboves conjecture, Opperman's conjecture.



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STAND:

59

PROJECT:

MATHEMATICS-03

COUNTRY:

POLAND

STAND:

60

PROJECT:

MATHEMATICS-04

COUNTRY:

TÜRKIYE

STAND:

61

PROJECT:

MATHEMATICS-05

COUNTRY:

IRELAND

STAND:

62

PROJECT:

MATHEMATICS-06

COUNTRY:

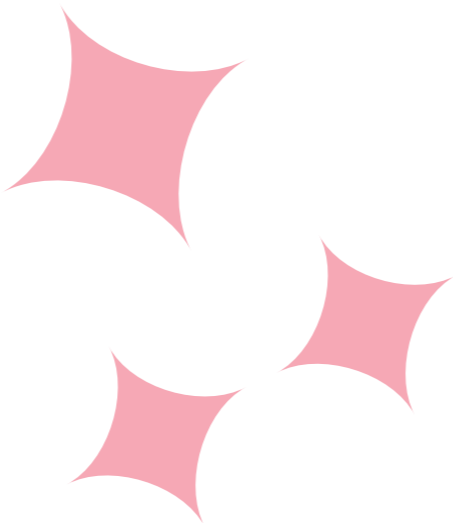
LATVIA

# NUMBER, SUM AND PRODUCT OF DIVISORS OF POSITIVE INTEGER

Positive integers, their divisors and properties are widely used not only in Mathematics but also, in Informatics and Programming respectively. The research project contains a wide range of properties of the functions of the number, sum, and product of the divisors of a positive integer. The basic data on these functions, broadened and supplemented with the personally derived propositions, allow one to obtain new theoretical results, as well as to conduct the calculations more rationally. This was illustrated in the derivation of the new results and the solutions to the self-created problems. The resulting material can help solve practical and theoretical problems and be applied as a database for further research.



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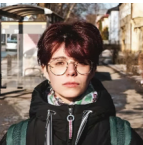


# MEDICINE

RESEARCH INTO THE GENETICS OF SCHIZOPHRENIA USING BIOINFORMATICS METHODS TAISSIJA RYCHKOVA	64
OVERCOMING MOTION DISORDERS ZEINAB MUSTAFA ABDULLAH ABDELRAHEEM	65
STEP BOOSTER YLAN DUCOBU, ETHAN CARLIER	66
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THE INFLUENCE OF SOCIAL ISOLATION ON SOCIAL BEHAVIOR MAYA KRIZHANOVSKY	72

# RESEARCH INTO THE GENETICS OF SCHIZOPHRENIA USING BIOINFORMATICS METHODS

Schizophrenia is a very common mental disorder, the biological understanding of the combination of symptoms of which is quite problematic. In this study, through the search for the most statistically significant genes associated with schizophrenia, an attempt was made to identify combinations of biological processes that could explain and combine the various manifestations of the disease. Using biological databases and already existing clinical research, a fairly complete list of the processes and metabolic pathways linking symptoms of different types was obtained. The results of the study can help in the development of more effective drugs of complex action, as they give an understanding of the biological relationship between the manifestations of the disease.



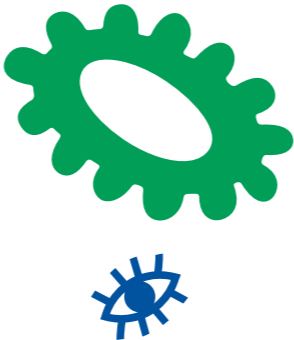
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# OVERCOMING MOTION DISORDERS

Motion disorders and motion weaknesses represent a big challenge for most of people around the world with different forms. The most common forms which causes motion disorders in legs are Multiple sclerosis(MS) and paresis especially paraparesis. The patients who have these forms of disorders can not walk normally. So, this device helps them to keep standing and achieve the movement like normal people by using their hands. The degree of improvement differs from person to another as depends on the hardness of the disease and injury kind.



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STAND:

64

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MEDICINE-01

COUNTRY:

ESTONIA

STAND:

65

PROJECT:

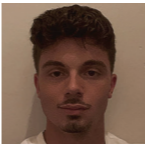
MEDICINE-02

COUNTRY:

EGYPT

# STEP BOOSTER

The step booster is an exoskeleton for the legs. He stands on the outer side of the leg. With its electric motor, motion detectors and gears, it would help people who have less strength in the leg. For example, it would help to walk the elderly or people in physical therapy. It can be adapted to any morphology, size, weight... The goal is to help people in their walk while providing a device accessible to all, not too expensive.



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PROJECT:

MEDICINE-03

COUNTRY:

BELGIUM

# A NOVEL CANCER THERAPY: HTERT - CRISPR/CAS9

I propose halting telomerase production in cancer cells via CRISPR-Cas9. Telomerase preserves telomeres preventing cancer cells from reaching the Hayflick limit and succumbing to apoptosis. A functional telomerase inhibitor would be a viable way to combat cancer. Should telomerase production cease, the Hayflick limit would be reached within a few rounds of mitosis. I propose eradicating a vital telomerase component, hTERT, via CRISPR-Cas9. Cas9 and sgRNA will be administered in a lipid nanoparticle. The process set forth by myself is theoretically viable and apt for mass production. I have laid out a research plan, which, if followed, could prove the viability of my solution in vitro. Existing scientific knowledge suggests that my proposition is theoretically valid both in vitro and in vivo.



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STAND:

68

PROJECT:

MEDICINE-05

COUNTRY:

FINLAND

# THE USE OF ENCAPSULATION OF CROSS-LINKED POLYSACCHARIDE SALTS AND MICELLES AS A CARRIER FOR HYDROPHOBIC MEDICINAL SUBSTANCES

Micelles were created with incorporated hydrophobic dye (a hydrophobic drug analog). Then, microparticles were made from sodium alginate in which the previously prepared micelles were encapsulated. 2 cross-linking solutions were used (calcium chloride, iron nitrate) and microparticles were observed under a laser confocal microscope (LCM) to confirm the presence of the dye inside the microparticles. After 24hrs, the microparticles were soaked for 45 min. in solutions imitating gastric and intestinal juices and then were analyzed using LCM. The microparticles cross-linked in calcium chloride were broken down in the intestinal and not in the gastric juice. However, the microparticles enclosed in the iron nitrate released the dye in both solutions simulating gastric and intestinal juices.



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# FOURSIGHT: ANALYSIS OF CANCEROUS GENETIC PROFILES WITH ARTIFICIAL NEURAL NETWORKS

FourSight is an attempt to revolutionize cancer diagnosis by combining two of science's newest innovations: AI and genetic sequencing. Despite early cancer detection being one of the most researched topics in the medical field, 20% of cancer diagnoses are incorrect, with 28% of inaccurate or delayed diagnoses leading to death. With this issue in mind, we built a microarray-based cancer diagnosis AI, and trained it to 95% accuracy on a massive dataset of 17,375 human miRNA microarray samples that we compiled from the GEO database. Using statistical methods, we further identified biomarker genes responsible for 12 different types of cancer. With FourSight, cancer detection can be non-invasive, faster, more accurate, and completely automated.



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STAND: 69

PROJECT: MEDICINE-06

COUNTRY: POLAND

STAND: 71

PROJECT: MEDICINE-08

COUNTRY: CANADA

# THE INFLUENCE OF SOCIAL ISOLATION ON SOCIAL BEHAVIOR

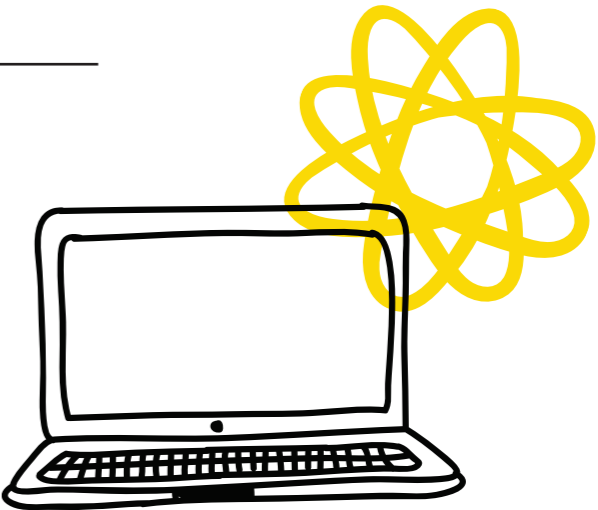
Social isolation can have severe health consequences for the rest of a subject's life. The responsible circuits weren't studied enough, and there is a general lack of information. In this research we focused on the Pre-Frontal Cortex, a brain region responsible for decision making, social behavior, language comprehension and so on. We hypothesized that the PFC is the brain region responsible for social behavior following social isolation. We conducted experiments on mice we socially isolated, and silenced specific parts of their PFCs. The results have shown that male mice completely recover from social isolation in two weeks, while the females do not. In addition, we found that the Insular Cortex has a large role in the regulation of social behavior that follows social isolation.



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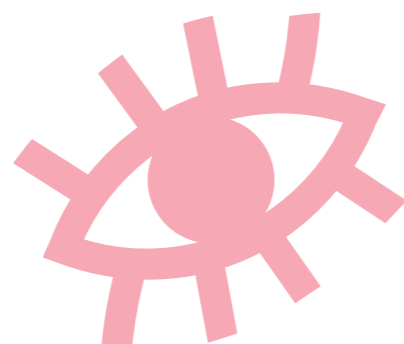


STAND: 72

PROJECT: MEDICINE-09

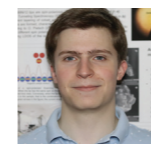
COUNTRY: ISRAEL

<b>PREPARATION AND CHARACTERIZATION OF SPIN POLARIZED TIPS FOR TUNNELING MICROSCOPY</b> KAHAN PETR	73
<b>AIR IONIZER WORKING USING CARBON NANOFIBERS</b> PANTELEIMON KOBAXIDZE , ALI ASGAROV	74
<b>CAN WE FREEZE A SOAP BUBBLE ?</b> MATHILDE HAMELIN, ZOÉ MORIN, RÉMI DEFORGE	75
<b>A SOLUTION FOR THE ENIGMA OF GAMMA RAYS: STAR CLUSTERS CREATING GAMMA SOURCES</b> VANESSA GUTHIER	76
<b>QUANTUM DOT DOPED BORON SOURCE HYDROGEN FUEL CELL</b> BERRA ÖKMEN, BATUHAN BOSTAN, LİDER ÖNGEN	77
<b>FILTER-ELECTROLYZER AS AN EFFECTIVE DEVICE FOR DISPOSING OF MICROPLASTICS IN WASTEWATER</b> ANASTASIJA PAŠKEVIČA, ĚRIKA PLOPA	78



## PREPARATION AND CHARACTERIZATION OF SPIN POLARIZED TIPS FOR TUNNELING MICROSCOPY

Spin-polarized scanning tunnelling microscopy (STM) offers a unique capability to study magnetic properties of single atoms or molecules. Scanning tips from classic materials like Fe and Cr are hard to prepare. Tips from Mn88Ni12 are easier and faster to prepare and deliver the same resolution as commercial tips. This work confirms the spin polarization of Mn88Ni12 tips and improves their preparation method. I doubled the success rate of etching these tips and shortened the preparation time to 15-20 seconds from 4-5 minutes. This method allows faster on-site preparation of spin-polarized STM tips and is cheaper. The cost per tip is under 10€ compared to commercial tips sold above 100€.

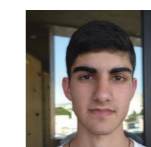


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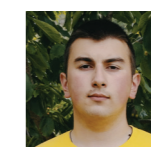
## AIR IONIZER WORKING USING CARBON NANOFIBERS

The negative effects of polluted air can differ due to different factors. Common short-term effects include dizziness, fatigue, etc. There are a few ways of dealing with these situations, one of them being a tool called Ionizer. To enhance this product, we created grids with modified Carbon nanofibers and electrical circuits and tested their effectiveness in several ways. The main change was introduced in the face of Materials. By changing already existing electrodes to Carbon nanotubes, we saw drastic improvement and exponential growth in the usability of this device. Our goal was to create a low voltage, safe, and environmentally-friendly automated ionizer, which we achieved.



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STAND: 73  
PROJECT: PHYSICS-01  
COUNTRY: CZECHIA

STAND: 74  
PROJECT: PHYSICS-02  
COUNTRY: GEORGIA

# CAN WE FREEZE A SOAP BUBBLE ?


Inspired by short online videos, in which we could enjoy the magnificent spectacle of soap bubbles freezing in cold places like Canada, we asked ourselves this question: Can we make a soap bubble freeze? The answer is yes, of course but in Laval, France, where temperatures rarely drop below 0°C this is far less obvious. We imagined and gradually set up experimental devices to observe this phenomenon in good conditions, which led us to answer many other questions. After two years of research, our current device allows us to observe the freezing of bubbles, to admire their beauty but also to begin studying their physics. This work promises to be all the more motivating as only one team of American researchers carried out such a study. We are regularly in touch with one of its members.



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# A SOLUTION FOR THE ENIGMA OF GAMMA RAYS: STAR CLUSTERS CREATING GAMMA SOURCES

When young stars cluster together closely, interactions between the astronomical bodies can cause particles to be accelerated to such high velocities that gamma rays are produced. Vanessa Guthier wrote programs to perform a statistical analysis of the data in star cluster and gamma ray source catalogues. She succeeded in showing that the following conditions must be met for gamma rays to be created in a star cluster: The stars should be younger than ten million years, the clusters should number over 100 stars, and the radius should be between 8.5 and 15 parsec (a unit of astronomical distance). She also identified two new promising pairs of star clusters and gamma ray sources, which are likely to be associated. Her results may help us to better understand where cosmic rays come from.



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STAND: 75

PROJECT: PHYSICS-03

COUNTRY: FRANCE

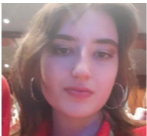
STAND: 76

PROJECT: PHYSICS-04

COUNTRY: GERMANY

# QUANTUM DOT DOPED BORON SOURCE HYDROGEN FUEL CELL


Increasing atmospheric pollution to meet the increasing energy need in our world seriously threatens both nature and human health. While there is more than one way to address this problem, one particular way is to develop and use fuel cell-powered machines. Fuel cells use hydrogen as fuel. Another important feature of fuel cells is that water comes out as waste after use. In this study it is aimed to increase the electrical conductivity of the fuel cell by applying carbon quantum dot solution directly to the nafion membrane, which is one of the components. To verify this situation, voltage-current density data was taken with the arduino system created using 1k and 10k resistors. Using this data, the fuel cell polarization curve graph was created.



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PROJECT: PHYSICS-05

COUNTRY: TÜRKİYE

# FILTER-ELECTROLYZER AS AN EFFECTIVE DEVICE FOR DISPOSING OF MICROPLASTICS IN WASTEWATER

This research paper considers the methodology of a filter for wastewater purification from microplastics. The authors have developed a prototype device capable of separating large particles of microplastic from small ones with subsequent destruction of small particles using electro-oxidation. To increase the efficiency of the unit, the prototype's construction includes a hydrogen collection option. With the implementation in this prototype of some elements of sensors and automatics this device can work successfully, with minimum human presence. To date there are no cheap and effective ways to clean wastewater from microplastics, so the research results of the authors of this work can be used to create large industrial filters capable of cleaning wastewater from microplastics.



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PROJECT: PHYSICS-06

COUNTRY: LATVIA



# SOCIAL SCIENCES

**“LONELINESS IN “THE UNBEARABLE LIGHTNESS OF BEING” BY MILAN KUNDERA, “TOO LOUD A SOLITUDE” BY BOHUMIL HRABAL AND “AUTUMN BALL” BY MATI UNT”**  
EMMA LOTTA LÖHMUS

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**THE IMPACT OF HUMAN IRRATIONALITY ON THE GLOBAL PROBLEMS OF THE MODERN WORLD**  
NANA STURUA

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**THE PRICING OF DIGITAL GOODS IN THE MUSIC PRODUCTION SOFTWARE INDUSTRY**  
MIRO KEIMIÖNIEMI

81

**“BIEN LIRE” - AN APPLICATION FOR IOS**  
SOPHIE NOBUKO, CAMILLE BARBERON

82

**THE MODERN WOMAN BETWEEN CAREER AND FAMILY**  
MAJA KALIN

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**WHAT IS THE PRICE ELASTICITY OF DEMAND (PED) OF SUGARY FOODS FOR TEENAGERS AT AN ONLINE SWEET SHOP LOCATED IN STAVANGER, NORWAY?**  
ANISH REDDY ATHMAKOOR

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**THE EVOLUTION OF THE FAMILY IN AMERICAN LIBERALISM BETWEEN THE 60’S AND 80’S**  
AMITAI BEN-PORAT ILLOUZ

85

**INFLUENCE OF THE CULTURAL LEVEL IN THE EXTINCTION OF HOMO NEANDERTHALENSIS IN ITS COMPETITION WITH HOMO SAPIENS: ANALYSIS THROUGH THE GAME OF CONTESTS**  
PATRICIA GONZÁLEZ PIQUERO

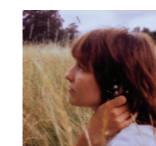
86

**WHAT SCHOOLGIRLS THINK OF THE MENSTRUAL CUP: A COMPARATIVE STUDY ABOUT THE PERCEPTIONS OF MENSTRUATION MANAGEMENT IN SOUTH AFRICA AND THE NETHERLANDS**  
ZARA NIJZINK-LAURIE

87

## “LONELINESS IN “THE UNBEARABLE LIGHTNESS OF BEING” BY MILAN KUNDERA, “TOO LOUD A SOLITUDE” BY BOHUMIL HRABAL AND “AUTUMN BALL” BY MATI UNT”

The research deals with loneliness in Milan Kundera’s novel “The Unbearable Lightness of Being”, Bohumil Hrabal’s novel “Too Loud a Solitude” and Mati Unt’s novel “Autumn Ball”. The aim of the research was to find out which types of loneliness are reflected in the books and in what ways they manifest. The theoretical part provides an overview of the concept of loneliness, as well as various classifications of it, from which the classification of the American philosopher Rubin Gotesky was chosen as the basis for the analysis. The analysis revealed that there are four types of loneliness: forced, voluntary, existential, and physical. They manifest in the philosophical ideas of the novels, in the relationships between the characters, in their self-images, inner worlds, and in space.



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## THE IMPACT OF HUMAN IRRATIONALITY ON THE GLOBAL PROBLEMS OF THE MODERN WORLD

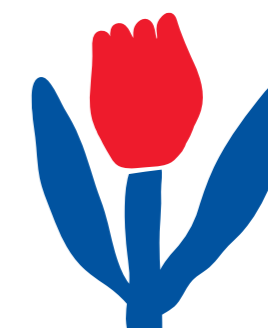


The research offers a thorough analysis of human irrational actions that often appear as the main causes of global problems in the modern world. An interdisciplinary approach is applied to analyze the problem from a wide range of sciences. The survey results demonstrate that only 20% of people are ready to take a step towards change, while the remaining 80% show utter rejection. To maximize rational action, the project suggests formation of the main subsystem of the corresponding idea in the society, characterized by emergent properties. Findings also indicate that application of the following three principles: minimum energy, complementarity and Le Chatelier from the exact science in the social system lead to an effective solution of this critical problem.



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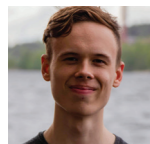


STAND: 79  
PROJECT: SOCIAL SCIENCES-01  
COUNTRY: ESTONIA

STAND: 80  
PROJECT: SOCIAL SCIENCES-02  
COUNTRY: GEORGIA

# THE PRICING OF DIGITAL GOODS IN THE MUSIC PRODUCTION SOFTWARE INDUSTRY

This research paper set out to investigate the factors affecting the pricing of non-tangible, non-rivalrous, digital software goods – a uniquely modern economic phenomenon of ever-increasing prominence in the transition to more and more digital economies – from a practical standpoint. Real world data from a consumer survey of 553 respondents and a producer survey of 12 firms in the music production software market – an ideal example of general software markets due to its diversity – was analyzed to discuss the degree of the market's conformity to a theoretical model for software goods. The findings include the ambiguous role of piracy, product-specific market structures, an argument for delayed marginal costs and an explanation for general price rigidity regardless of varying costs.



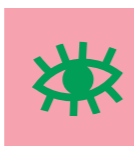
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# “BIEN LIRE” - AN APPLICATION FOR IOS

Bien Lire is an application for iOS that was developed specifically for adult refugees. Reading French is a challenge for them because of the alphabet they have to learn and all the different sounds specific to French that don't exist in their mother tongue. Unfortunately, applications aiming to teach how to read on the market are often for children and not motivating for adults. Bien Lire was developed taking into account their specific needs and was also tested and approved by users. I am aiming to improve some functionalities and distribute the application so it can be widely used.



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**CAMILLE BARBERON**  
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# THE MODERN WOMAN BETWEEN CAREER AND FAMILY

In this paper, we explored the role of women in the family, in the workplace, and society. Through analysing scientific literature, conducting a survey of adolescents, and multiple interviews with successful women with children, we researched what is the position of women in Slovenia and the EU. We analysed the division of work in the family as well as what are the factors that help women coordinate work and family and improve women's position in the labour force. We focused on many factors, the main being policies of the state, domestic help (external and of kinship), the practice of egg freezing, gender quotas, discrimination, and stereotypes. Lastly, we wanted to know how much COVID-19 impacted women's rights and how much of the additional obligations were taken on by them.



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# WHAT IS THE PRICE ELASTICITY OF DEMAND (PED) OF SUGARY FOODS FOR TEENAGERS AT AN ONLINE SWEET SHOP LOCATED IN STAVANGER, NORWAY?

As obesity rates are rising in Norway as well as in many other countries, governments are searching for policies to slow this development. A primary factor behind these growing rates is the overconsumption of sugary foods among teenagers. My project investigates the economic concept of price elasticity of demand (PED), the responsiveness of a consumer's quantity demanded to a change in price, and how it applies to Norwegian teenagers. Using PED values calculated for sugary foods, governments can adopt policies to change the prices of these sugary foods to address the overconsumption of these foods or to address other national goals depending on the political and economic orientation of the country.



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**STAND:** 81  
**PROJECT:** SOCIAL SCIENCES-03  
**COUNTRY:** FINLAND

**STAND:** 82  
**PROJECT:** SOCIAL SCIENCES-04  
**COUNTRY:** LUXEMBOURG

**STAND:** 83  
**PROJECT:** SOCIAL SCIENCES-05  
**COUNTRY:** SLOVENIA

**STAND:** 84  
**PROJECT:** SOCIAL SCIENCES-06  
**COUNTRY:** NORWAY

# THE EVOLUTION OF THE FAMILY IN AMERICAN LIBERALISM BETWEEN THE 60'S AND 80'S

In my project, I attempt to track the convoluted realignment of liberals in the U.S. between the 60's & 80's through the lens of a particular social institution: the family. In exploring the inner struggle of liberalism regarding the family, I reached my main thesis: the political landscape of American Liberalism between the 60's & 80's featured a conflict between two distinct liberal factions – Great Society liberalism and the Liberation Movements (Second Wave Feminism and Black Power). This conflict, I argue, was won with the support of a decidedly illiberal actor – Neo-Liberalism. While exploring the social and political circumstances that facilitated the modern version of American liberalism, I hope to shed some light on the agency and purpose of this highly ambiguous institution.



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STAND:

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PROJECT:

SOCIAL SCIENCES-07

COUNTRY:

ISRAEL

# INFLUENCE OF THE CULTURAL LEVEL IN THE EXTINCTION OF HOMO NEANDERTHALENSIS IN ITS COMPETITION WITH HOMO SAPIENS: ANALYSIS THROUGH THE GAME OF CONTESTS

We develop a model based on one of the possible causes of the extinction of Homo neanderthalensis: the arrival of Homo sapiens to Europe and their competition. The cultural level of the species is introduced in the contest determining the efficiency of the effort. The population dynamics chosen is the replicator equation. It is now coupled with the temporal evolution of their cultural level. The results show that, the extinction of one of the species is inevitable. The model also predicts the existence of a threshold in the initial concentration, which the Sapiens had to overcome to extinguish Neanderthals. When the contest has a cost, the ability to learn of Sapiens species and its relationship with the optimization of the effort could be decisive in the reduction of the threshold.



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STAND:

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PROJECT:

SOCIAL SCIENCES-08

COUNTRY:

SPAIN

# WHAT SCHOOLGIRLS THINK OF THE MENSTRUAL CUP: A COMPARATIVE STUDY ABOUT THE PERCEPTIONS OF MENSTRUATION MANAGEMENT IN SOUTH AFRICA AND THE NETHERLANDS

Many girls around the world miss school due to insufficient resources during menstruation. Although menstrual cups are cheaper and more environmentally friendly than pads or tampons, they are not widely used. This project investigates the awareness of the menstrual cup and barriers to using it among schoolgirls using both survey data and focus group discussions. By comparing girls in South Africa and the Netherlands, this project helps to identify how these barriers could best be overcome, both in general and in a particular national context. While information remains the most important tool to empower girls about menstruation management, this study points to the need for a culturally sensitive approach.



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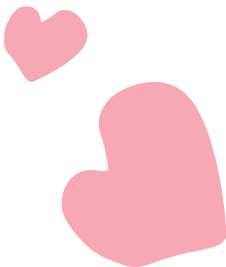
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PROJECT:

SOCIAL SCIENCES-09

COUNTRY:

NETHERLANDS

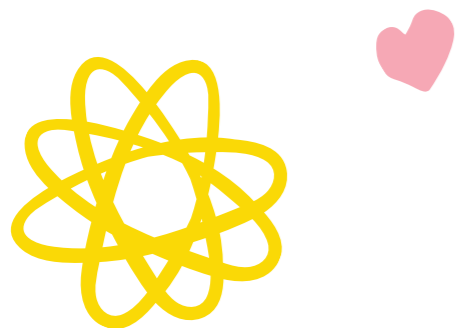


# THE JURY

The contest Jury is composed of 22 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 two 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 LUNDGAARD**  
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

**DR. ATTILA BORICS**  
Hungarian Academy of Sciences, 2019 - 2021

**DR. MARIYA LYUBENOVA**  
European Southern Observatory, 2022

**PRESIDENT  
OF THE  
JURY**



**MARIYA  
LYUBENOVA**

European Southern Observatory



**MEMBERS  
OF THE  
JURY**



**FRANCO  
ALGIERI**  
Webster Vienna University



**MIRA  
VAN THIELEN**  
Ghent University Hospital



**MARGUS  
NIITSOO**  
Music Education LLC



**VICTORIA  
BLOODWORTH**  
Siemens Gamesa Renewable  
Energy



**YANNICK  
LACAZE**  
ESRF



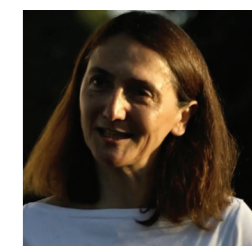
**CHRISTIAN  
BRESSLER**  
xFEL



**ATTILA  
BORICS**  
Hungarian Academy of Sciences



**TONY  
FAGAN**  
University College Dublin



**LINA  
TOMASELLA**  
INAF Italian National Institute  
for Astrophysics, Astronomical  
Observatory of Padua



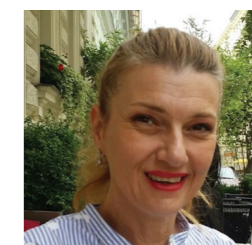
**ANNA  
ZAJAKINA**  
Latvian Biomedical Research  
and Study Centre



**HANS  
LANGEVELD**  
Biomass Research



**ZUZANNA  
SZYMAŃSKA**  
University of Warsaw



**LIDIJA  
RUDOLF MATIJA**  
University of Belgrade



**MÁRIA  
MINÁROVÁ**  
Slovak University of Technology



**MARÍA ÁNGELES  
MORO-SANCHEZ**  
Universidad Complutense  
Madrid



**HENRIK PER GÖRAN  
ARONSSON**  
University of Gothenburg



**MORTEN  
LENNHOLM**  
EUROfusion (JET), Culham  
Science Centre



**ESTELLE  
MOSSOU**  
ESRF



**LUISA  
PEREIRA**  
Institute of Molecular Pathology  
and Immunology, University of  
Porto




PETER  
CELEC  
Comenius University



# MARIYA LYUBENOVA

PRESIDENT OF THE JURY

European Southern Observatory  
 Germany


Dr. Mariya Lyubenova is a researcher who thrives at the intersection of fields, disciplines, and sectors in society. She holds a MSc in Physics from Sofia University in Bulgaria and a PhD in Astronomy from the University of Munich, Germany. She currently works at the foremost intergovernmental organisation in astronomy, the European Southern Observatory (ESO), where she is head of Media Relations, science advisor to the department of communication, editor of ESO's science & technology journal, and an active researcher in the area of galaxy evolution, black holes, and stellar clusters. Aside from being invested in research and science communication, Dr. Lyubenova enjoys mentoring women and gender minorities interested in pursuing a career in STEM (Science, Technology, Engineering, and Mathematics). Her professional expertise, complemented by volunteering for social causes, enables her to successfully share her knowledge with people coming from various backgrounds.



THE JURY




# FRANCO ALGIERI

Webster Vienna University  
 Austria

Franco Algieri is Associate Professor of International Relations and Head of the International Relations Department at Webster Vienna Private University. Furthermore, he is a member of the Science Commission of the Austrian Ministry of Defence as well as of The Alphen Group. Prior to that, he was Director of Research at the Austrian Institute for European and Security Policy in Vienna and Senior Research Fellow at the Center for Applied Policy Research, Ludwig Maximilians University Munich (LMU). He was lecturing Political Science at the Eberhard Karls University Tübingen and at the LMU. He was an 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 University of Tübingen, and a Diploma of Advanced European Studies from the College of Europe Bruges. His research focus and publications cover European and Asian security issues, the European integration process and EU-Asia relations, with special emphasis on EU-China relations.



# MIRA VAN THIELEN

Ghent University Hospital  
 Belgium

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 a staff member at the department of Anaesthesiology in Leuven 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.



THE JURY



## MARGUS NIITSOO

Music Education LLC  
 Estonia

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. He was the CTO of a small music education startup that developed a tool for automatic assessment and feedback of musical performance and is not the CPO of an agritech startup eAgronom trying to help make farming more sustainable worldwide

## THE JURY



## VICTORIA BLOOD- WORTH

Siemens Gamesa Renewable Energy  
 France

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, providing design engineering for wind turbines, large scale artworks and zero carbon vehicles, which includes the current world speed sailing record holder Vestas Sailrocket 2. In 2017, she moved to Denmark to join the world's largest wind turbine manufacturer, Siemens Gamesa Renewable Energy, in the Blade Design department where she was part of the team that designs and produces the largest turbine blades in the world. In 2021, she decided to take time out and try something different in life - she is now living aboard her sailing boat and exploring the world, very slowly.



## YANNICK LACAZE

ESRF  
 France

"I am a former geologist (MSc in 2004) trained in science communication (MSc in 2006). After working in science communication in different places in France, I have moved to Australia to work as an exploration geologist in 2011 and 2012.

I have been working as a public outreach officer at the ESRF – the European synchrotron (Grenoble – France) since 2013.

I am currently in charge of education, and more particularly managing the Synchrotron@School programme, designed for high school students. Through this programme, the ESRF welcomes each year more than 1500 students."



## CHRISTIAN BRESSLER


xFEL  
 Germany

Christian Bressler has been developing the field of ultrafast x-ray science over the past 20 years at several synchrotron and free electron laser facilities. During the pandemic he created a new innovative Learning and Teaching Tool with the help of a fully virtual lab (VLab), which allows users and students to execute ultrafast x-ray experiments and extract fully realistic experimental data. He is currently Leading Scientist at European XFEL and Professor of Physics at the Universität Hamburg.

## THE JURY



## ATTILA BORICS


Hungarian Academy of Sciences  
 Hungary

Dr. 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 Centre of the Eötvös Loránd Research Network 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 biological compounds and drug candidates, explanation of the mechanism of action of enzymes and receptors on a structural basis and the location of interaction sites of proteins.

THE JURY



## TONY FAGAN

University College Dublin  
 Ireland

Professor Anthony (Tony) Fagan received his PhD in Electronic Engineering from University College Dublin (UCD) in 1978. He then spent two years working on advance modem design at Marconi Research laboratories in England. On his return to UCD in 1980 he established the DSP research group there. Through this group he has helped establish a strong signal processing industry in Ireland with many companies being founded by his research graduates, especially in the area of physical-layer communications design. Well over 100 research graduates have been produced by his group. Co-operation with industry has been a distinguishing feature of his academic career with much of his research funding coming directly from these contacts. In 2016 he was awarded the Parsons medal for his work with industry. He retired from full-time academic life in 2017 but continues his love of engineering by acting as consultant to various advanced communication systems design companies.



## LINA TOMASELLA


INAF Italian National Institute for Astrophysics, Astronomical Observatory of Padua

 Italy

Lina Tomasella is a researcher of the Italian National Institute for Astrophysics (INAF). She has a degree in physics and a PhD in astronomy from the University of Padua. Her research interests are devoted to the physical properties of explosive events, mainly supernovae. She is a member of the GRAWITA (Gravitational Wave INAF team) and ENGRAVE (Electromagnetic counterparts of gravitational waves at the Very Large Telescope) collaborations, which have the aim of carrying out multi-wavelength observational campaigns after the gravitational wave (GW) alerts released by the ground-based interferometers network (Advanced LIGO in USA and Advanced Virgo in Italy). Her scientific production is summarised in about 120 refereed papers in international special-istic journals and in several hundreds among Astronomical Circulars, Astronomer's Telegrams, Gamma-ray coordinates network, Transient name server reports, etc (CBET, ATel, GCN, TNSCR). She lives in Asiago highland, where there are the telescopes and instrumentations operated by the Astronomical Observatory of Padua (INAF), where she is the institute coordinator. Lina Tomasella was awarded with the first prize in the 1st EUCYS in Bruxelles (1989)."



## ANNA ZAJAKINA

Latvian Biomedical Research and Study Centre  
 Latvia

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 include the development of novel clinically translatable methods for cancer treatment based on gene therapy vectors and combination with chemotherapy and immunotherapy. Currently, main research projects are focused on delivery of therapeutic genes by viral vectors into tumors 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 the organization and hosting of international workshops, seminars and conferences, working in cooperation with students and researchers representing various organizations and universities.

THE JURY




## HANS LANGEVELD

Biomass Research  
 Netherlands

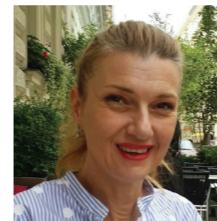
I am a tropical agronomist with a wide experience in quantifying sustainable land use and food production around the globe. I focus on land use, food production, organic residue valorization, biogas, organic fertilizer and compost, biobased production chains. I have been an enthusiast member of the jury since 2016. My main interest is helping students to identify the object(s) of their passion and setting out a route to develop their skills and interest in the subject.




## ZUZANNA SZYMAŃSKA

University of Warsaw  
 Poland

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. Currently, she is an Assistant Professor at the Institute of Mathematics of the 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 in biology and medicine, particularly for processes such as the growth and spread of cancer or wound healing.




## LIDIJA RUDOLF MATIJA

University of Belgrad  
 Serbia

Lidija Matija is a professor at the University of Belgrade Faculty of Mechanical Engineering where she received her PhD in Control Engineering in 1997. She has been working in the Institute for Chemical Power Sources, Belgrade, Serbia, in the field of fullerenes based materials, its production and application for battery production. In 2002 she has changed her field of research and moved to the Institute of Technical Sciences, Serbian Academy of Science and Arts, where she investigated fullerene and carbon based materials for biomedical applications. In 2005, professor Lidija Matija moved back to the University of Belgrade Faculty of Mechanical Engineering where she joined the group for Biomedical Engineering within the department for control engineering and became the Chair of NanoLaboratory. She is a founder of the department for Biomedical engineering at the University of Belgrade Faculty of Mechanical engineering. Her main fields of research are: Control Systems, Early Detection of Skin Cancer and Melanoma, Intelligent Materials, Fullerenes and Carbon Nanotubes, STM/AFM, Nanotechnology, Nanomedicine. Professor Matija's fields of teaching are: Control Systems, Biomedical Engineering, Nanotechnology, Nanomedicine. She was several times awarded in her country for her research achievements in the field of nanotechnology and she was the coordinator of several national research projects of which more than half had industry involvement.



## MÁRIA MINÁROVÁ

Slovak University of Technology  
 Slovakia


Mária Minárová graduated from Faculty of Mathematics, Physics and Informatics of Comenius University in Bratislava. From the very beginning of her professional life up to now, she works at Slovak University of Technology. On her position of senior lecturer at the Faculty of Civil Engineering she teaches and do the research, as well. She educates future engineers in mathematical subjects, mathematical modelling of evolutionary and stationary natural and industrial processes and biomechanics. Her research is interdisciplinary and multidisciplinary. It is based both on the mathematical theory, e.g. uncertainty modelling, the convergence of heuristic algorithm investigation; and applications of mathematics in physics, civil engineering, biomechanics, image processing, viscoelasticity theory, economy etc., utilizing the appropriate computational tools, as well.

THE JURY

THE JURY



## MARÍA ÁNGELES MO- RO-SÁNCHEZ

Universidad Complutense Madrid  
 Spain

“María Ángeles Moro leads the Neurovascular Pathophysiology Group and the “Cardiovascular Risk Factors and Brain Function” Programme at the Spanish Centre for Cardiovascular Research (CNIC; Madrid, Spain). She is also a co-leader of the Neurovascular Research Unit at Universidad Complutense (UCM) and of the Neurovascular Diseases Group at Hospital “12 de Octubre” Health Institute (i+12). She is a member of several consortia such as the Spanish Stroke Network (RICORS-ICTUS) and the Leducq Foundation Grants “Stroke-Impact” and “Leducq Circadian Network”.


Thanks to a multidisciplinary expertise in neuroscience and cardiovascular disease, Maria A. Moro has focused her research efforts on the study of cerebrovascular diseases, specifically, stroke and vascular cognitive impairment. In these fields, Prof. Moro investigates the mechanisms that underlie the different neurological entities that account for cardiovascular disease-driven cognitive decline. She is also interested in the immune response after stroke and its impact on outcome, including cognitive function. Her work has resulted in several books, patents, and more than 170 publications ([www.ncbi.nlm.nih.gov/myncbi/maria%20angeles.moro%20sanchez.1/bibliography/public/](http://www.ncbi.nlm.nih.gov/myncbi/maria%20angeles.moro%20sanchez.1/bibliography/public/)). Prof. Moro belongs to the editorial boards of “Stroke” and “Journal of Cerebral Blood Flow and Metabolism”. Since 2016 she is a Fellow of the British Pharmacological Society (FBPhS).”



## THE JURY




## HENRIK PER GÖRAN ARONSSON

University of Gothenburg  
 Sweden

Professor in Plant Molecular Biology, at the University of Gothenburg, Sweden. He pursued his PhD degree in Plant Physiology at the University of Gothenburg, and graduated in 2001. He spent the following year and a half as a postdoctoral student at Leicesters University, United Kingdom. The next year he spent at Gotland University and Skövde University, Sweden as senior lecturer. He then returned to the University of Gothenburg in 2004. His current research is dedicated to molecular breeding of salt tolerant wheat where the aim is to develop new varieties in a faster and more precise way than before. These varieties can be used for cultivation on salt-affected land in e.g. Bangladesh, to increase food security. He has expertise from working with chlorophyll and photosynthesis, salt stress, protein import complex and protein transport, and lipid and vesicle transport. Moreover, he has published solely bioinformatics papers. He is the founder and owner of the plant biotech company OlsAro Crop Biotech AB.



## MORTEN LENNHOLM

University of Gothenburg  
 United Kingdom

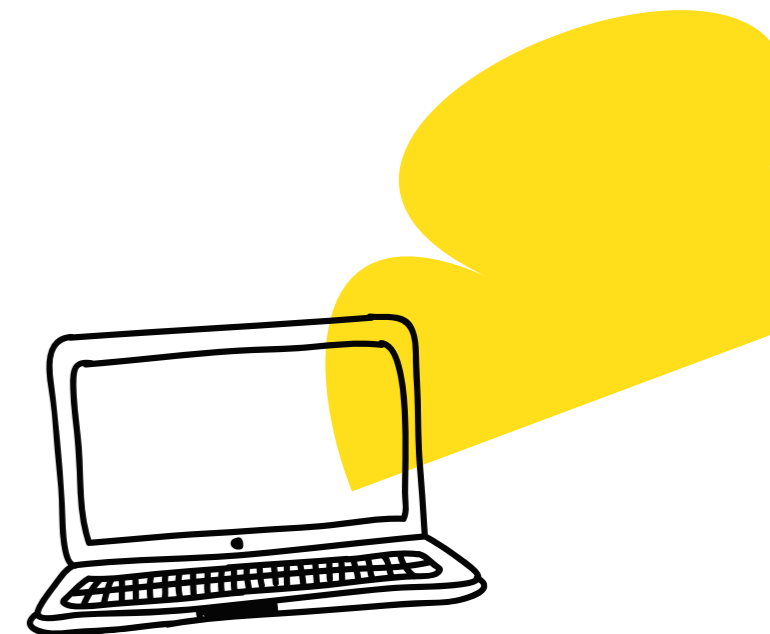
Morten Lennholm has worked in the field of Nuclear Fusion Research for the last 35 years. From a microwave and control engineering education, he developed his knowledge of plasma physics and much of his work has involved a combination of engineering and plasma physics. He has published in journals such 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. He is also leading the plasma control aspects of the design of STEP - the future UK fusion power plant. 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.



## ESTELLE MOSSOU

ESRF  
 France


Physicist by training, I carried out my PhD on the structural characterization of biomedically and biotechnologically relevant filamentous systems. At the world’s leading facility in neutron science (ILL, France) I then focussed on method developments aimed at combining X-ray and neutron techniques for biological systems, and worked as instrument scientist, responsible of a monochromatic single crystal neutron diffractometer. I am now part of the macromolecular crystallography group at the European Synchrotron Radiation Facility (ESRF), the world’s brightest X-ray source where I am working to support the operation of the state-of-the-art structural biology beamlines as well as developing pipelines for room-temperature data collection with microfluidic crystallization chips.



## THE JURY




LUISA  
PEREIRA

Institute of Molecular Pathology and Immunology, University of Porto  
 Portugal

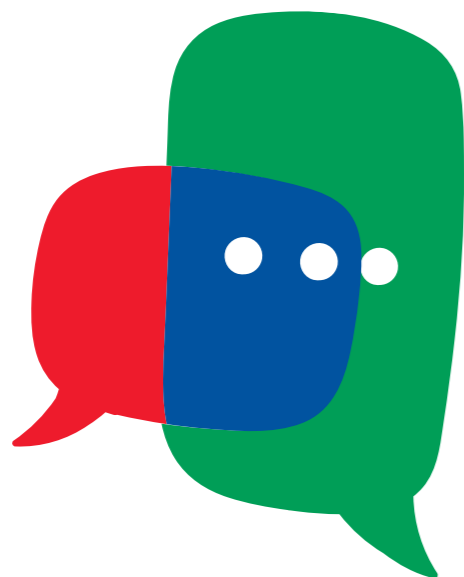
Luisa Pereira has a degree in Biology and a PhD in Human Population Genetics. She is a senior researcher and group leader at i3S (Institute of Research and Innovation in Health, University of Porto), being interested in using genetics to infer the past and evolution of human populations and to evaluate susceptibility of human populations to complex diseases. She is co-author of 145 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.



PETER  
CELEC

Comenius University  
 Slovakia

Peter Celec is the head of the Institute of Molecular Biomedicine at the Comenius University in Bratislava, Slovakia. He studied medicine, molecular biology and national economy, has PhD in normal and pathological physiology, as well as DSc in molecular biology. His research focuses on extracellular DNA as a biomarker but also on its role in the pathogenesis of inflammatory diseases. Research stays in Germany (Göttingen, Aachen) and USA (Boston) enabled several important and fruitful international collaborations for his interdisciplinary research team. With an h-index of 34 Dr. Celec is one of the most successful researchers in biomedical sciences in Slovakia. His professional motto is: Science must be fun! So, he is proud of the Ig Nobel prize for the research on salivary DNA exchange during kissing.



## THE JURY

# ERIGHT YOLING MINDE

# THE PRIZES



The contestants 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, the Jury awards a limited number of special donated prizes. These prizes offer some winners the opportunity to benefit from the specific experiences linked to the prize. It is up to the Jury to decide whether a prizewinner can receive both a core prize and a special donated prize.

## CORE PRIZES

The Core Prizes are the main cash prizes awarded by the European Commission 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:

1

FOUR FIRST PRIZES  
WORTH €7.000 EACH

2

FOUR SECOND PRIZES  
WORTH €5.000 EACH

3

FOUR THIRD PRIZES  
WORTH € 3.500 EACH

## HONORARY PRIZE ASSOCIATED WITH THE FIRST PRIZES

There is one Honorary Prize associated with first prize.

### 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 in collaboration with the Nobel Foundation.

The history of SIYSS dates back to 1976 when the first seminar was organised 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 Prize Awarding Ceremonies 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 organisations 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 unique occasions to meet the Nobel Laureates. Furthermore, the students are introduced to Swedish science and research as well as 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 where the SIYSS participants attend both the Nobel Reception at Nordiska Museet and the Nobel Prize Award Ceremony at the Stockholm Concert Hall, followed by the Nobel Banquet at the Stockholm City Hall as well as the Nobel Night Cap, the final festivity after the banquet. With its connection to the Nobel Prizes, 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)

# SPECIAL DONATED PRIZES

The Special Donated Prizes are offered to contestants who, according to the EUCYS Jury, would benefit from the specific experience that these prizes offer. They are mostly study visits to leading scientific organisations:

EIROforum members 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 at their Culham, Oxfordshire, UK site
- The European Molecular Biology Laboratory (EMBL) – offers one winner a one week placement at their centre for molecular biology in Heidelberg
- European Southern Observatory (ESO) – ESO offers a prize of a visit of up to one week to its headquarters in Germany for up to three students. Minimum age at time of taking up prize is 18.
- 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 (XFEL. EU) – offers one winner a one week placement at European XFEL in Hamburg

**The Joint Research Centre:** kindly offers a two day stay at its Ispra site in Italy for 3 projects (up to nine students).

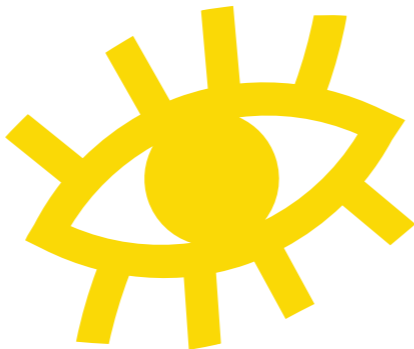
**Bulgarian National Seminar on Coding Theory, the “Prof. Stefan Dodunekov” Prize:** a prize is offered for a team to attend and benefit from this seminar.

**International Swiss Talent Forum:** One student will be invited to attend ISTF with their individual projects.

**Expo-sciences Luxembourg:** Two students are invited to attend Expo-sciences Luxembourg with their individual projects.

**EuChemS:** The European Chemical Society is pleased to offer a prize of €1000 to the best Chemistry project

**WOLFRAM** are pleased to offer all contestants submitting projects in Mathematics and Computer Science 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 (up to) 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 its Geneva site;
- EUROfusion – offers one project a one week stay (for up to 3 people) at a EUROfusion member research facility;
- The European Molecular Biology Laboratory (EMBL) – offers a project prize (for up to 3 people) of a week’s placement at its premises in Heidelberg;
- The European Space Agency (ESA) - offers a single prize winner the opportunity to spend a week at ESA’s main technical centre, ESTEC, in The Netherlands;
- European Southern Observatory (ESO) – offers a project prize (for up to 3 people) of a visit of up to one week to the ESO headquarters in Germany ;
- European Synchrotron Radiation Facility (ESRF) – operator of the world’s most powerful synchrotron radiation source, offers up to 2 people (3 if the ESRF prize is combined with that of the ILL) of a winning project a one week visit to its site in Grenoble;
- The Institut Laue-Langevin (ILL) – operator of the world’s most intense neutron source, offers up to 2 people (3 if the ESRF prize is combined with that of the ILL) of a winning project a one week visit to its site in Grenoble;
- European X-Ray Free-Electron Laser Facility GmbH (European XFEL) – offers one winner a one-week placement its site in Schenefeld (Hamburg metropole).
- The European Molecular Biology Laboratory (EMBL) – offers

# 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 (up to) 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),** Geneva, Switzerland, founded in 1954. CERN’s main research area is particle physics. [www.cern.ch](http://www.cern.ch)

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. 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** is a framework between EURATOM and various fusion research programmes in many EU countries. Its aim is to provide an infrastructure for fusion research. [www.euro-fusion.org](http://www.euro-fusion.org)

The European scientific programme is based on the Roadmap to the Realisation of Fusion Energy. The programme aims to pave 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, and to develop concepts for the future demonstration fusion power plant, DEMO. EUROfusion will award a one week stay at one of its member 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)** 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. [www.embl.org](http://www.embl.org)

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. 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)** Paris, France. ESA is Europe's gateway to space. Its mission is to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world. It is an international organisation with 22 member states, and by coordinating the financial and intellectual resources of its members, it can undertake space programmes and activities far beyond the scope of any single European country. Its programmes and missions cover astronomy, planetary, solar, and fundamental physics, human spaceflight and robotic exploration, Earth observation, launchers, navigation, telecommunications and applications, and space engineering research and development. [www.esa.int](http://www.esa.int)

ESA offers a single prize winner the opportunity to spend a week at ESA's main technical centre, ESTEC, in The Netherlands. The winner must be at least 18 and already studying at university, preferably science or engineering, at the time of taking up the prize.



**The European Southern Observatory (ESO)** enables scientists worldwide to discover the secrets of the Universe for the benefit of all. We design, build, and operate world-class observatories on the ground — which astronomers use to tackle exciting questions and spread the fascination of astronomy — and promote international collaboration in astronomy. [www.eso.org](http://www.eso.org)

Established as an intergovernmental organisation in 1962, today ESO is supported by 16 Member States along with the host state of Chile and with Australia as a Strategic Partner. ESO's headquarters and its visitor centre and planetarium, the ESO Supernova, are located close to Munich in Germany, while the Chilean Atacama Desert, a marvellous place with unique conditions to observe the sky, hosts our telescopes. ESO operates three observing sites: La Silla, Paranal and Chajnantor. At Paranal, ESO operates the Very Large Telescope and its Very Large Telescope Interferometer, as well as two survey telescopes, VISTA working in the infrared and the visible-light VLT Survey Telescope. Also at Paranal ESO will host and operate the Cherenkov Telescope Array South, the world's largest and most sensitive gamma-ray observatory. Together with international partners, ESO operates APEX and ALMA on Chajnantor, two facilities that observe the skies in the millimetre and submillimetre range. At Cerro Armazones, near Paranal, we are building "the world's biggest eye on the sky" — ESO's Extremely Large Telescope ([elt.eso.org](http://elt.eso.org)). From our offices in Santiago, Chile we support our operations in the country and engage with Chilean partners and society.

ESO provides various training programmes and internships for master and doctoral students in astronomy, engineering, science communication, and science policy, as well as fellowships in astronomy and engineering for early-career researchers that have completed their doctoral studies. ESO offers a prize of a visit of up to one week to its headquarters in Garching, for up to three students. Minimum age: 18 years at the time of taking up the prize.



**The European Synchrotron Radiation Facility (ESRF)** Grenoble, France, is financed by 21 countries. [www.esrf.eu](http://www.esrf.eu)

The ESRF is the most powerful synchrotron radiation source in the world; 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. ESRF will award the prize of a one week visit to the EPN Science Campus in Grenoble, for the leader(s) (maximum 2, or 3 if combined with the ILL prize) 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 may be undertaken in parallel with that of the winner(s) of the ILL prize. Minimum age: 18 years at the time of taking up the prize.



**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. [www.ill.eu](http://www.ill.eu) The research at ILL includes the analysis of the structure of new materials for future electronic tools, the measurement of stress-

es 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.

ILL will award a prize of a one week visit to the EPN Science Campus in Grenoble, for the leader(s) (maximum 2, or 3 if combined with the ESRF prize) 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 magnetics.

The visit may be undertaken in parallel with that of the winner(s) of the ESRF prize. Students must be at least 18 at the time of taking up the prize.



**The European XFEL** (XFEL.EU), Schenefeld Hamburg metropole, Germany. European XFEL is an X-ray laser based on a linear accelerator with unique characteristics. Its operation started in September 2017.  
[www.xfel.eu](http://www.xfel.eu)

The facility opens up new research opportunities for a whole range of scientific fields, such as medicine, pharmacy, biology, chemistry, physics, materials science, and nanotechnology. European XFEL will award a one-week visit at its site in Schenefeld for one person presenting a project in biology, chemistry, engineering, materials research, or physics. 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 2 400 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.

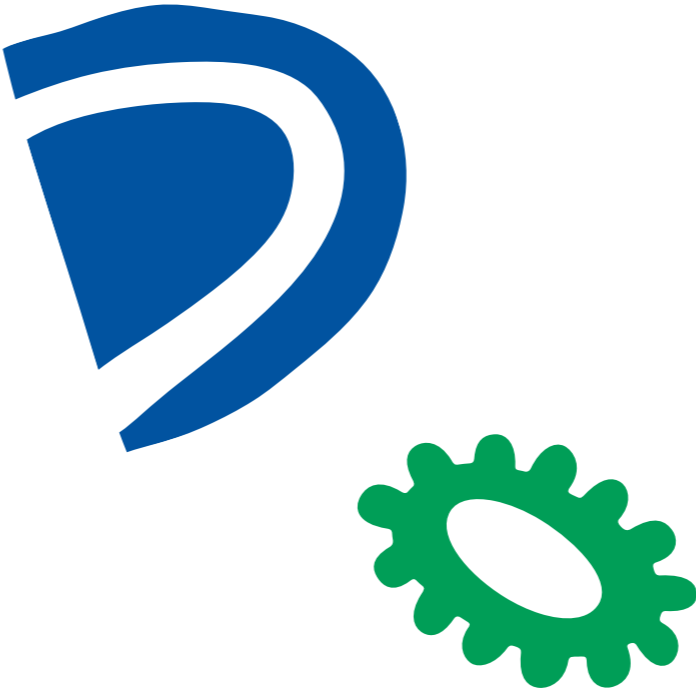
**Science in School**  
[www.scienceinschool.org](http://www.scienceinschool.org)

Published and funded as a cooperative venture by the eight European research organizations of EIROforum, *Science in School* aims to support teachers in the delivery of their STEM curricula, by connecting them to inspiring, cutting-edge science and technology, in order to foster positive attitudes towards the science that shapes their lives, and attract students to careers in these fields.

The programme supports science teaching both across Europe and across disciplines: highlighting the best in teaching and cutting-edge research. It covers not only biology, physics and chemistry, but also earth sciences, engineering and health, focusing on interdisciplinary work.

The contents include teaching materials and projects in science education, up-to-date information on cutting-edge science, interviews with inspiring scientists and teachers, reviews of books and other resources, and many other useful resources for science teachers. The main language of publication is English, and the

journal aims to provide translations when possible in other European languages.  
*Science in School* originated as a quarterly print journal. Following a 2019 review, EIROforum decided to move to an online-only model to better reflect changing digital competencies and encourage wider take-up



# 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.



# BULGARIAN NATIONAL SEMINAR ON CODING THEORY “PROF. STEFAN DODUNEKOV” PRIZE

The annual National Workshop on Coding Theory (NWCT) named after Professor Stefan Dodunekov (1945-2012) was established in the 1980's, signifying the growth of the Bulgarian research group in the field of mathematical foundations of informatics.

Prof. Dodunekov, the founder of this research group, 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. Following his vision, the seminar brings together experienced researchers and young people from several countries – from leading specialists in coding theory, cryptography and others, to undergraduate students and PhD candidates. Special sessions are devoted to emerging research topics, connections with other fields of knowledge and development of project-based and long-term collaborations.

The authors of one EUCYS project will be invited to participate in the next edition of the seminar, in the last quarter of 2022.

# THE CIRCULAR BIO-BASED EUROPE EUCYS PRIZE

The Circular Bio-based Europe Joint Undertaking (CBE JU) is a partnership between the European Union and the Bio-based Industries Consortium (BIC) that funds projects advancing competitive circular bio-based industries in Europe. This new partnership is building on the success of its predecessor, the Bio-based Industries Joint Undertaking (BBI JU). CBE JU's funding encourages 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 infra-structural 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 CBE 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.



# 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)

**International Swiss Talent Forum:** One student invited to attend ISTF with their individual project.

**Expo-sciences Luxembourg:** One project, up to three students, plus adult in charge, invited to attend Expo-sciences Luxembourg with their individual projects.



# 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)



# HOST COUNTRY PRIZES: NATURALIS BIODIVERSITY AWARD


Everything in nature is connected, and balance is vitally important for its continued existence. Therefore, research in nature is of great importance in order to preserve biodiversity. Biodiversity knowledge will contribute to solutions for major, global issues involving climate, living environment, food supply and medicine. Our own future depends on biodiversity and that's why EUCYS and Naturalis Biodiversity Center supports young international talent in the field of biodiversity research with the Naturalis Biodiversity Award. The award consists of a prize amount of 3000 euros to encourage young scientists.



# THE NATIONAL ORGANIZERS



JANA  
BREYER

Austria Wirtschaftsservice GesmbH  
 Austria National Organizer



ANTOINE VAN  
RUYMBEKE

Jeunesses Scientifiques de Belgique  
 Belgium National Organizer




LUCA  
LUONGO

 Belgium Adult in Charge



VESELA  
LEVCHEVA  
VASILEVA

Ministry of education and science  
 Bulgaria National Organizer




KONSTANTIN  
VASSILEV  
DELCHEV

 Bulgaria Adult in Charge



JANA  
ŠEVCŮVA

National Pedagogical Institute  
 Czechia National Organizer



ZORA  
VIDOVEN-  
COVÁ

 Czechia Adult in Charge



KATRINE  
HOLCK

Astra  
 Denmark National Organizer



NINON  
ROSENKILDE



Denmark

Adult in Charge



ANNELY  
ALLIK

Estonian Research Council



Estonia

National Organizer



MARI  
CAHALANE

BT Ireland



Ireland

National Organizer



ALBERTO  
PIETRO PIERI

FAST-Federazione delle associazioni scientifiche e tecniche



Italy

National Organizer



TUULA  
PIHLAJAMÄÄ

Tekniikan Akateemiset TEK



Finland

National Organizer



RÉGIS  
DREXLER

Sciences à l'École



France

National Organizer



ROSARIA  
GANDOLFI



Italy

Adult in Charge



SINTIJA  
BIRULE

National Centre for Education of Latvia



Latvia

National Organizer



GILLES  
CAMUS



France

Adult in Charge



SVEN  
BASZIO

Stiftung Jugend forscht e. V.



Germany

National Organizer



VIKTORIJA  
KALAIMAITE

Lithuanian Centre of Non-formal Youth Education



Lithuania

National Organizer



SOUSANA  
EANG

Fondation Jeunes Scientifiques Luxembourg



Luxembourg

National Organizer



CHRISTIAN  
THEUNER



Germany

Adult in Charge



AIKATERINI  
VOLIRDANOY

Hellenic Ministry of Education and Religious Affairs



Greece

National Organizer



PAULINE VAN  
DER WEL

Dutch Research Council



Netherlands

National Organizer



JEANET  
BRUIL

Netherlands

Adult in Charge



JÁNOS  
PAKUCS

Hungarian Association for Innovation



Hungary

National Organizer



GÁBOR  
IVÁNKA



Hungary

Adult in Charge



JAN  
MADEY

Krajowy Fundusz na rzecz Dzieci - Polish Children's Fund



Poland

National Organizer



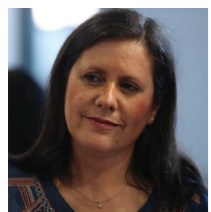
CARLA  
MOURO

Fundação da Juventude



Portugal

National Organizer



SUSANA  
CHAVES



Portugal

Adult in Charge



LAURENTIU  
DAN MILICI

Cygnus Scientific Society



Romania

National Organizer



OLEXÄNDER  
ROMANENKO

National Medical University



Ukraine

National Organizer



YANA  
CHEISHVILI



Ukraine

Adult in Charge



JOZEF  
RISTVEJ

AMAVET



Slovakia

National Organizer



MÄRIA  
BABINČAKO-  
VA



Slovakia

Adult in Charge



MAY  
ABDELRAHEEM  
ABDELHAMEED  
MOHAMED

IdeasGym



Egypt

National Organizer



TAMAR  
KHULORDAVA

International Education Programs Foundation



Georgia

National Organizer



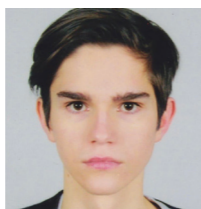
TIM PREZELJ

The Association for Technical Culture of Slovenia



Slovenia

National Organizer



MATJAŽ  
DLOUHY



Slovenia

Adult in Charge



ANA  
GVELESIANI



Georgia

Adult in Charge



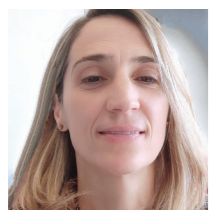
HÄMUTAL  
LOTAN

Bloomfield Science Museum



Israel

National Organizer



MARÍA  
LOURDES  
ALMODÓVAR RUIZ

Ministry of Universities



Spain

National Organizer



LAURA  
IGLESIAS  
GÓMEZ



Spain

Adult in Charge



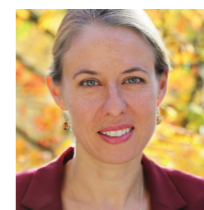
ANNE RIISER

Research Council of Norway



Norway

National Organizer



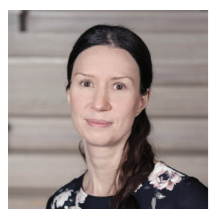
MELANIE  
SEILER

Swiss Youth in Science



Switzerland

National Organizer



TOVE  
LÄDBERG

Swedish Federation of Young Scientists



Sweden

National Organizer



STELLA  
PAULINA  
AXELSSON



Sweden

Adult in Charge



ÖMER FARUK  
URSAVAŞ

High School Students Research Projects Competition



Türkiye

National Organizer



IRMÄK YILDIZ



Türkiye


Adult in Charge




RENI  
BARLOW



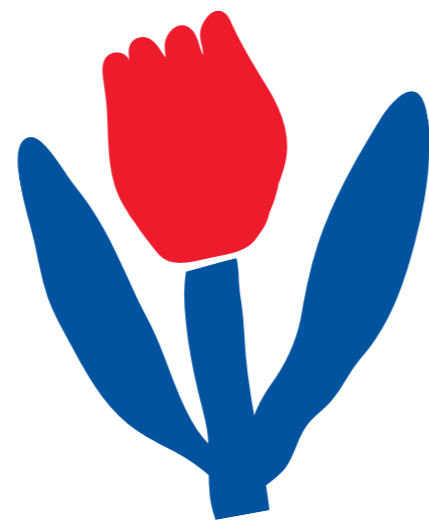
SHARON  
B. SNYDER

Youth Science Canada  
 Canada

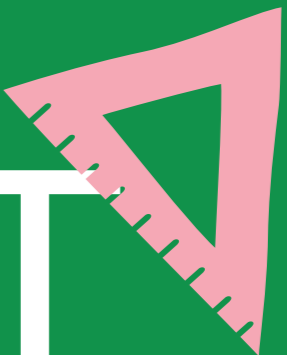
National Organizer

Society for Science  
 USA

National Organizer



TAKE  
THE  
NEXT  
STEP



# STUDENT HELPERS



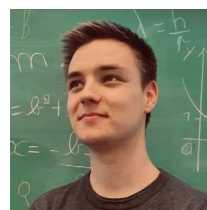
ANNA  
CHARLOTTE  
MÁTHÉ

English, Hungarian, French  
**SIDEKICK:** Romania, Denmark



ARNE  
GEIPEL

English, French  
**SIDEKICK:** Germany, Czechia



ARTHUR  
D'HERTOG

French, English, Dutch  
**SIDEKICK:** INFO MASTER



CANAN  
KURT

German, Turkish, English  
**SIDEKICK:** Türkiye, Egypt



CÄRMEN  
PIIROJA

Estonian, English  
**SIDEKICK:** Estonia, Ukraine



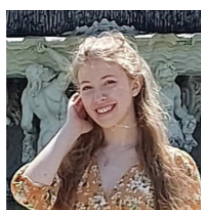
GAL  
ZÄVRSNIK

Slovene, English, Croatian, Serbian  
**SIDEKICK:** Slovenia, Canada



KATÄRINA  
JUHÄRT

English, German, Slovenian, Serbian  
**SIDEKICK:** INFO MASTER



KLÄUDIA  
SZYDŁOWSKA

English, Polish  
**SIDEKICK:** COMMUNITY CARE



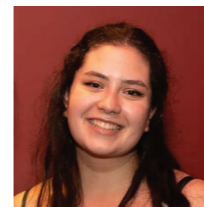
LEÄNDRA  
ZINKE

German, English  
**SIDEKICK:** COMMUNITY CARE



LEONÄRD  
MÜNCHEN-  
BACH

German, English  
**SIDEKICK:** Austria, Ireland



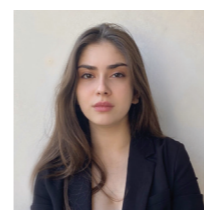
LILLÄ  
HEGYVÄRI

Hungarian, English, French  
**SIDEKICK:** COMMUNITY CARE



MARIÄNNA  
MATÁNYI

English, Hungarian  
**SIDEKICK:** Hungary, USA



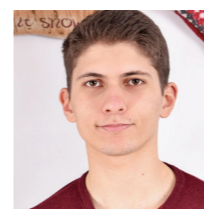
MÄRINA  
GUDZHABID-  
ZE

English, Georgian, Russian, Spanish  
**SIDEKICK:** Lithuania, Georgia



MÄTTEO  
SANTONI

English, Italian  
**SIDEKICK:** Italy, Sweden



NIKOLAY  
PASHOV

Bulgarian, English, German  
**SIDEKICK:** Bulgaria, Portugal



NINÄ  
KATHE

German, English, French  
**SIDEKICK:** INFO MASTER



OPHÉLIE  
RIVIÈRE

English, French, German, Italian  
**SIDEKICK:** Switzerland, Greece



PÄTRICIJA  
MIKELE

Latvian, Russian, English, French  
**SIDEKICK:** Latvia, Israel



PETTERI  
PULKKINEN

Finnish, English  
**SIDEKICK:** Finland, Norway



PHILIPP  
KESSLER

German, English  
**SIDEKICK:** Luxembourg, Slovakia



ROMAIN  
BIEVELEZ

French, English  
**SIDEKICK:** INFO MASTER



SEVERIN  
BRATUS

English, Estonian, Russian  
**SIDEKICK:** COMMUNITY CARE



XAVIER  
DUMONT

French, Dutch, English  
**SIDEKICK:** Belgium, Netherlands, France



ZOFIA  
SYRYCZYŃS-  
KA

English, Polish, French, Spanish, Italian  
**SIDEKICK:** Poland, Spain

# THE EUCYS CREW



MARJO  
BUIJS

Projectmanager EUCYS2022



SYLVIA  
BLAZER

Communications manager EUCYS2022



LINDA  
KNOESTER

Volunteer Coordinator EUCYS2022



TIM  
BALDEE

Project Officer Events EUCYS2022



RIK  
SPEEL

Designer EUCYS2022



FABIENNE  
VAN HUNNIK

Intern Events & communication EUCYS2022



AMY  
VAN  
MARSEVEEN

Financial Administration EUCYS2022



MARLEEN  
VAN DER  
STEEN

Eventmanager Hooglandse Kerk EUCYS2022



ASTRID &  
LINDA

Producer Award Ceremonie EUCYS2022



RENEE  
SCHMIDT

Producer Opening Ceremonie EUCYS2022



JELLE  
WIJERS

Socials EUCYS2022



TOM  
VAN DER  
HEIDEN

Illustration & Animation EUCYS2022



KAREN  
SLAVIN

EUCYS Project Officer – European Commission



MARIA  
MECENERO

Communications Officer - European Commission



JUSTYNA  
CIRUK

Administrative Officer - European Commission



META  
KNOL

Director Leiden2022



LUCIEN  
GEELHOED

Intendant Leiden2022 & Initiator EUCYS2022



DANIELLE  
VREEBURG

Managing Director & Fundraiser Leiden2022



# FORMER WINNERS

## TALLINN 2017

### FIRST PRIZES

**Karina Movsesjan**

CZECH REPUBLIC | BIOLOGY

The role of RAD51 mutations in cancer development

**Adam Jan Alexander Ohnesorge**

SWITZERLAND | SOCIAL SCIENCES

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

**Danish Mahmood**

CANADA | ENGINEERING

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

### SECOND PRIZES

**Kamil Humański**

POLAND | ENVIRONMENT

Taxonomic diversity of the Middle Ordovician – early Silurian echi-noderms from Siljansringen, Sweden

**Yana Zhabura**

UKRAINE | ENGINEERING

Enhancement of technical capabilities of delta robot

**Colette Benko**

CANADA | MEDICINE

Novel Pediatric Cancer Therapy: Targeting Epigenetics to Induce Differentiation

### THIRD PRIZES

**Florian Căsar, Michael Plainer**

AUSTRIA | MATHEMATICS

Sigma – Learning how computers learn

**Chavdar Tsvetanov Lalov**

BULGARIA | MATHEMATICS

The structure of self-avoiding walks and the connective constant

**Arne Jakob Geipel, Matthias Paul Grützner, Julian Egbert**

GERMANY | PHYSICS

Liquid stream hits rough surfaces – showing

## DUBLIN 2018

### FIRST PRIZES

**Adrian Fleck, Anna Amelie Fleck**

GERMANY | MATERIALS

FleckProtec – Body Protec on Made From Starch

**Nicolas Fedrigo**

CANADA | MEDICINE

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

**Brendon Matusch**

CANADA | ENGINEERING

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

### SECOND PRIZES

**Alexandru Liviu Bratosin, Petru Molla, Mihnea Vlad Bojian**

FRANCE | BIOLOGY

DNAdrive

**Karl Hendrik Tamkivi**

ESTONIA | BIOLOGY

Positioning of bat maternity roosts in relation to surrounding land-scape complex in Western Saaremaa

**Francisco Miguel Araújo**

PORTUGAL | MATHEMATICS

Commutativity theorems for groups and semigroups

### THIRD PRIZES

**Marina Gudzhabidze, Dea Ilarionova, Shorena Gudzhabidze**

GEORGIA | PHYSICS

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

**Kyuhee Jo, Chaeyoung Lee**

SOUTH KOREA | COMPUTING

Building a robust classifica on model for speech-based Parkinson’s Disease diagnosis

**Sijia Zhang**

CHINA | SOCIAL SCIENCES

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

## SOFIA 2019

### FIRST PRIZES

**Leo Li Takemaru, Poojan Pandya**

USA | BIOLOGY

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

**Adam Kelly**

IRELAND | COMPUTING

Optimised Simulation of General Quantum Circuits

**Alex Korocencev, Felix Sewing**

GERMANY | ENGINEERING

Hoverboard – a Magnetically Levitated Vehicle

**Magnus Quaade Oddershed**

DENMARK | ENGINEERING

The wingtip’s influence on the efficiency of airplane wings

### SECOND PRIZES

**Saba Gogichaishvili, Nia Gogokhia**

GEORGIA | CHEMISTRY

Novel Biodegradable Polymer for Pharmaceutical Applications

**Olli Järviniemi**

FINLAND | MATHEMATICS

On the Common Prime Divisors of Polynomials

**Jaehyun Lee**

SOUTH KOREA | PHYSICS

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

**Claudia Lidia Pubill Quintillà**

SPAIN | SOCIAL SCIENCES

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

### THIRD PRIZES

**Antoni Ignacy Lis – Poland**

POLAND | CHEMISTRY

Nanoparticles in antitumor therapy

**Noah Scheiring, Andreas Ladner, Tobias Schauer**

SWITZERLAND | ENGINEERING

Diffrec PRO

**Océane Zofia Adrienne Patiny**

CHINA | ENGINEERING

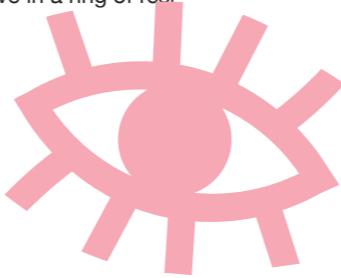
Remote Controlled Cylinder

**Aliaksandr Piachonkin**

BELARUS | MATHEMATICS

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

## SALAMÂNCA 2020/2021



### FIRST PRIZES 2020

**Feridun Balaban**

TURKEY | PHYSICS

Investigation of Spectral Response and Efficiency of Boron and Nitrogen doped Diamond-like carbon as a Top Junction on Multi-junction Solar Cells

**Cormac Thomas Harris, Alan Thomas O’Sullivan**

IRELAND | SOCIAL SCIENCES

A statistical investigation into the prevalence of gender stereotyping in 5-7 year olds and the development of an initiative to combat gender bias.

### FIRST PRIZES 2021

**Viktor Stilianov Kolev**

BULGARIA | COMPUTING

Neural Abstract Reasoner

**Marik Müller**

GERMANY | BIOLOGY

Enzymatic inactivation of the veterinary antibiotic Florfenicol

**Carla Caro Villanova**

SPAIN | COMPUTING

Formulation and implementation of a support vector machine on D-Wave’s quantum annealer

**Illia Nalyvaiko**

UKRAINE | MATHEMATICS

Properties of possible counterexamples to the Seymour’s Second Neighborhood Conjecture

### SECOND PRIZES 2020

**Ophélie Léna Rivière**

SWITZERLAND | PHYSICS

Sinking Bubbles - On the Behavior of Air Bubbles in a Vertically Oscillating Column of Liquid

**Yordan Tsvetkov Tsvetkov**

BULGARIA | ENGINEERING

Training Quadrupeds to Walk via Evolution Strategies and Sinusoidal Activation Functions

### SECOND PRIZES 2021

**Mehmet Sertaç Çeküç**

TURKEY | CHEMISTRY

Artificial Antibodies: Development of Micro-Fluidic Sensors for The Detection of Environmental Contaminants and Apply to Mathematical Models

**Hardit Singh**

CANADA | MEDICINE

Specular: A Comprehensive Teleophthalmology Platform for People Centered Eyecare

**Sophie Lynn Wiesmann**

SWITZERLAND | BIOLOGY

Temperature-dependent toxin production of the cyanobacterium Microcystis aeruginosa

**Giovanni Benetti**

ITALY | PHYSICS

Distorted Interstellar Bubbles: a new mathematical and computational model

### THIRD PRIZES 2020

**Dmitriy Gorovoy**

BELARUS | MATHEMATICS

On graphs with unique geodesics or antipodes

**Jarosław Jakub Brodecki**

POLAND | ENVIRONMENT

An assessment of the pollution of urban rivers by microplastics and their penetration of food webs based on the example of the river system in the Łódź agglomeration (central Poland)

### THIRD PRIZES 2021

**Gregory Guy Tarr**

IRELAND | COMPUTING

Towards detecting state-of-the-art deepfakes

**Matus Mlynar**

SLOVAKIA | MEDICINE

The dynamic effect of oxytocin treatment on autistic-like behaviors in a genetic model of autism

**Emirhan Kurtuluş**

TURKEY | COMPUTING

DEEP LEARNING BASED STEREOTACTIC CRANIAL SURGERY PLANNING

**Michal Bravanský**

CZECHIA | COMPUTING

Be Informed: a news aggregator

# SCAN THE QR CODE TO SEE ALL WINNERS

Eucys has a long history. Normally we include all winners of the past 33 years in the contest catalog. In order to save paper, we have chosen to include only the winners of the past 5 years. That saves a lot of paper! As much as 10,000 pages! How many trees would that be? Don't worry to miss out. You can easily view the rest of the winners online!

# 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 Europe which is the biggest Research and Innovation programme ever, has a budget of over €95 billion available to research during the period 2021 – 2027. 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 European Commission has 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.

Website: <http://ec.europa.eu/research/participants/portal/desktop/en/>

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: <https://marie-sklodowska-curie-actions.ec.europa.eu/>

## 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:

<https://euraxess.ec.europa.eu/>

## ERC STARTING GRANTS

The European Research Council (ERC) is a special funding component of Horizon Europe 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 here:

[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: <http://europa.eu>

A large photograph of Brussels Square, showing the modern glass and steel architecture of the Brussels Convention Centre and the historic buildings of the square. A blue banner with the EUCYS logo and event details is overlaid on the right side. The logo features a stylized head profile with a brain made of arrows. The text 'EUCYS BRUSSELS'23' is prominently displayed. Below it, the event title 'European Union Contest for Young Scientists' and dates '12 > 17/09/2023' are listed, followed by the location 'Brussels - Square'. At the bottom, logos for 'SQUARE', 'jeunesses scientifiques', 'BXL LA VILLE DE STAO', and the 'European Commission' are visible.

**EUCYS**  
BRUSSELS'23

**European Union Contest  
for Young Scientists**  
**12 > 17/09/2023**  
**Brussels - Square**

SQUARE  
jeunesses  
scientifiques  
BXL  
LA VILLE  
DE STAO  
European  
Commission



European  
City of Science  
Leiden2022