

# 7. EUROPEAN PHYSICS OLYMPIAD LEIBNIZ NEWS

Leibniz University Hannover  
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Women's Special

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## Hey, girl! Where are you?

In almost every Physics Olympiad, we have seen that the participation of girls is very less. This time too, sadly, there are only 13 girls out of 176 participants for EuPhO 2023. In the previous Olympiad, among 182 participants, there were 166 boys and only 16 girls which made it a ratio of 10:1.

This time, the maximum participation of girls is from Kyrgyzstan which has 3 girl students. The second highest participation of girls is from Iceland and Luxembourg. Do problem narratives also make an impact differently on boys and girls? Perhaps, we need to make the narratives more oriented towards girls, so that female participation will increase not only at Olympiads, but also overall in STEM subjects.

However, the problem is not just about girls being lesser across STEM fields. This glaring issue is a deep-rooted one of a sense of increased responsibility and the consequent lesser risk-taking factor instilled in girls in their growing years. This is evident when girls excel at general exams than boys, but do not participate in competitive exams, because perhaps, the element of guilt of failure and self-doubt is much more in females than males. Girls are

subconsciously taught to make lesser mistakes than boys because there is a certain subtle teaching by society that girls cannot afford the consequences of making mistakes!

Whatever the factors may be, this alarming issue needs to be worked upon by all those leaders who can make a difference at the Physics Olympiad.

**We dedicate this issue of the newsletter to all the girls at EuPhO 2023.**

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## Freedom at Last !

As the students finally put down their pens in the afternoon, there was a collective sense of relief that rippled through the examination hall. The past weeks of hectic preparation and five-hour exams had led to this moment. As the theory exams conducted at the Leonore Goldschmidt School Mühlenberg ended, the exams of the EuPhO 2023 were finally over.

The first theory problem was of a thermal lens. The problem statement was that if an intense laser beam falls onto a semi-transparent plate, the transmitted light can self-focus to a point behind the plate due to the inhomogeneous heating of the material. This effect, known as thermal lensing, is observed in materials whose index of refraction increases with temperature, characterized by a positive thermo-optic coefficient  $\gamma = dn/dT$ . The students were instructed to sketch a qualitative graph of the temperature profile and also calculate the parameters  $T_c$  and  $m$ . They also had to show that the beam was focused on one point and find the distance  $f$  from this point to the disk.

The second theory problem was about a brick between two planes. A small brick is squeezed between two parallel planes in zero gravity. The planes are perpendicular to the  $z$ -axis. The lower plane is moving with constant velocity  $u_1$  along the  $x$ -axis, whilst the upper one is moving with constant velocity  $u_2$  along the  $y$ -axis. The students had to calculate the speed of the brick after a certain time.

The third theory problem was based on a plate between magnets. Two identical long, cylindrical rod



magnets of radius  $R$  are close to each other and share the same vertical symmetry axis. The polarity of the two magnets is the same. As a result, the magnetic field in the air gap between the magnets is directed towards the  $+z$  direction and uniform with flux density  $B$ . The students had to sketch the shape of current streamlines in the metal plate at a given time. They also had to find and plot the current density inside the plate along a line parallel to the  $y$  axis intersecting the symmetry axis of the magnets. The third task in the same question was to find out the horizontal force required to move the plate.

The moderation and grading of the exams start tomorrow. We wish the students all the very best for the moderation and hope that they are satisfied with the results and solutions!



## Exploring the Beauty of Goslar



*Marktplatz, Goslar*

Goslar is a beautiful historic town in the Lower Saxony area of Germany near the Harz mountain range situated about 60 km from Hanover. It is located to the northeast edge of the Harz National Park. It was designated a UNESCO World Heritage site in 1992, on account of more than 1000 well preserved, half-timbered houses still standing in the town of Goslar which were made in different eras. Many houses are from medieval times when building half-timbered houses was common all over northern Europe. In Germany, towns like Trier, Aachen, Erfurt, Lubeck, Quedlinburg in the north, and Bamberg and Rothenburg ob der Tauber in the Southern Bavaria region are adorned with such medieval half-timbered houses. Many of these towns are on the UNESCO World Heritage list as well.

Half-timbered houses are called so because the houses have a strong oakwood framework on the outside and inside. The spaces in between are filled in with plaster, bricks, wattle, and daub. To make such houses, oak timber logs were chopped in half to make the frames, thus deriving the name, 'half-timbered'. Many of these houses look like a box structure. Others were designed to house not just people, but also to store farm produce and livestock all under one roof.



*Half Timber Houses, Goslar*



*The Imperial Palace, Goslar*

One can take a group walking tour of Goslar. Other places to see in and around Goslar are the following:

- The Marktplatz
- Zinnfiguren-Museum in the market square
- The clock at Glocken-und Figurenspiel in the Marktplatz
- The Church Marktkirche St. Cosmas and Damian
- The Stabkirche Church
- The Imperial Palace
- Weltkulturerbe Rammelsberg Museum & Besucherbergwerk
- Liebesbank nature trail for walks and bird watching

The mines of Rammelsburg are located very near Goslar. You can combine both places as tourist destinations to tick off from your bucket list!

## A Trip to the Mines of Rammelsberg

The mines of Rammelsberg are a UNESCO World Heritage site. They are located about 2 km south of Goslar town which is in the Lower Saxony region of Germany and are considered to be one of the oldest mines in Europe. The mines were a source of silver, copper, lead, and zinc and were therefore considered as prized possessions. It shaped the city of Goslar, which was the residence of German Kings and Emperors till 1253. The area was famous for merchant guilds and market towns. It is estimated that 30 million tons of ore was mined here and this wealth helped build Germany into the country it is today.

Although archaeological finds show that ore was extracted here even 3000 years ago, yet the earliest documentation of mining at Rammelsberg is at 968 AD. Mining went on for nearly 1000 years before the mines were closed in 1988. Rammelsberg also had massive sulphide deposits that are comparable to the other sulphide deposits in the 3000 km-long European Variscan belt that extends in Western Europe from Portugal, Ireland upto England, and then through Spain, France, Germany's Black Forest region up to the Bohemian region in the Czech Republic.

The Rammelberg site has been a model of innovative mining practices across Europe for a millennium. In the Middle Ages, the Cistercian monks designed and built

the Upper Harz mining water management system that consisted of kilometers of ditches, small channels, artificial ponds, and underground waterways. This system kept expanding the till the 19 th century. It supplied water and hydropower to the region for 800



Visitors inside the Rammelsberg Mines

years and enabled the development of water power for use in mining and metallurgical processes. This water system was instrumental in the technical innovation of mining throughout Europe.

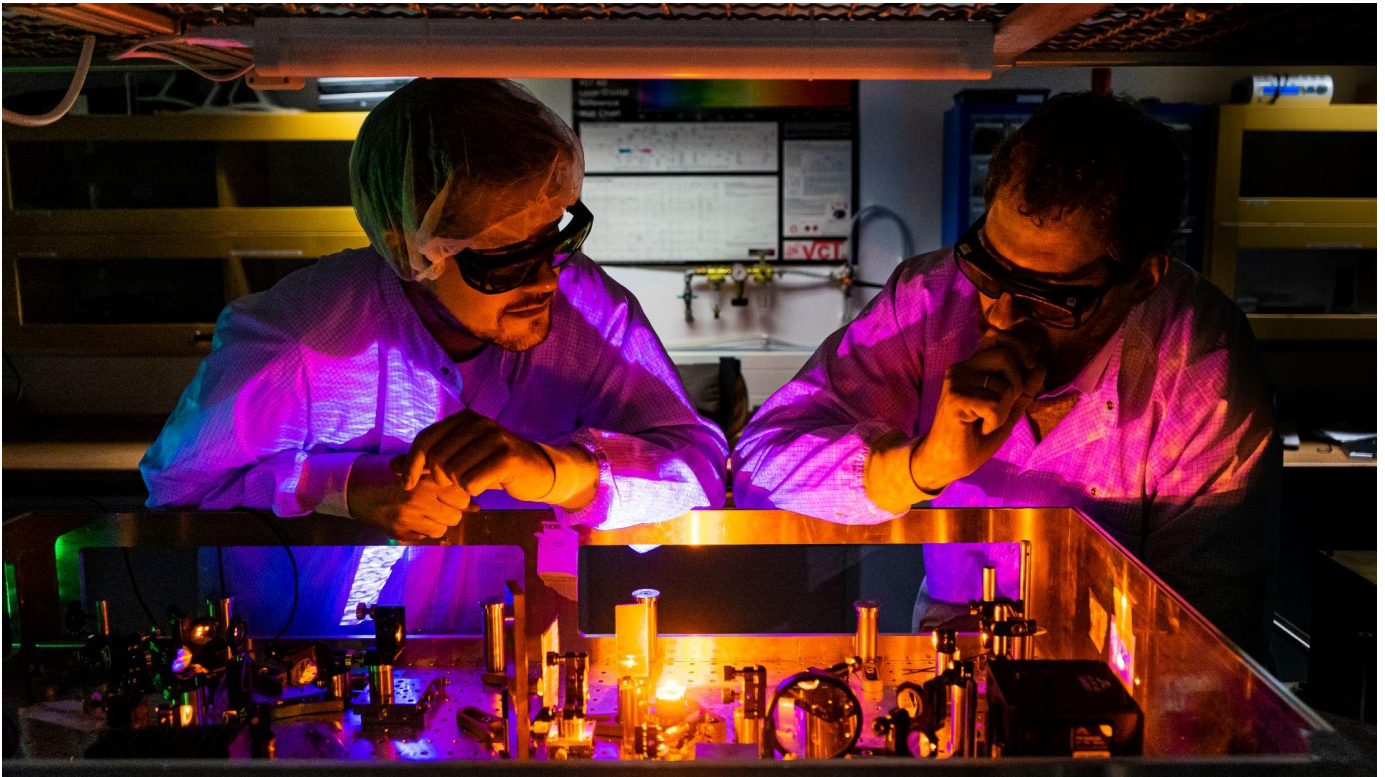
The mines today are a tourist attraction and the underground visit can only be done through guided tours. The mine has been authentically preserved. Tours take place every 30 minutes. You can walk down or go by the mine train which takes you down through the Roeder tunnels. The underground site temperature keeps constant at 12 degrees centigrade. It drips at certain places, so good shoes are a must. One can see the hard labour that went into the creation of these mines with its cold dark alleys. Imagine the workers breaking rocks using primitive tools, and then pushing the ore to the ground above. Their effort created the modern society that we are today!

During Christmas, the whole area is lit up in a sea of pretty lights, making Rammelsberg an ever better delight to see.



Inside the Rammelsberg Mines

## Discover Bright Career Paths in Optical Technologies, Laser and Photonics



Light is energy and a very versatile enabler for digital applications. Optical glass fibres are the backbone of the internet and mobile networks. Optical sensors and high-resolution cameras are necessary for autonomous driving, and lasers are replacing the scalpel in medical technology. Optical technologies (light-based technologies) make our everyday digital life possible. The applications of light are potentially endless, but it takes creative minds to develop the right technologies to harness the power of light.

The Bachelor's degree programme 'Optical Technologies: Lasers and Photonics' at Leibniz University, Hannover is unique in its form at a German university. During studies, you will learn a combination of physical, mathematical, and chemical principles with specific technical problem-solving skills. Prepare yourself for a career in one of the critical technologies

of the 21<sup>st</sup> century. After graduation, you will have abroad knowledge of optical technologies which you can use, e.g. in measurement technology or material processing.

Do you plan to continue your studies or already have a Bachelor's degree in physics, mechanical engineering or a similar subject? Then, the Master's programme 'Optical Technologies' might be the right choice for you. You will broaden your knowledge and learn to think and work solution-oriented, creatively, and innovatively across disciplinary boundaries. The programme combines the teaching of engineering methods on one hand with basic physics on the other. Students study both at the Faculty of Mechanical Engineering and at the Faculty of Mathematics and Physics. The courses are taught in German and English, and thus attract a lot of international students.

Learn more about your options at the following links:

[http://go.lu-h.de/BSc\\_Optical\\_Technologies](http://go.lu-h.de/BSc_Optical_Technologies)

[http://go.lu-h.de/MSc\\_Optical\\_Technologies](http://go.lu-h.de/MSc_Optical_Technologies)

You can watch the video at:

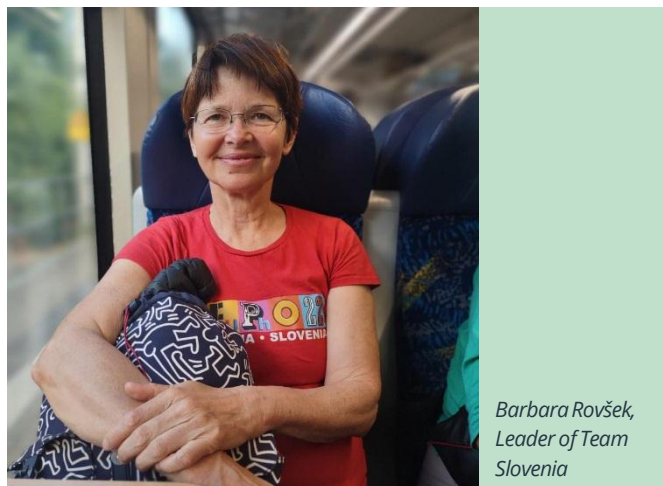
<https://www.phoenixd.uni-hannover.de/en/phoenixd-research-school/students#c16229>

## The Gaping Gender Gap

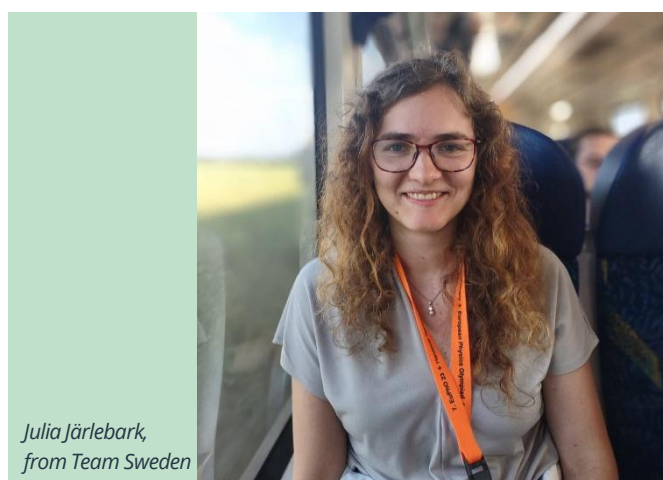
As we try to understand the gaping difference in the ratio between girls and boys at Physics Olympiads, we ask the opinions of the ladies at the Olympiad. What do they have to say about this?

Barbara Rovšek, Leader of Team Slovenia opines, "Why are there such less girls in the Physics Olympiad in the first place? What can we do to make this better? There are so many women physicists around. This gender gap is an alarming factor. If we have an attitude that there's nothing we can do to fix this, then we have already lost the battle. There are many ways to solve this problem. There is no single way to go about this, and it is not a quick fix. We don't have time to wait, either. Its only been a hundred years since women got voting rights, even in some of the most developed countries. Any Physics Olympiad is more than just a possibility to compete; it is a chance for girls to explore this as a career. Just one Olympiad can be absolutely life-changing. We actually lose out on a lot of capable girls due to a lot of factors. Statistically, women brains work differently in factors such as cognitive abilities and even while multi-tasking. If we even change some rules today in the Olympiad, then it would also send a message to all the girls out there who would feel encouraged to participate. Teachers have a lot of influence on the minds of young girls, and having an encouraging teacher is of paramount importance. We need to have an increase in the ratio of girls per delegation. How to motivate more girls is an issue that every country must urgently address. We are losing out half the precious minds from the entire population of physicists."

Julia Järlebark, Observer from Sweden says, "Girls have the same abilities as boys, but not the same chance because of external factors. We need a change in society at the grassroots level. If we conduct more



Barbara Rovšek,  
Leader of Team  
Slovenia



Julia Järlebark,  
from Team Sweden

Physics workshops specially for girls, there would be more interest from girls in this subject as a whole. In Sweden, we always try to encourage girls towards the qualifying exams. It is not easy to come up with a solution for this, either. We can also explore the options if experimental tasks are probably more biased towards one gender. There are even lesser girls in the qualifying rounds. I had a very encouraging teacher who advised me to pursue Physics, so teachers definitely shape your mind and influence your career choices."

Barbara Roos, Member of the Academic Committee has a story to share, "When I was a participant at one of the Physics Olympiads, a boy came up to me and asked, 'What are you doing here?' I was very shocked at his question and replied that I had qualified through the national qualifying exams on the basis of pure merit. Now, would he have asked this same question to another boy? This already means that a certain prejudice against girls in Physics already exists. Everyone needs to come up with ways to tackle this problem. Or else, this gender gap will always remain."

Do you have a suggestion to encourage more girls towards Physics? Then, please write to the organisers.

## People's Specials



*Irina Petreska, Macedonia Leader*

### **Irina Petreska, Leader of Team Macedonia**

"I like the programs, and I hope that my students win some medals! I look forward to the excursions and meeting new people. Everything is running very smoothly and I also felt that the problems were excellently thought of."

### **Anne-Sofie Mårtensson, Leader of Team Sweden**

"We really enjoyed this Olympiad. I especially liked the experimental exam - particularly the second task about the black-box. It was a new experiment. We had a short look at the solutions as well, and they were very cleverly thought of. I've been enjoying the excursions very much as well. I loved the city of Goslar and it looked like an absolute fairytale! It felt lovely to meet so many fantastic people at this Olympiad."



*Anne-Sofie Mårtensson, Leader of Team Sweden*

## EVENT SCHEDULE

### June 19

#### Students' program

7:00 - 9:00	Breakfast
9:00 - 11:45	Preparation for moderation and transfer with guides
12:00 - 13:30	Lunch (depending on moderation times)
12:00 - 18:00	Moderation & Visits to Laboratories
18:00 - 18:45	Transfer by public transport with guides (possibly earlier)
19:30 - 23:00	Farewell Dinner & Party

#### Program Leaders and Observers

7:00 - 9:00	Breakfast
9:00 - 11:45	Preparation for moderation and walk to LUH
12:00 - 13:30	Lunch (depending on moderation times)
12:00 - 18:00	Moderation & Visits to Laboratories
18:00 - 18:45	Board meeting for leaders
18:45 - 19:30	Transfer by public transport
19:30 - 23:00	Farewell Dinner & Party
23:00 - 23:45	Transfer by public transport

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