



DragoNews



6th European Physics Olympiad 2022
Ljubljana, Slovenia | 20–24 May 2022

20th May 2022, Friday

Weather forecast

Ljubljana 28 °C

Welcome to the 6th European Physics Olympiad!

Today marks the day we commence the European Physics Olympiad in Ljubljana, Slovenia. Students from 37 countries are participating for this Olympiad, and will take the experimental and theoretical examinations over this weekend. As you already know, besides the European Physics Olympiad (EuPhO) there are other pan-continental Olympiads such as the Asian Physics Olympiad (APhO) and the Ibero-American

Physics Olympiad, too. The concept of the EuPhO simulates real research with short problem descriptions, and an encouragement towards creative solutions that widens the youths' perspectives on physics.

The first EuPhO was held in Tallinn, Estonia in 2017, the second in Moscow, Russia in 2018, and the third in Riga, Latvia in 2019. The fourth EuPhO was supposed to be held in Sato Mare, Romania in 2020, but was cancelled due to the global health situation and the Covid 19 crisis. Instead, the Olympiad was organised online and was conducted with great success, much to the delight of all 257 participants from the 54 participating countries. The continued Covid crisis led to another online EuPhO in 2021. Today, this sixth EuPhO is being conducted physically in Ljubljana, Slovenia, from 20th to 24th May 2022. The Society of Mathematicians, Physicists, and Astronomers of Slovenia and the University of Ljubljana warmly welcomes all participants and team leaders to Ljubljana!



Slovenia – A Balkan Beauty

“I told them a bit of what I told you: that this is bigger than a beekeeping class, that Slovenia is a magical place, and that the person who comes here will have an Aha! moment that will change them forever. And that person will absolutely become a champion for bees in the process.”

– Jay Ebben, ‘Painted Hives’

The Republic of Slovenia is bordered by Italy to the west, Austria to the north, Hungary to the northeast, Croatia to the southeast, and the Adriatic Sea to the southwest. Located in central Europe with its national language as Slovene, Slovenia is famous for its beautiful landscapes, lakes, and scenery. It is a perfect place for adventure seekers and nature lovers. This country is home to one of the most beautiful lakes in the world and some of the best ski resorts in Europe.

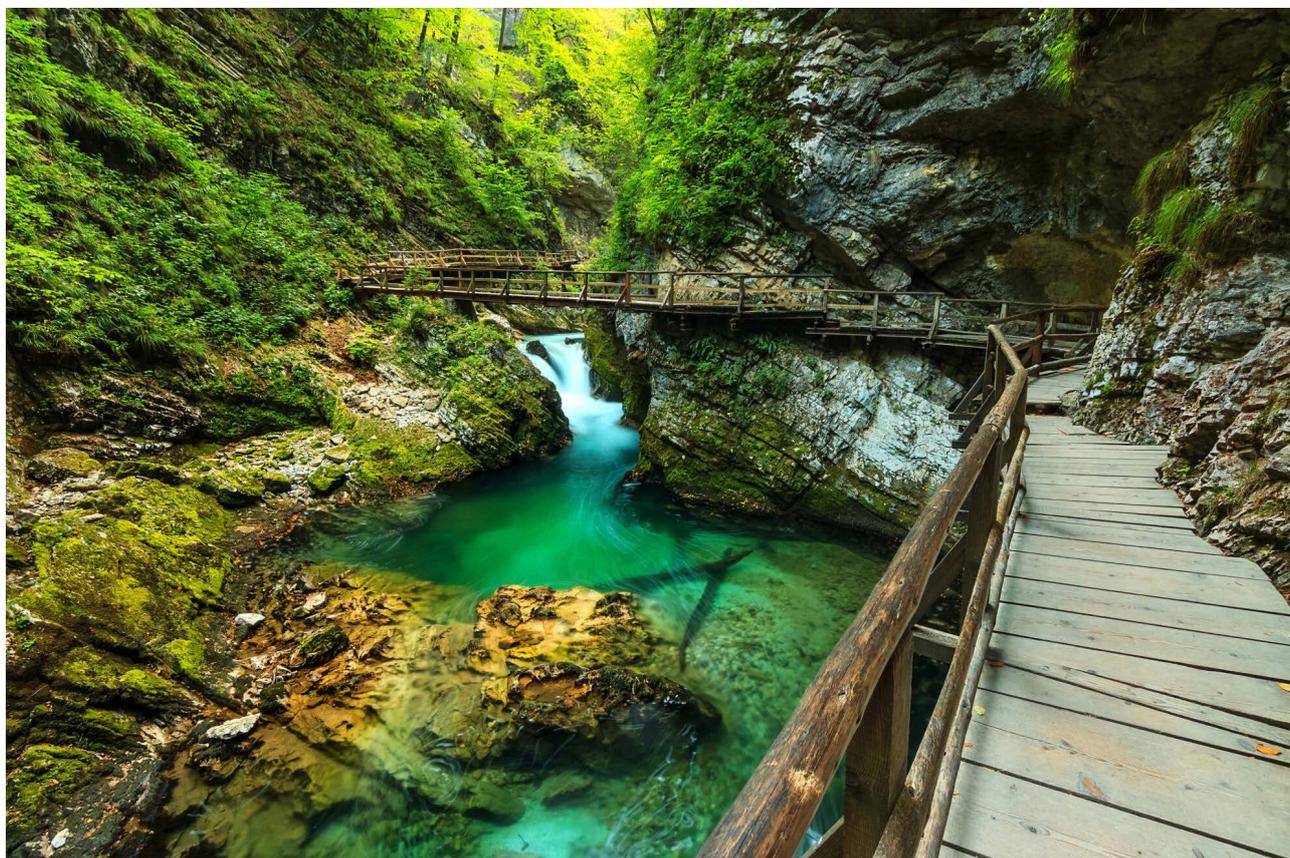
Slovenia is full of rich heritage, having four natural and cultural sites on the UNESCO World Heritage Site list. Škocjan Caves and its karst landscape are a protected site. Karst is a topography formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum. It is characterized by underground drainage systems with sinkholes and caves. It has also been documented for more weathering resistant rocks, such as quartzite, given the right conditions. The old forests in Goteniški Snežnik and Kočevski Rog in Slovenia are of great significance. The Idrija Mercury mining site is of world importance, as are the prehistoric pile dwellings in the Ljubljana Marsh.



The Idrija Mercury mining site

Eminent authors such as Slavoj Žižek, Mladen Dolar, Alenka Zupančič, and Boris Pahor come from Slovenia. Similar to its stellar academic and literature counterparts, Slovenia is home to global sport stars including Luka Dončić, Primož Roglič, Tadej Pogačar, Janja Garnbret, Tina Trstenjak, Benjamin Savšek, and many others. In 2017, Slovenia was named as the ‘Most sustainable country on Earth’ by National Geographic.

So, keep your eyes open – You will stumble upon wonderful surprises and discover many delightful things during your stay in Slovenia!



Solace in the lap of nature

Slovenian Specials

Why is the Soča river green?

Known as the 'Emerald Beauty', the Soča is a 137 km-long Alpine river, with a mysterious karst source in Trenta, at the foot of the majestic Julian Alps. The emerald-green color comes from light scattering on tiny air bubbles which are dispersed in the water, as the river gushes through the canyons. As the Soča Valley region is mainly from limestone and marl deposits, the color remains almost the same for the whole length, right till the Adriatic Sea in Italy. International kayaking competitions have taken place on the Soča. In 2007, several scenes for the Disney film, 'The Chronicles of Narnia: Prince Caspian' were shot on the Soča rapids.



The Soča river

Wildlife

A population of bears, wolves, and now surprisingly, lynxes add to the glorious Slovenian wildlife. The Snežnik forests have a new, richer addition of the lynx, which was brought from Romania in April. The lynx male Blisk, is the tenth lynx to be moved to Slovenia as part of the 'LIFE Lynx' project. One lynx will also be released in Croatia this year. Fourteen lynxes have been released into the wild so far, with four in Croatia and ten in Slovenia. All lynxes are monitored with GPS telemetry collars, which are used to determine how lynxes integrate into the population.

Migration of the wolf, Slavc, was also electronically tracked by the University of Ljubljana's Biology department, through usage of a GPS-GSM wildlife collar. Slavc even swam across the Drava river and met his mate Juliet in Lessinia. Amazingly, Slavc has travelled for around 2000 kilometres!



The lynx | Photo credits: Vedran Slijepcevic

Folklore

The dragon is a symbolic protector of Ljubljana. The dragon was originally present on the medieval coat of arms as a decoration, but later assumed a more central position. From its initial intimidating portrayal, the dragon gradually transformed into a symbolic protector of the city, embodying power, courage, and wisdom. And so, DragoNews will brief you about all the happenings of EuPhO 2022!



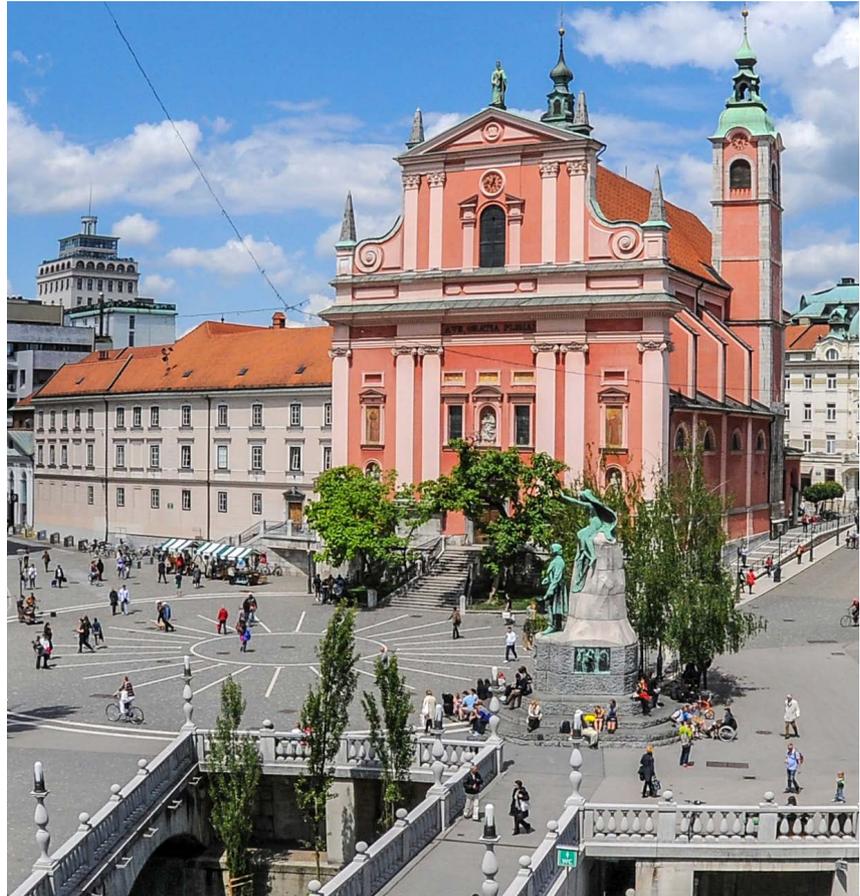
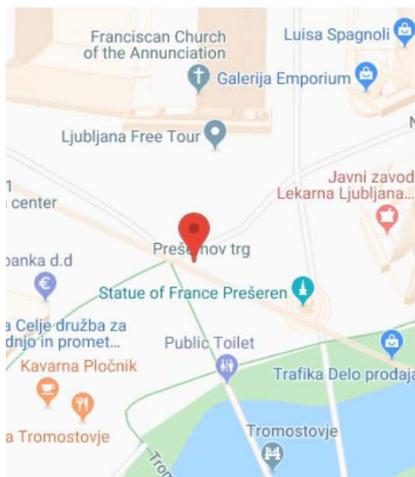
The iconic dragon on the Dragon Bridge in Ljubljana

Exploring Ljubljana Old Town

If you did not take a photo with the dragon, were you even in Ljubljana?

After the experimental exam on Saturday, the students and team leaders can explore Ljubljana's charming old town area. You can take a walk through the heart of Ljubljana, discovering medieval historic places. The Prešernov trg Square has developed from medieval crossroads from the former entrance to the walled city. It includes the pink facade of the Franciscan Church, the monument to the poet France Prešeren, and the Triple Bridge.

When you cross the Triple Bridge, you arrive at the Central Market, which is a great place to shop for souvenirs. Not far from the market is the famous Dragon Bridge (Zmajski most) which is adorned with famous dragon statues. Make sure you take plenty of selfies with the dragon! The Dragon bridge is a distinctive design, considered to be unique technical heritage and a fine example of Art Nouveau architecture, which flourished in the 20th century. Constructed between 1900 and 1901, it was Ljubljana's first reinforced concrete structure and one of the largest bridges of its kind to be built in Europe. The construction plans for the Dragon bridge were prepared by Professor Josef Melan, the inventor of the Melan System; a method for the construction of reinforced bridges. Prof. Melan was also the pioneer of the theory of underlying static calculations for large suspension bridges.



Ljubljana Old Town - Prešeren Square

If you feel your stomach grumbling, grab a sandwich, juice, and Potica from one of the cafes at the Petkovšek Embankment. You can buy antique crafts, jewellery, paintings, and ceramics at the Ljubljanica riverside. As you

stroll, you can enjoy music from talented buskers while slurping home-made ice cream. This would be a great time for you to take a break and relax before your theoretical exams.



Ljubljana Old Town - The Dragon Bridge

The EuPhO Chairperson Speaks...

Dear future physicists, dear present physicists, and dear colleagues,

It is my great honour to welcome you here in Ljubljana as participants of the 6th European Physics Olympiad, and at the Faculty of Mathematics and Physics, an institution with a carefully cultivated tradition of not only educating good physicists, but also reaching out to and recruiting the best high-school students with physics aspirations. I am very fond of the fact that the experiment, which is the key ingredient of a successful Olympiad has been devised at our Faculty — by my indefatigable colleagues Simon Čopar and Jošt Stergar. Yet above all, I am thrilled to be able to greet a host of energetic, determined young students with a high motivation to pursue a career in science. You could not have failed to notice that we live in a metastable world, jeopardized by anything from epidemics to asteroid impacts; your attendance at this Olympiad, however, is a testimony to the fact that at least in one aspect — the integrity of science — this planet has a bright future.



Charles Dickens once wrote, 'It was the spring of hope, it was the winter of despair...' May the sequence be reversed! I do hope that you will have a pleasant and memorable stay in Ljubljana, and I wish you all the inspiration in solving your theoretical and experimental tasks.

Prof. Dr. Simon Širca
Chairperson of the 6th EuPhO

Words from the Honourable Chairperson...

Although this is officially the first time Slovenia is hosting the European Physics Olympiad, it is actually the second time we have organised such a competition. In 1985, the Olympiad was held in Slovenia, at that time still in the name of the Federal Republic of Yugoslavia. This was an important time when the event evolved from a local competition launched by the so-called Eastern European socialist countries to a truly worldwide gathering of the most talented young physicists. Although at that time only 17 European and 3 non-European countries – Canada, Cuba, and Vietnam, participated; compared to 31 European and 6 countries from other continents in today's competition, which is considered a local competition. We had some observers from outside Europe, especially from the USA and China. They immediately recognised the important task of the Olympiad and decided to participate the following year. A few years later, they even organised the Olympiad in their own countries, which in turn strongly encouraged other non-European countries to participate. In 1985, the Secretary of the International Physics Olympiad, Dr Waldemar Gorzkowski, Professor Anton Moljk and I prepared the first version of the syllabus for the theoretical part. It was then discussed and adopted during the Olympiad. This document was important, and remains so not only for the participants to define the topics covered



in the competition, but also to set the highest standards for the knowledge of physics in secondary education, and to stimulate the modernisation of physics education around the world through national competitions. While the national and regional competitions are important to give a wider community of young physicists the opportunity to participate, it is crucial to continue the global competition to promote the universal nature of physics, while giving young people all over the world – where there are so many things that divide us – a common goal worth pursuing.

Prof. Dr. Bojan Golli
Honourable Chairperson of the 6th EuPhO

To bee or not to bee...

Today is World Bee Day! To produce one kilogram of honey, a bee must visit four million flowers and fly four times the distance around the planet.

Slovenia is a nation of beekeepers, and beekeeping enjoys a status equal to that of other types of agricultural activity. Bees are some of the most important pollinators, ensuring food and food security, sustainable agriculture, biodiversity, and they significantly contribute to the mitigation of climate change and the conservation of the environment. In the long-term, the protection of bees and the beekeeping sector is a strong measure to preserve biodiversity and creating rural jobs. Slovenia proposed that the United Nations (UN) proclaim 20th May as World Bee Day. Slovenia has 11,293 beekeepers, 15,420 apiaries and more than 210,000 bee colonies, which is 42% more than ten years ago. With five beekeepers per 1000 inhabitants, Slovenia ranks at the very top of the EU Member States in terms of the number of beekeepers per capita. Thus, awareness of the significance of bees and ensuring their well-being is generally high.

Urban beekeeping

Honey, being a traditional specialty, Slovenia also has its very own bee (kranjska sivka) or the Carniolan honeybee, registered as a trademark. There is even a special exhibition in the City Hall Glass Atrium in Ljubljana City Centre which is devoted to urban beekeeping. You can visit the exhibition in this week, or on Monday afternoon. The exhibition also presents the experience and knowledge that is being spread to other European cities in the projects 'BeePathNet' – the network of bee paths, and 'BeePathNet Reloaded'.

<https://www.ljubljana.si/en/news/in-ljubljana-may-is-dedicated-to-bees/>



Despite the Covid pandemic, the year 2021 was very good for the Urban Beekeepers' Association of Slovenia. The association started with the 'Honey Cell' project. For this project, the association is cooperating with prisoners from Ljubljana. The project not only provides more knowledge on how to make cities self-sufficient, but also contributes to the resocialization and reintegration of prisoners into society. The association is also engaged with innovation. One member, Damir Škraban, has developed a digital scale for beehives, that lets beekeepers check the weight and condition of the bee colony at any time of the day. The scales are already being used in several European countries. It is important that city dwellers do not lose touch with the long process of getting food on the table. Our current lifestyle puts a heavy strain on natural resources and the earth. The Urban Beekeepers' Association of Slovenia has plenty of plans and ambitions, even in 2022 to contribute to biodiversity, improve life in cities, and empower vulnerable groups.

Tour de Force!

Slovenian bicycle riders are dominating all aspects of professional cycling.

Primož Roglič and Tadej Pogačar are phenomenons in the cycling world. Roglič started as a ski jumper, but after an injury in 2007, he switched to cycling. Despite coming to the sport so late, he won the Vuelta a España three years in a row, as well as at Tour de France, and evolved into one of the best riders of his generation. Similarly, Tadej Pogačar is a two-time Tour de France winner. Both cyclists are the best Slovenian riders in recent years. With a pleasant climate, Slovenia offers some of the most beautiful biking trails in the world and attracts a wealth of cyclists virtually the whole year round.

In the world of basketball, Luka Dončić is a Slovenian professional basketball player for the Dallas Mavericks of the National Basketball Association (NBA). He also represents the Slovenian national team, making his senior debut in 2016 at a tender age of 17. Tina Maze is the most successful Slovenian ski racer in history with a career that culminated with two gold medals at the 2014 Winter Olympics. She is one of

the seven female racers who has won in all five World Cup disciplines and one of three to do it in a single season. Maze won a total of 26 World Cup races during her career.



Slovenian cyclist superheroes

The experience of a gold medallist

Tevž Lotrič narrates his memorable time at the EuPhO

"I participated in EuPhO twice – in Latvia in 2019, and virtually the following year, missing out on a trip to Romania. I must say it was a fantastic experience, especially in Latvia. I really enjoyed being able to see Riga, going on a trip around Latvia, and meeting some interesting physicists – something I missed a lot the following year. But what stayed in my memory the most were probably the fantastic problems. In my two years of studying physics since, I have not encountered many problems that required such clear physical reasoning as the ones set at EuPhO. So, even if all else fails, you will still leave this event with some new and most definitely interesting knowledge, and solved problems. The problems will be difficult and probably none of you can solve everything, but you should still try them all, and maybe, with a bit of luck, you could end up getting a medal. But in the end, having a medal, or the metal of which it is made, ends up mattering relatively little. I got a gold medal both times I participated and yet, looking back, I find that the most important bit, for me at least, was that due to my competitive desire to succeed at the Olympiads, I had to, for the first time in my life, pick up some physics books and



Tevž Lotrič

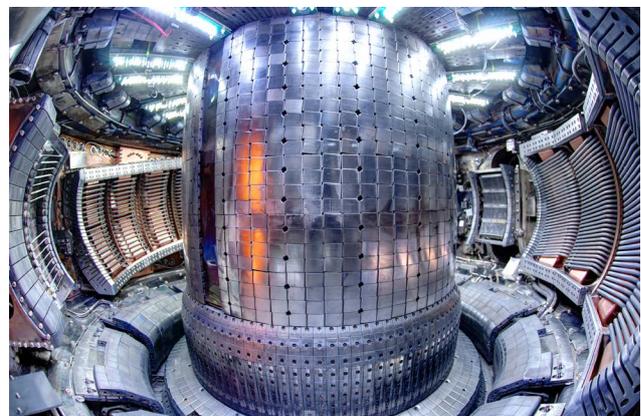
start studying. This confirmed in my head that I really liked physics, and that it was something I wanted to do in my life. Now, I am finishing my second year of studying physics in Oxford. While being able to cite my Olympiad success was definitely nice, I think that any of you who managed to qualify for EuPhO are more than good enough to get accepted to any university you would want. So be brave and aim for wherever you want to go. But that is enough about me. You are very lucky to be able to attend EuPhO in person in a beautiful city like Ljubljana, so make sure to make the most of it. If you enjoy yourself here, success will follow. I wish you all good luck, and may the best win. I will do my best to ensure this happens, as I will be marking some of your problems this week."



Enabling scientific breakthroughs, advanced cancer treatment, and clean future energy

Cosylab is the leading provider of software solutions for the world's most complex, precise, and advanced systems, and are also one of the sponsors of EuPhO 2022. Cosylab's technology enables organisations to discover scientific breakthroughs, offer state-of-the-art cancer treatment and healthcare innovations, and bring clean fusion power to the future energy market.

Cosylab's solutions are integrated into the most significant Big Science international projects, including CERN and ITER. Cosylab provides software products and services to



the largest medical device manufacturers and cancer centres worldwide, such as Varian and Massachusetts General Hospital. Cosylab's engineering expertise helps innovative medical start-ups get their medical devices to patients faster. Through its headquarters in the EU and subsidiaries across Europe, North America, and Asia, Cosylab has worked on hundreds of multi-year and multi-people projects worldwide.

Did you know that at the moment, there are around 50 Cosylabers that studied Physics or Math? When your time comes to look for a student job (or a full-time job, of course), remember Cosylab! They are always happy to receive students' applications and are delighted to see your interest in gaining any experience with them. Visit www.cosylab.com or follow them on Instagram [@teamcosylab](https://www.instagram.com/teamcosylab).



EuPhO schedule

Students' program

May 20 (Friday)

◇ 17.15	Arrival and registration, M hotel
17.30	Bus departure, M hotel ◇ FMF
18.00	Opening ceremony, FMF
18.45	Welcome reception, FMF
21.00	Bus departure, FMF ◇ M hotel

May 21 (Saturday)

◇ 07.45	Breakfast, M hotel
08.00	Bus departure, M hotel ◇ PEF
09.00	Experimental competition, PEF

14.00	Lunch, meeting leaders, PEF
15.00	Free time in Ljubljana, City
19.00 ◇	Dinner, M hotel

May 22 (Sunday)

◇ 07.45	Breakfast, M hotel
08.10	Bus departure, M hotel ◇ PEF
09.00	Theoretical competition, PEF
14.00	Lunch, PEF
15.00	Excursion Škocjan caves, PEF ◇ Škocjan
20.30	Dinner, M hotel
21.30 ◇	Meeting leaders, M hotel

May 23 (Monday)

◇ 07.45	Breakfast, M hotel
08.00	Preparation for Moderation, M hotel
09.00–13.30	Moderation / Free time, M hotel / City
13.00–15.00	Lunch, M hotel
14.30–18.00	Moderation / Free time, M hotel / City
19.00	Mayor of Ljubljana reception, Kino Šiška
20.30	Concert - Koala Voice, Kino Šiška

May 24 (Tuesday)

◇ 08.45	Breakfast, M hotel
09.20	Bus departure, M hotel ◇ CD
10.00	Closing ceremony, CD
12.00	Farewell reception, CD
13.30	Bus departure, CD ◇ M hotel
14.00 ◇	Departures, M hotel

Leaders' and observers' program

May 20 (Friday)

◇ 17.15	Arrival and registration, M hotel
17.30	Bus departure, M hotel ◇ FMF
18.00	Opening ceremony, FMF
18.45	Welcome reception, MF
21.00	Bus departure, FMF ◇ M hotel

May 21 (Saturday)

05.00–07.50	Experimental problem translation, M hotel
08.00	Breakfast, M hotel
09.00	Meeting with Academic Committee, M hotel
10.00	Free time in Ljubljana, City
13.00	Lunch, PEF
14.00	Meeting students, PEF
15.00	Free time in Ljubljana, City
19.00 ◇	Dinner, M hotel

May 22 (Sunday)

05.00–07.50	Theoretical problem translation, M hotel
08.00	Breakfast, M hotel
10.00	Excursion to Bled, M hotel d Bled
13.30	Lunch (lunch-box), Bled
18.00	Bus departure, Bled ◇ Ljubljana
19.00	Leader's and Observer's dinner, Ljubljana
21.30 ◇	Meeting students, M hotel

May 23 (Monday)

◇ 07.45	Breakfast, M hotel
08.00	Preparation for Moderation, M hotel
09.00–13.30	Moderation / Free time, M hotel / City
13.00–15.00	Lunch, M hotel
14.30–18.00	Moderation / Free time, M hotel / City
19.00	Mayor of Ljubljana reception, Kino Šiška
20.30	Concert - Koala Voice, Kino Šiška

May 24 (Tuesday)

◇ 08.45	Breakfast, M hotel
09.20	Bus departure, M hotel ◇ CD
10.00	Closing ceremony, CD
12.00	Farewell reception, CD
13.30	Bus departure, CD ◇ M hotel
14.00 ◇	Departures, M hotel

Cogwheel: People behind the Olympiad

I am currently a post-doc in the field of sports biomechanics at Mid Sweden University and the Faculty of Sport at the University of Ljubljana, but the road to get there has not been straight. Besides physics, I have always been interested in three other things, namely sports, medicine, and teaching. So, after graduating from high school, I started studying at the Faculty of Education in Ljubljana, where I became a teacher of mathematics and physics. During my studies, I decided to study Medical Physics, a new course. After graduation, I agreed to do a PhD in the field of biomedical optics but saw an open position for a PhD student at Faculty of Sport in the field of sports biomechanics. I never applied for this position, but I always had in the back of my mind "what if...?". Fortunately, after I finished my PhD, a post-doctoral position in sports biomechanics was opened in collaboration with the Faculty of Sport at Mid Sweden University.



Nina Verdell

I applied immediately and was lucky enough to get it. After a long road, I can say that I have found my dream job where I can combine physics, sports, and teaching and now and then a little bit of medicine. At EuPhO 2022, I am the coordinator for the social activities of the participants.

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Slovenske železnice



Jan Ravnik
Data Scientist