IYPT 2010
Vienna - Austria

23rd International Young Physicists' Tournament

the Physics WorldCup

9th to 16th of July

Vienna University of Technology – Austria

fotos: istockphoto

Our Sponsors

austriamicrosystems – a leap ahead in analog
echomedia
telesoft consulting
WKO Wien – Wirtschaftskammer Wien – Weiter kommen.
Österreichische Physikalische Gesellschaft
BMWF – Bundesministerium für Wissenschaft und Forschung
ZIT – Zentrum für Innovation und Technologie – Die Technologieagentur der Stadt Wien
AYPT
bm:uk
universität wien
bmwfi – Bundesministerium für Wirtschaft, Familie und Jugend
QimiQ
VIENNA Convention Bureau
TU Wien
EPS
Stadt Wien
iv Industriellen Vereinigung
Wiener Linien
Wien Kultur
Infineon
ÖAW – Austrian Academy of Sciences
ÖNB – Österreichische Nationalbank – Eurosystem
Sony DADC
IST Austria – Institute of Science and Technology

Contents

Contents

Info: www.iypt.at

Greetings

© privat

Alan Allison

Welcome to the 23rd International Young Physicists' Tournament!

The eyes of many may be focussed on another World Cup at the moment but it is wonderful to see teams from all over the globe come to compete in this Physics World Cup. This event is just as joyous a meeting of countries as the football competition and just as difficult to win. The team that hopes to win this world cup will need to demonstrate good coaching, great teamwork and moments of individual brilliance.

The success of this tournament will depend upon the many physicists and educators willing to give up their time to be jurors at IYPT and the hard work of the whole Local Organising Committee. Without them this competition would not take place. I am grateful to them all!

The real joy of the IYPT is the unique way that students, teachers, scientists and friends meet to "talk physics"! I know you will all enjoy this week and leave with magnificent memories of our time at this World Cup in the beautiful city of Vienna.

Mr Alan Allinson
President IYPT

Brigitte Pagana-Hammer

Dear participants!

Every year students from all continents meet in the International Young Physicists'Tournament to measure their skills in solving tricky scientific problems, to socialize with fellow-students with similar interests and to experience the culture and the way of life of foreign countries. This year Austria has the honor and pleasure to host the competition. We tried our best to offer you a program which shows you the beauties of our homeland, the traditional art treasures and the modern development of the City of Vienna and its surroundings. However, with the IYPT being a physics competition, we considered it important to show you also the great significance and the high level of science in our country.

We hope that we were able to create for you the conditions to enjoy a challenging competition. We also hope that your participation in the tournament will further enrich your knowledge and increase your exposure to scientific research while improving international friendship and understanding among us.

I wish you a pleasant stay and a memorable experience here in Vienna.

Mag. Dr. Brigitte Pagana-Hammer, MSc. MAS
Head of the LOC

Magnifizenz Skalicky

Welcome to the Vienna University of Technology!

Since its founding in 1815 the Vienna University of Technology has been a place of research, teaching and learning in the service of progress. Furthermore the Vienna University of Technology is committed to enhance internationalization in education and to support the personal development of the students. In order to achieve this goal the Vienna University of Technology also hosts events such as the International Young Physicists' Tournament which gathers students from all over the world to measure their competence, to improve their skills in science and technology and to establish contacts and friendships. We hope that your participation will be not only an interesting and joyful experience, but also a step forward in your personal development. Whether you are going to choose the sector of science and technology or other fields of study, your experience with the IYPT should help you to contribute to the progress, understanding and cooperation in your home countries and all around the world.

I wish you all a fair competition, excellent physics-fights and a pleasant visit to Austria.

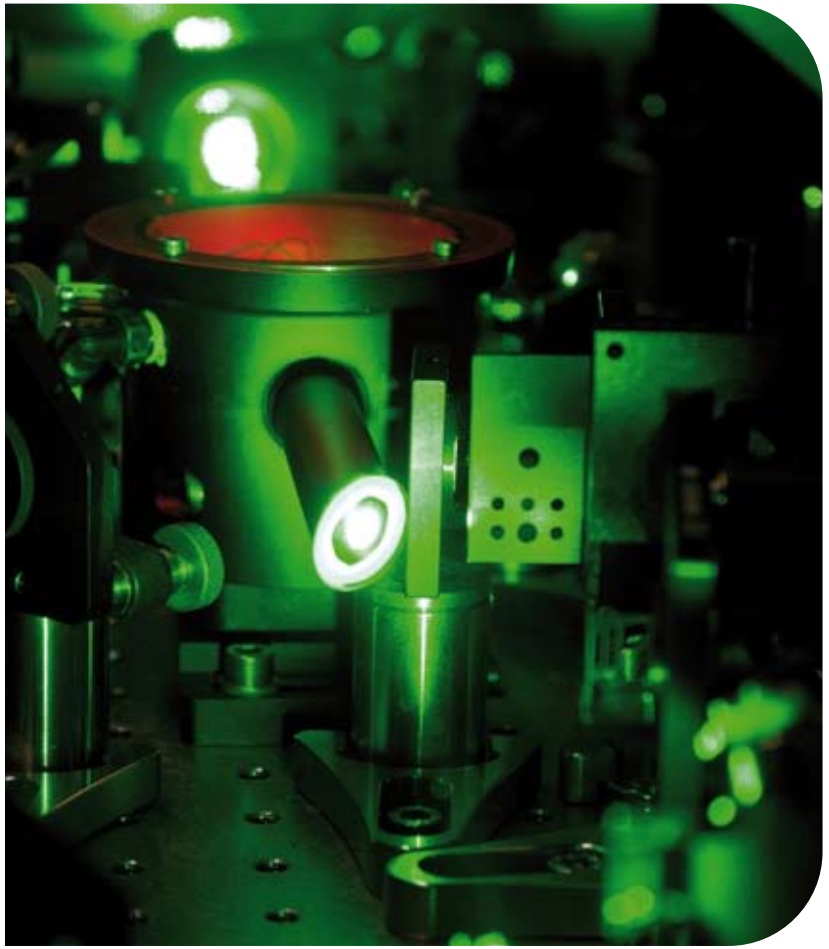
Univ. Prof. DI Dr. Peter Skalicky
President of the Vienna University of Technology

TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

Vienna University of Technology

Our mission is technology for people. Through our research we „develop scientific excellence", through our teaching we „enhance comprehensive competence".
Get insight into parts of our research:

See behind the curtain at the laser lab of the Photonics Institute or cheer for humanoid robots playing football at the Institute of Automation and Control.



Research Focus Points:

- Quantum Physics and Quantum Technologies
- Materials and Matter
- Information and Communication Technology
- Energy and Enivronment
- Computational Science and Engineering

Technology for People

KINDERUNITECHNIK/PHYSICS

WORKSHOP TU WIEN

What does a Physicist do?

Little research projects for great future scientists

Mag. Dr. Brigitte Pagana-Hammer, MSc, MAS
Fakultät für Physik, Universität Wien

Contemporaneously with the Children's University at the Vienna University of Technology the International Young Physicists' Tournament (IYPT), the Physicists World Cup, will take place. The IYPT is an international competition where students between 14 and 18 years from all over the world present their answers to tricky physical questions. At the workshop you will have the opportunity to investigate together with them the miracles of nature and understand how the world works.

Nr.	Date	Time	Age
558	Mo 12th July	12:00–13:00	10–12 years

Afternoon in Science

TU – FREIHAUS – FOYER

Tuesday, July 13th, 2.30 p.m.

You will experience some cutting edge science from both applied and fundamental research. Vienna University of Technology and four external exhibitors will show physics from their field of interest and will give you the chance to gain some hands-on experience.

IST Austria

The Institute of Science and Technology Austria is an institute dedicated to basic research focusing on a variety of fields. The ISTA, which was founded in 2006, values an interdisciplinary approach to cutting-edge research. Since internationality is another fundamental concept of the institute the connection to IYPT is easily established.

Sony DADC

This international company is part of Sony's digital media production network and has some significant production facilities in Austria. The development of new and the improvement of existing technologies for storage of digital content is the main field of research performed at Sony DADC (Digital Audio Disc Corporation).

InnoC.at

The Austrian Association for Innovative Computer Science is an initiative that contributes to the development of research and teaching in computer sciences. Via a variety of platforms it also gives young researchers access to high technology equipment and support to help them realize their own ideas. In addition, it annually holds the Robot-Challenge where young engineers get the chance to have their self-designed robots compete with those of their peers.

Austrian Federal Criminal Office

The BKA (Bundeskriminalamt – Austrian Federal Criminal Office) is dedicated to maintaining security for both citizens and visitors in Austria. When it comes to disarming explosives the BKA uses high-end robotics to avoid putting the lives of their agents at risk. The scope of action of such devices will be made visible and the process of a disarming operation will be explained.

Vienna

Vienna (German: Wien) is the capital of Austria and one of its nine states. Situated in the east of Austria at the easternmost extension of the Alps, it is the country's largest city with a population of about 1.7 million. It is the cultural, economic and political centre of Austria and the 10th largest city (by population) in the European Union. In 2001, the city centre was designated a UNESCO World Heritage Site, and in the latest publications Vienna ranked first in the quality of life.

Founded around 500 BC as a Celtic settlement, Vienna became a Roman frontier city and eventually the capital of the Holy Roman Empire and an important cultural centre. In 1804, Vienna became the capital of the Austrian Empire and subsequently, after World War I, the capital of the Austrian Republic. Today, the city is composed of 23 districts, numbered from the city centre (first district) outwards. Vienna has a humid continental climate with warm summers and cold winters. Due to its geographical position it is an extremely windy place, which contributes to the extraordinarily clean air. The most important economic sector for Vienna is tourism, but more than 1000 research institutions specialized in various areas complement the city's economic activity.

Giant ferris wheel

Art and culture have a long tradition in Vienna, including theatre, opera, classical music and fine arts. Many theatres, opera houses and different museums as well as the city's architecture and the word famous balls contribute to the Vienna's rich culture.

Among the many parks and gardens there is Schönbrunn, surrounding the imperial castle and including the world's oldest zoo, and the Prater with its famous giant ferris wheel. Other tourist attractions include the imperial palace of the Hofburg, St.Stephan's Cathedral, the Spanish Riding School, the Vienna Boys' Choir, the Hundertwasserhaus and the Danube Tower with its rotating restaurant.

Regarding dining and nightlife, Vienna offers a broad variety of restaurants, bars, clubs and of course the traditional Viennese Coffee Houses. Local gastronomic specialities include the Wiener Schnitzel, special desserts such as the Apfelstrudel or the well known Sacher Torte (chocolate cake) and local wines, cultivated on vineyards surrounding the city.

Karlskirche

Cultural Experiences

Melk Abbey

Melk Abbey or Stift Melk is an Austrian Benedictine abbey, and one of the world's most famous monastic sites. It is located above the town of Melk on a rocky outcrop overlooking the river Danube in Lower Austria. The abbey was founded in 1089 when Leopold II, Margrave of Austria, gave one of his castles to Benedictine monks from Lambach Abbey. A school was founded in the 12th century, and the monastic library soon became renowned for its extensive manuscript collection. The monastery's scriptorium was also a major site for the production of manuscripts. Today's impressive Baroque abbey was built between 1702 and 1736. Particularly noteworthy is the abbey church with its beautiful frescos and the impressive library with countless medieval manuscripts. The school still exists and now caters for nearly 900 pupils of both sexes.

Melk Abbey

Schallaburg Renaissance Castle

The Schallaburg, located about 5 kilometers from Melk, ranks among the finest Renaissance castles north of the Alps. The Schallaburg castle received today's characteristic appearance in 1572, when the prosperous Lose Steiner dynasty established a manor for themselves that was modeled on the Italian palazzo of the time and whose impressive silhouette can still be seen from far away to this day. The Schallaburg's generous, picturesque castle courtyard for tournaments with its cantilever stairs testifies to the Losensteiner family's prosperity and love of art, as do the unique decorative sculptures of the two-storey arcade court. The terracotta mosaic, comprising 1.600 single pieces, depicts a vivid scene of mythological figures, gods, masks and fabulous creatures, all crafted in lavish detail. One of the figures represented is the "Hundefräulein" (a female human figure with a dog's head), a character based on a Schallaburg-related legend. The Schallaburg Castle is also widely known for its annually changing, cultural-historical and archaeological exhibitions. The castle's charming, Mannerist gardens boast historic roses, ornamental trees and bushes, herbs, and tow typical Renaissance apple orchards. A special attraction is the Schallaburg's huge smoke-spewing dragon outside the castle gates, 30 meters long and 6 meters high, which allows children to slide from his mouth, climb up and down inside its body, and hides many secrets waiting to be discovered

Schallaburg Renaissance Castle

IOC, EC & LOC

IOC & EC Members	position	country
Alan Allison	President	Australia
Martin Plesch	Secretary General	Slovakia
John Balcombe	Treasurer	United Kingdom
Rudolf Lehn	EC	Germany
ChuanYong Li	EC	China
Georg Hofferek	EC	Austria
Brigitte Pagana-Hammer	EC	Austria

IOC Members	country
Alan Allinson	Australia
Burin Asavapibhop	Thailand
John Balcombe	United Kingdom
Samuel Byland	Switzerland
Kim Freimann	Sweden
Paul Haines	New Zealand
Kingsley Imade	Nigeria
Dina Izadi	Iran
Hsien-chung Kao	Chinese Taipei
Zdenek Kluiber	Czech Republic
Bernd Kretschmer	Germany

IOC Members	country
Frantisek Kundracik	Slovakia
Myeung Hoi Kwon	Korea
Valentin Lobyshev	Russia
Oleg Matveichuk	Ukraine
Andrzej Nadolny	Poland
Matti Rajamäki	Finland
Zsuzsanna Rajkovits	Hungary
Cyril Ravat	France
Romano Rupp	Austria
Silvina Simeonova	Bulgaria
Qian Sun	China
Francisco Swaminathan	Kenya
Theresa Poh Sin Thor	Singapore
Kreso Zadro	Croatia

LOC Members	
Wolfgang Buc	Thomas Lindner
Christa Deinlein	Leopold Mathelitsch
Armin Fuith	Brigitte Pagana-Hammer (Head of the LOC)
Viktor Gröger	Ulrike Regner
Gerhard Haas	Romano Rupp
Timotheus Hell	Erika Tilgner
Georg Hofferek	Heribert Tilgner
Martin Hopf	Angel Usunov
Heinz Kabelka	Katharina Wittmann
Helmut Kühnelt	

Independent Jury Members

name	country
Alan Allison	Australia
John Balcomb	United Kingdom
Ilse Bartosch	Austria
Peter Bajons	Austria
Stefan Bernet	Austria
Helmuth Böck	Austria
Jozef Brestnsky	Slovakia
Wojciech Dindorf	Poland
Irena Drevensek-Olenik	Slovenia
Christopher Drew	Kenya
Manfried Faber	Austria
Feng Song	China
Armin Fuith	Austria
Erich Gornik	Austria
Viktor Gröger	Austria
Gerhard Haas	Austria
Paul Hains	New Zealand
Gerda Huf	Austria
Dina Izadi	Iran
Judit Illy	Hungary
Hong Jung	Korea
Heinz Kabelka	Austria
Reinhard Klauser	Austria
Hermann Klein	Germany
Zdenek Kluiber	Tschechische Republik
Maciej Kolwas	Poland
Zadro Kreso	Croatia
Mygui Kwon	Korea
Frantisek Kundracik	Slovakia
Andrii Lazariev	Ukraine
Rudolf Lehn	Germany
Li ChuanYong	China
Valentin Lovishev	Russia
Leopold Mathelitsch	Austria
Oleg Matveichuk	Ukraine
Maurizio Musso	Austria
Frank Kamunde Mwongera	Kenya
Andrzej Nadolny	Poland
Suwonjandee Narumon	Thailand
Martin Plesch	Slovakia
Zsuzsanna Rajkovits	Hungary
Helmut Rauch	Austria
Erich Reichel	Austria
Jörg Schmiedmayer	Austria
Josef Siess	Austria
Silvina Simeonova	Bulgaria
Helga Stadler	Austria
Suhas G. Tagare	India
Gunnar Tibell	Sweden
Gilman Toombes	Australia/France
Gero Vogl	Austria
David Wharham	Germany
Daniel Wirz	Switzerland
YE Yeo	Signapore
Yung-Yuan	Chinese Taipei
Kathryn Zealand	Australia

For more information about the independent jury members, please refer to the special booklet!

IYPT 2010 Participants

Teams, visitors & staff-members

NATION	TEAM LEADER	TEAM MEMBER
 AUSTRIA	Usunov, Angel Winkler, Dieter	Heise, Phillip Scherbela, Michael (Captain) Schnedlitz, Michael Tiefnig, Johannes Zatloukal, Bernhard
 AUSTRALIA	Chan, Noel O'Neill, Philip	Gunawardena, Manuri Roe, Alistair (Captain) Seo, Soo Jung Sklavos-Creevey, Jonathon Thang, Christopher
 BELARUS	Rabinovich, Oscar Zadedyurina, Svetlana	Goncharov, Fedor (Captain) Herman, Mikalai Karuseichyk, Ilya Koval, Pavel Sapronova, Julia Latunina, Olga (Visitor)
 BRAZIL		Hirata, Allison (Observer)

NATION	TEAM LEADER	TEAM MEMBER
 BULGARIA	Lozanov, Kaloian Ribarov, Dimitar	Chachkarova, Elena Genkov, Kaloyan Naydenov, Momchil Shenol, Aslihan (Captain) Yordanova, Yoana
 CHINA	Lu, WenQiang Sun, Qian	Cheng, ZhongQi Kang, WanYing Wang, NingYue (Captain) Wang, MengXia Xie, Yuanzheng He, QingLi (Visitor) Yan, XiaoZhi (Visitor)
 CHINESE TAIPEI	Chia, Chih-Ta Pao, Chien-Hua	Chen, Wei-Hsuan Chu, Jun-Yu Hsieh, Tsung-Lin (Captain) Lin, Yu-Cheng Liou, Franklin Huang, Wei-Lin (Visitor)
 CROATIA	Marohnic, Zeljko Micic, Dario	Grbanovic, Lora (Captain) Keretic, Anica Markovic, Igor Pale, Una Racz, Gabriela Clara Saric, Lidia (Observer)
 CZECH REPUBLIC	Dirlbeck, Jan Kluiber, Zdeněk	Hazi, Josef (Captain) Kozák, Miroslav Le Quang, Dung Le Quy, Anh Vu Luu Tran, Viet Švecová, Anna (Visitor)

NATION	TEAM LEADER	TEAM MEMBER
 FRANCE	Bottineau, Patrice Ravat, Cyril	Allard, Victor Bordenave, Théo Cahen, Arthur Lucken, Romain (Captain) Sebukhan, Derya
 GERMANY	Bühler, Fabian Kretschmer, Bernd	Burock, Marc Miksch, Björn Vierke, Stefan Vinçon, Ilka (Captain) Völkel, Simeon
 IRAN	Ghaednia, Hamid Seifan Ahari, Hamidreza	Farajollahi Ahmadi Til, Ali Karimi, Zahra Meraj Bousaki, Seyed Montazeri Namin, Reza (Captain) Zargham, Saba Kefayati, Mohammad Esmaeil (Visitor)
 KENYA	Drew, Christopher N J Swaminathan, Francisco	Gathuru, Charles Karuga Mahesan, Jathurshanth Omar, Muhammad Abdibasid Shah, Sakhi Ritesh Shah, Mirav Nailesh (Captain)
 KOREA	Kim, Kwang Joo Lim, Heon Kweon	Ji, Dong Jin Kim, Jae Hyun (Captain) Kim, Eun Seo Kwon, Ki Yon Moon, Seok Il Park, Kyung-Yun (Visitor) Yim, So Hee (Visitor)

NATION	TEAM LEADER	TEAM MEMBER
 NEW ZEALAND	Hogan, Kent Jennings, Gavin	Chen, Yufei Randle, Jennifer Simmers, Evan Xie, David Yuen, Tony (Captain) Haines, Carol (Visitor)
 NIGERIA	Ekwenta, Francis Imade, Kingsley	Aghahowa, Nosadeba (Captain) Ekweani, Chukwuka Ibeke, Ogechi Osondu, Jessica Sakyenu, Jenom
 POLAND	Lipiński, Stanisław Nadolny, Andrzej	Gładczuk, Łukasz (Captain) Łysiak, Jacek Siwiec, Mateusz Sławiński, Albert Siddhartha Wierzba, Piotr Rüb, Inga (Visitor) Kurek, Radosław (Visitor)
 RUSSIA	Olga, Inisheva Vladimir, Kruzhaev	Alexey, Berdyugin Anton, Berezin (Captain) Artem, Krutko Maria, Trofimenko Olga, Goldina
 SINGAPORE	Seow, Yongli Wee, Mark Chye Huat	Kang, Zi Yang Li, Kewei (Captain) Lin, Jiahuang Wong, Say Juan Jeremias Yee, Weiliang Samuel Lo, Yiu Wah Daniel (Visitor)

NATION	TEAM LEADER	TEAM MEMBER
 SLOVAKIA	Ftáčnik, Matej Kulich, Tomáš	Cocuľová, Zuzana Juránek, Michal Šíp, Matej (Captain) Součková, Kamila Vavrík, Boris
 SWEDEN	Freimann, Kim Lavröd, Jakob	Bertenstam, Mårten Kesek, Blanka (Captain) Li, Joel Nilsson, Anja Ullstad, Felicia Andersson, Mattias (Visitor)
 SWIZERLAND	Byland, Samuel Keller, Daniel	Ahmadi, Hares Muntwiler, Simon (Captain) Nägeli, Jonas Radonic, Stephan Seitz, Michael
 THAILAND		Aiyarak, Pattara (Visitor) Koeiniyom, Kongnita (Visitor) Manyum, Prapun (Visitor) Wattanakasiwich, Pornrat (Visitor)
 UNITED KINGDOM	King, Noelle Frances Audrey Peters-Flynn, Sion	Bootland, Carl David (Captain) Bootland, Niall James Guo, Rui Jeffery, Niall Oxley, John Robert

VISITING TEACHERS & VOLUNTEERS		
VISITING TEACHERS	Alimohammodi, Hassan Ayvaz, Huseyin Hariri, Abolfazl	Manavitehrani, Elham Mehri, Banafsheh YE, Yuan
VOLUNTEERS	Albert, Katharina Awad, Sarah Behit, Giuliana Cortolezis, Alexander Ding, Xiaoyue Ermert, Matthias Fallmann, Sarah Festl, Andreas Gerl, Gisela Graf, Melanie Horak, Johannes Huang, Jinglin Huber, Elias Huber, Saskia Jin, Qing Langsam, Franz Lee, Jiyeon Legenstein, Michael Legner, Philipp Li, Shunan Liu, Jiani	Liu, Mingjie Man, Yuan Melichar, Sophie Anna Mikulik, Florian Neikes, Désirée Pirker, Marisa Schneeweis, Pia Sinz, Sophie Siquans, Karoline Slonska, Karolina Su, Shanshan Tonauer, Christina Usunova, Stephanie Wang, Jingyi Wang, Xinyan Wimmer, Viktoria Winkler, Pamina Xu, Leping Zhang, Hanquan Zhou, Hao

IYPT 2010
Schedule

Friday,
July 09th 2010

09:30 - Press Conference at the ÖAW
10:00 - Guides Briefing
17:00 - Juror-Workshop
21:00 - EC-Meeting

Saturday,
July 10th 2010

09:00 - Opening Ceremony with a Speech by
Rudolf Grimm, Austrian Scientist of the Year 2010
14:30 - PF1

Sunday,
July 11th 2010

08:30 - PF2
14:30 - PF3

Monday,
July 12th 2010

08:30 - PF4
12:00 - 13:00 - IYPT Meets Children's University
14:30 - Vienna Round Trip and Schönbrunn
City Walk

Tuesday,
July 13th 2010

08:30 - PF5
13:00 - Team Photographs
14:30 - Afternoon in Science
18:00 - Talk by Prof. Christian Fabjan:
„The Next 10 Years in Particle Physics"

Wednesday,
July 14th 2010

08:00 - Visit to Stift Melk & Schallaburg
Prater Fun Fair

Thursday,
July 15th 2010

09:00 - Finals
15:00 - Award Ceremony
18:00 - Farewell Party

Friday,
July 16th 2010

IOC Meeting (Friday 16th until Sunday 18th)
Departure 9.00 a.m., Hotel Academia

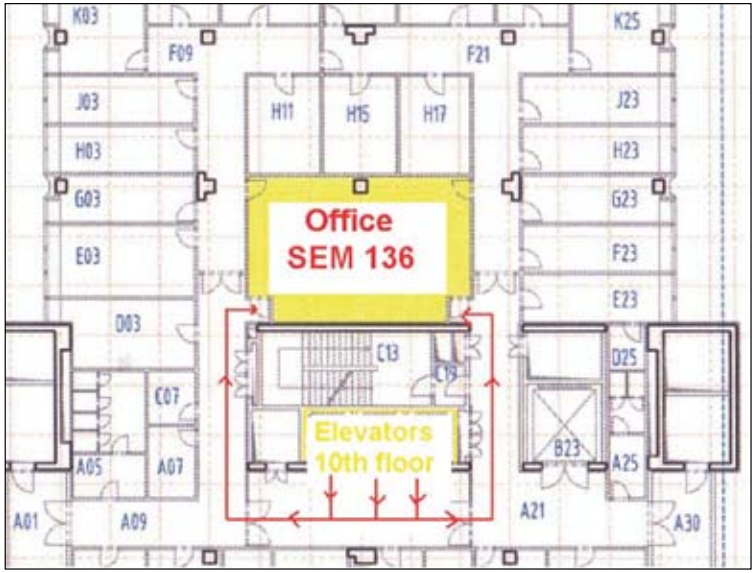
The IOC members will be transferred back via bus to the train station / airport after the meeting. Estimated arrival time is 12:30.

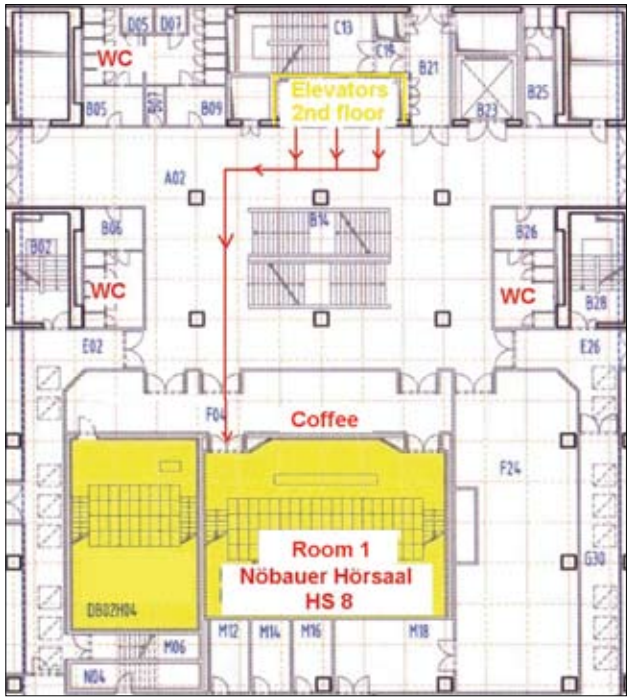
Maps of the Fight Rooms

VIENNA UNIVERSITY OF TECHNOLOGY
1040 Wien, Wiedner Hauptstraße 8-10 „Im Freihaus“

Ground floor

10th floor: office





2nd floor: room 1

3rd floor: room 2 & 3

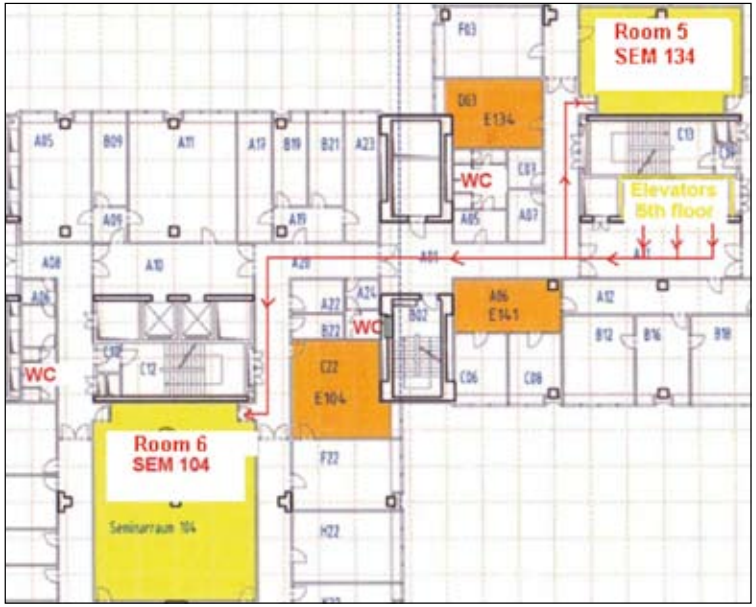
The Vienna University of Technology is a non smoking area!
Coffee, tea and water on the 2nd floor!

Maps of the Fight Rooms

VIENNA UNIVERSITY OF TECHNOLOGY
1040 Wien, Wiedner Hauptstraße 8-10 „Im Freihaus“

4th floor: room 4

5th floor: room 5 & 6



7th floor: room 7 & 8

8th floor: room 9

The Vienna University of Technology is a non smoking area!

Coffee, tea and water on the 2nd floor!

Problems for the 23rd IYPT 2010

1. Electromagnetic cannon A solenoid can be used to fire a small ball. A capacitor is used to energize the solenoid coil. Build a device with a capacitor charged to a maximum 50V. Investigate the relevant parameters and maximize the speed of the ball.

2. Brilliant pattern Suspend a water drop at the lower end of a vertical pipe. Illuminate the drop using a laser pointer and observe the pattern created on a screen. Study and explain the structure of the pattern.

3. Steel balls Colliding two large steel balls with a thin sheet of material (e.g. paper) in between may „burn" a hole in the sheet. Investigate this effect for various materials.

4. Soap film Create a soap film in a circular wire loop. The soap film deforms when a charged body is placed next to it. Investigate how the shape of the soap film depends on the position and nature of the charge.

5. Grid A plastic grid covers the open end of a cylindrical vessel containing water. The grid is covered and the vessel is turned upside down. What is the maximal size of holes in the grid so that water does not flow out when the cover is removed?

6. Ice A wire with weights attached to each end is placed across a block of ice. The wire may pass through the ice without cutting it. Investigate the phenomenon.

7. Two flasks Two similar flasks (one is empty, one contains water) are each connected by flexible pipes to a lower water reservoir. The flasks are heated to 100C and this temperature is held for some time. Heating is stopped and as the flasks cool down, water is drawn up the tubes. Investigate and describe in which tube the water goes up faster and in which the final height is greater. How does this effect depend on the time of heating?

8. Liquid light guide A transparent vessel is filled with a liquid (e.g. water). A jet flows out of the vessel. A light source is placed so that a horizontal beam enters the liquid jet (see picture). Under what conditions does the jet operate like a light guide?

9. Sticky water When a horizontal cylinder is placed in a vertical stream of water, the stream can follow the cylinders circumference along the bottom and continue up the other side before it detaches. Explain this phenomenon and investigate the relevant parameters.

10. Calm surface When wind blows across a water surface, waves can be observed. If the water is covered by an oil layer, the waves on the water surface will diminish. Investigate the phenomenon.

11. Sand Dry sand is rather ‚soft' to walk on when compared to damp sand. However sand containing a significant amount of water becomes soft again. Investigate the parameters that affect the softness of sand.

12. Wet towels When a wet towel is flicked, it may create a cracking sound like a whip. Investigate the effect. Why does a wet towel crack louder than a dry one?

Problems for the 23rd IYPT 2010

13. Shrieking rod A metal rod is held between two fingers and hit. Investigate how the sound produced depends on the position of holding and hitting the rod?

14. Magnetic spring Two magnets are arranged on top of each other such that one of them is fixed and the other one can move vertically. Investigate oscillations of the magnet.

15. Paper anemometer When thin strips of paper are placed in an air flow, a noise may be heard. Investigate how the velocity of the air flow can be deduced from this noise?

16. Rotating spring A helical spring is rotated about one of its ends around a vertical axis. Investigate the expansion of the spring with and without an additional mass attached to its free end.

17. Kelvins dropper Construct Kelvin's dropper. Measure the highest voltage it can produce. Investigate its dependence on relevant parameters.

The Regulations of the IYPT

➤ I. International Young Physicists' Tournament

The International Young Physicists' Tournament (IYPT) is a competition among teams of secondary school students in their ability to solve complicated scientific problems, to present solutions to these problems in a convincing form and to defend them in scientific discussions, called Physics Fights (PF).

➤ II. The problems of the IYPT

The 17 problems are formulated by the International Organizing Committee (IOC) and sent to the participating countries not later than in October. These problems may be used in any competition that could lead to selection of a national team. They may be used in International tournaments that involve foreign teams not taking part in IYPT.

➤ III. The participants of the IYPT

1. The national teams

Any invited country, as well as the host country, is represented by one team. A country can only take part in the IYPT that has already taken part in the past or sent an observer in one of the last three years.

2. The membership of the teams

The IYPT team is composed of five secondary school students. The secondary school graduates could participate in the IYPT in the year of their graduation. The participation of university students is not allowed. The LOC may allow participation of teams

of four or three students. The composition of the team cannot be changed during the Tournament. The team is headed by a captain who is the official representative of the team during the PF.

3. The team is accompanied by two team leaders.

➤ IV. The Jury

The Jury is nominated and organized by the LOC in cooperation with EC. The Jury consists of at least five members, if possible from different countries. Team leaders, at least one from each team, are included in the Jury. The team leaders cannot be members of the Jury in the PF where their teams participate and should not, if possible, grade the same team more than twice.

➤ V. The agenda of the IYPT

The IYPT is carried out in a period determined by the LOC (from May to July).
All teams participate in five Selective PFs. Selective PFs are carried out according to a fixed schedule as detailed in the attachment to these Regulations. Numbers are ascribed to teams by lot. The best teams participate in the Final PF.
The host country provides a cultural program for the participants.

➤ VI. The Physics Fight regulations

Three or four teams participate in a PF, depending on the total number of teams. In the course of a PF the members of a team communicate only with each other.
Before the beginning of a PF, the Jury and the teams are introduced.
The PF is carried out in three (or four) Stages. In each Stage, a team plays one of the three (four) roles: Reporter, Opponent, Reviewer (Observer). In the subsequent Stages of the PF, the teams change their roles according to the schemes:

Three teams PF

Stage	1	2	3
Team			
1	Rep	Rev	Opp
2	Opp	Rep	Rev
3	Rev	Opp	Rep

Four teams PF

Stage	1	2	3	4
Team				
1	Rep	Obs	Rev	Opp
2	Opp	Rep	Obs	Rev
3	Rev	Opp	Rep	Obs
4	Obs	Rev	Opp	Rep

➤ VII. The Stage regulations

The performance order in the Stage of a PF:	Reserved time in minutes
The Opponent challenges the Reporter for the problem	1
The Reporter accepts or rejects the challenge	1
Preparation of the Reporter	5
Presentation of the report	12
Questions of the Opponent to the Reporter and answers of the Reporter	2
Preparation of the Opponent	3
The Opponent takes the floor, maximum 5 min. and discussion between the Reporter and the Opponent	15
Questions of the Reviewer to the Reporter and the Opponent and answers to the questions	3
Preparation of the Reviewer	2
The Reviewer takes the floor	4
Concluding remarks of the Reporter	2
Questions of the Jury	5

In the Final PF the procedure of challenge is omitted.
The official language of the IYPT is English.

➤ VIII. The team performance in the Stages

The Reporter presents the essence of the solution to the problem, attracting the attention of the audience to the main physical ideas and conclusions.
The Opponent puts questions to the Reporter and criticizes the report, pointing to possible inaccuracy and errors in the understanding of the problem and in the solution. The Opponent analyses the advantages and drawbacks of both the solution and the presentation of the Reporter. The discussion of the Opponent should not become a presentation of his/her own solution. In the discussion, the solution presented by the Reporter is discussed.
The Reviewer presents a short estimation of the presentations of Reporter and Opponent.
The Observer does not participate actively in the PF.
During one PF only one member of a team takes the floor as Reporter, Opponent or Reviewer; other members of the team are allowed to make brief remarks or to help with the presentation technically. No member of a team may take the floor more than twice during one Selective PF or, as Reporter, more than three times in total during all Selective PFs. During the Final PF any team member can take the floor only once.

The LOC must inform about the devices available for presentations not later than two months before the IYPT.

➤ IX. The rules of problem-challenge and rejection

1. All problems presented in the same PF must be different.

2. Selective PF

The Opponent may challenge the Reporter on any problem with the exception for a problem that: a) was rejected by the Reporter earlier;
b) was presented by the Reporter earlier;
c) was opposed by the Opponent earlier;
d) was presented by the Opponent earlier.

If there are less than five problems left to challenge, the bans d), c), b), a) are successively removed, in that order.
During the Selective PFs the Reporter may reject the challenge of three different problems in total without penalty. For every subsequent rejection the coefficient of the Reporter (see section X) is decreased by 0.2. This reduction continues to apply during the following selective PFs.

3. Final PF

Within four hours after the announcement of the results of the Selective PFs the teams participating in the Final choose their problems. In case teams choose the same problem, priority is given according to the order of presentation in the Final (see section XII). The choice should be made public immediately.

➤ X. The grading

After each stage the Jury grades the teams, taking into account all presentations of the members of the team, questions and answers to the questions, and participation in the discussion. Each Jury member shows integer marks from 1 to 10. The mean of the highest and the lowest marks is counted as one mark which is then added to the remaining marks. This sum is used to calculate the mean mark for the team. The mean marks are multiplied by various coefficients: 3.0 or less (see section IX) for the Reporter, 2.0 for the Opponent, 1.0 for the Reviewer and then transformed into points.

➤ XI. The resulting parameters

1. For a team in the PF

The sum of points (SP) is the sum of mean marks, multiplied by the corresponding coefficients and rounded to one decimal.

. For a team in the Tournament

The total sum of points (TSP) equals the sum of SP of the team in all Selective PFs.
The number of fights won (FW) is the number of Selective PFs, in which a team received the highest SP from all three or four teams participating in the same PFs.

➤ XII. The Final

The three teams having the highest TSP in the Selective PFs participate in the Final. In case teams have equal TSP, their participation in the Final is decided by FW. If team(s) winning all their Selective PFs (FW=5) did not reach the Final by TSP, the best of them (determined by TSP) takes part in the final as fourth team.
The order of presentation in the Final is determined by position by entering the final: the higher the position, the lower the number in the scheme of section VI.

➤ XIII. The final team ranking of the IYPT

Students in the top half (rounded up) of participating teams receive medals. The students of the team winning the Final are awarded the winners' cup. If two or three teams have the same SP result in the Final, the winner is nominated according to the highest TSP, in case of equality by FW. All teams participating in the final are awarded 1st place certificates and gold medals. The five best teams not participating in the final are awarded 2nd place certificates and silver medals. 3rd place certificates and bronze medals are awarded to students in all other teams finishing in the top half. All other students receive certificates of participation. Team leaders obtain certificates indicating the ranking of their team.

➤ XIV. The status of the regulations of the IYPT

The regulations are established by the IOC and may be changed only by the IOC.
Accepted in Tianjin on 29th July 2009

General Information for your stay in Austria

Climate: During the day typical temperatures in July are around 25 degrees Celsius and sometimes go up above 30° C. In the Vienna region around 80mm of precipitation is typical for the whole of July.

Money: The official currency in Austria is the Euro (1 Euro is 100 Cents). At the time of writing 1 Euro equals 1.35 US Dollars. There are 8 coins (Đ2, Đ1, 50ct, 20ct, 10ct, 5ct, 2ct and 1ct) and 7 bank notes (Đ5, Đ10, Đ20, Đ50, Đ100, Đ200, Đ500). Credit cards and bank cards are widely accepted for payment throughout Austria, especially in Vienna.

Legal Information: In Austria people under 16 are not allowed to buy and/or consume alcoholic beverages and/or tobacco. People between 14 and 16 are not allowed to be out in the streets between 1 am and 5 am without supervision of an adult.

Opening Hours: Austria has a relatively restrictive law concerning opening hours. Supermarkets are usually opened from 7 a.m. to 7 p.m. during the week and from 8 a.m. to 5 p.m. on Saturdays and closed on Sundays. However there are some that are opened. Post offices and banks are usually closed on weekends and around midday.

Water, Health and Insurance: The tap water is of highest quality in Austria. There are no special immunizations required for a journey to Austria. Health insurance for EU citizens is covered through the "ECard" (European Health Insurance Card – EHIC).

Not Getting into Trouble: Vienna is the safest city in the world according to recent studies. However, this does not mean that you should make yourself an easy target for pickpockets. If you are victim to any theft or similar crime please contact the LOC immediately.

For Your Safety

The badges

The badges show all the necessary information you may need in case of troubles. They show all the data you may need and/or could be asked by security officials and by helpers.

Please, wear them during the whole period of your sojourn in Vienna.

In case of troubles, please immediately contact one of the following persons in the given order:

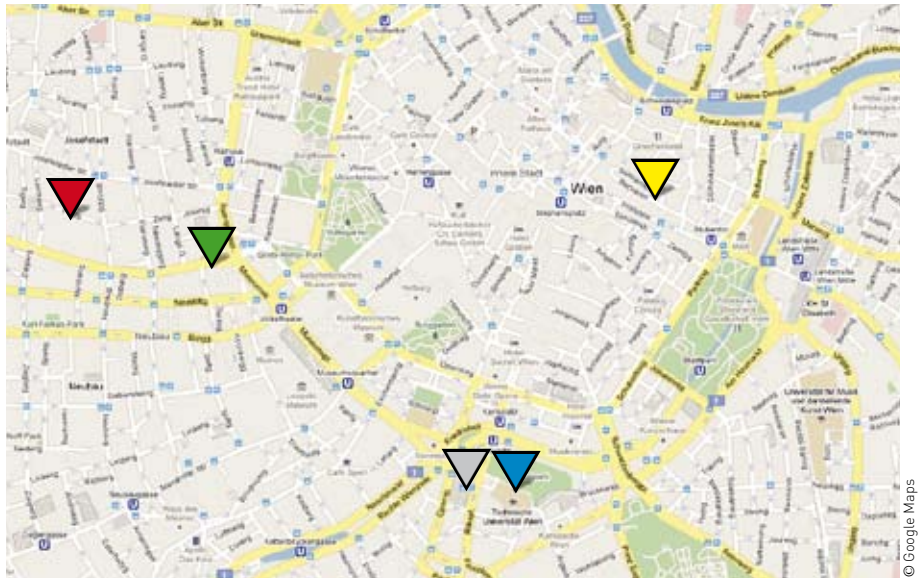
Brigitte Pagana-Hammer:	**0043 (0)664 542 20 38**
Romano Rupp:	**0043 (0) 664 60277 51105**
Thomas Lindner:	**0043 (0) 664 527 17 19**

Vienna is a rather safe city, nevertheless: Take care of your belongings! Keep objects of value in your bag or, if possible, in your pocket. Keep clear from persons you do not consider trustworthy. Follow the advices of the police!

Some useful phone-numbers:

General emergency call:	112
Police:	133
Ambulance:	144
On-duty medical unit:	141
Fire department:	122

Have a pleasant stay and keep safe!



Vienna University of Technology (TU Wien) Wiedner Hauptstraße 8-10, 1040 Wien	**Location for: Fightrooms, Afternoon in Science, team photo**
Hotel Academia Pfeilgasse 3a, 1080 Wien	**Location for: Hotel, Lunch, Dinner**
Hotel Atlas Lerchenfelderstraße 1-3, 1070 Wien	**Location for: Hotel**
Austria Academy of Sciences Dr. Ignaz Seipel-Platz 2, 1010 Wien	**Location for: Opening Ceremony**
Vienna University of Technology (TU Wien) main building – „Kuppelsaal“, Karlsplatz 13, 1040 Wien	**Location for: Final, Award Ceremony & Farewell Party**

Impressum: Local Organizing Committee of the 23rd IYPT 2010, p.A. AYPT Forschungsforum junger Physiker, Fakultät für Physik der Universität Wien, Strudlhofgasse 4, 1090 Wien.

www.iypt.at

fotos: istockphoto