



26th

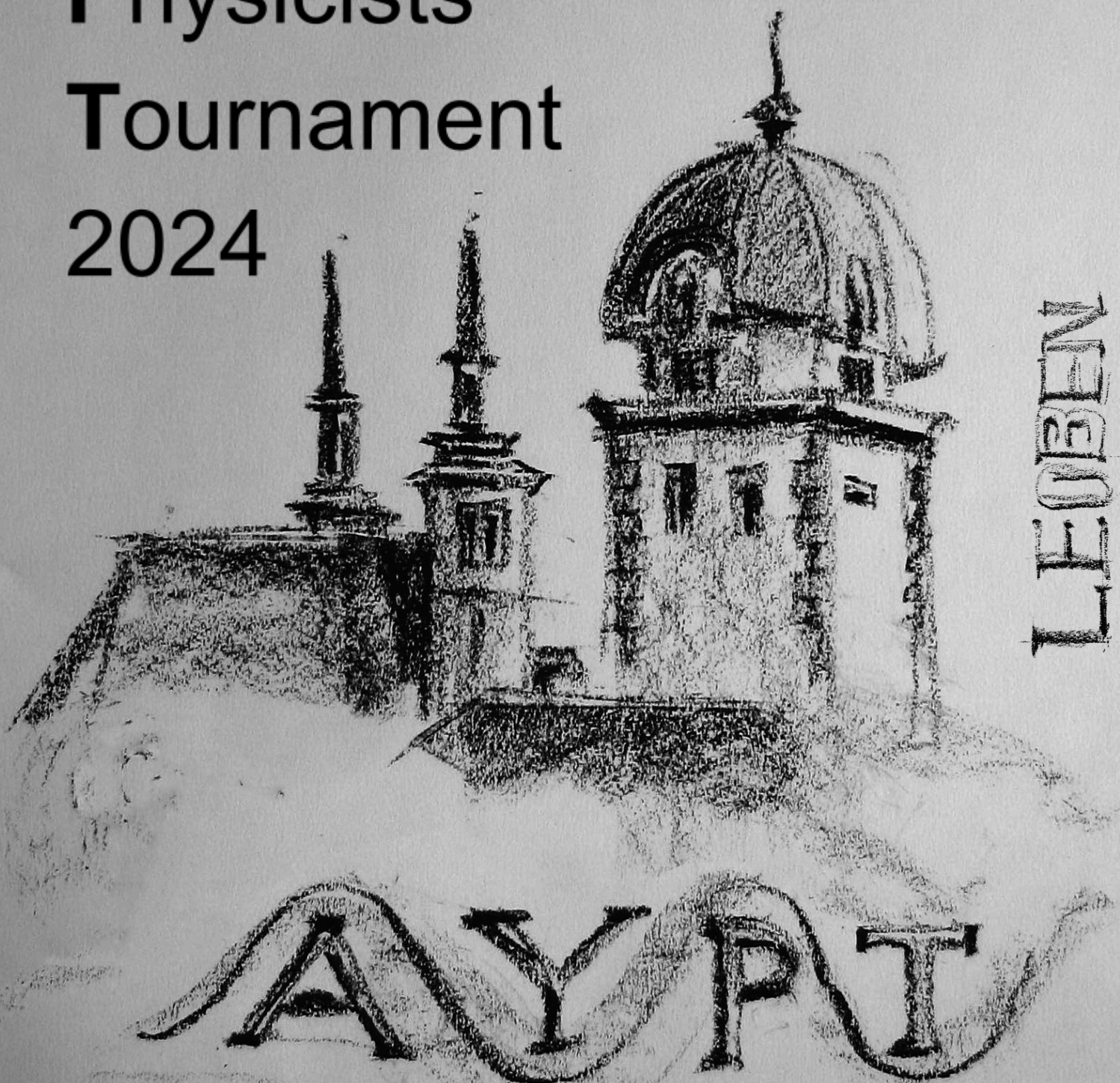
Austrian

Young

Physicists'

Tournament

2024



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Dear participants of the 26th AYPT

It is a pleasure for me to once again be part in the organization of the 26th anniversary of the AYPT and I want to welcome all of you who made it here this year. Every year many teams from Austria and from abroad gather in Leoben to compete. However, preparation has already started several months ago, and I am sure it was a long road for every one of you to come here. But now the time has come to show your work and we are all excited to see you present your ideas. So, go ahead, enjoy the competition and never stop working on your dreams!



Dr. Gerhard Haas

Head of the Local Organizing Committee

As a company in the technology and industrial sector, we urgently need well-trained employees in the fields of mathematics, IT, natural sciences and technology.

We have to start getting our youngsters interested in such subjects early on, introducing them and, ideally, inspiring them.

The AYPT is a good opportunity to bring the fascination of natural sciences closer to young people.



Dr. Friedrich Santner

CEO Anton Paar GmbH

Recognising and promoting talent at an early stage is an important task in our society. As a high-tech company, we engage in a wide range of commitments in the fields of mathematics, IT, natural sciences and technology because the talented young people of today are our potential for the future. The International Young Physicists' Tournament offers a suitable framework for young people and is a good example of this. This investment in young people benefits us as well as Austria as a technology and research location.



Dr. Sabine Herlitschka

Chairman of the Board at Infineon Technologies Austria AG

Teams participating in the 26th AYPT 2024

Austrian Teams

- Innsbruck
- Donaustadt
- Vienna

Foreign Teams

- Sweden
- Switzerland
- Greece
- Georgia
- Hungary
- Slovenia
- GYPT
- Slovakia East
- Slovakia West
- Poland

Official Schedule for the AYPT 2024

Note: This schedule may be subject to change. A representative from each team should check for the latest information each morning at the information desk.

Thursday, April 4th 2024

Arrival:

Participants are accommodated at Hotel¹

05.30 pm:

Meeting at the reception desk

06.00 pm:

Opening ceremony:

- Drawing of lots at Montanuniversität

¹ Hotel Kongress Leoben, Hauptplatz 1, 8700 Leoben; Phone: +43 3842 468 00

afterwards:

Dinner at Hotel

After Dinner (08.00 pm approx.):

Meeting of Teamleaders with Organizing Committee, at Hotel

Friday, April 5th 2024

08.30 am:

Jury Briefing

09.00 am:

Selective Round 1

01.00 pm:

Lunch at Hotel Kongress

02.30 pm:

Selective Round 2

06.30 pm:

meet at the reception to walk to the BG/BRG Neu (in case you don't know the way)

07.00 pm (approx.):

Barbecue party in the court of BG/BRG Neu

Saturday, April 6th 2024

09.00 am:

Selective Round 3

01.00 pm (approx.):

Lunch at Hotel

02.00 pm:

Finals

afterwards:

Winner's ceremony, closing ceremony

afterwards:

Departure

If not stated otherwise, all activities take place at the Montanuniversität Leoben.

Photo & Video Policy throughout the AYPT

This policy should clarify under which circumstances photography and video recordings are authorized during the course of the Austrian Young Physicists tournament (short AYPT). This policy is also to be followed by jurors and chairs as well as team leaders.

The general public (including participants, visitors, supervisors and members of the jury, etc.) is not permitted to take photos and videos during the stages of the tournament. Only officials and members of the organization committee have the permission for filming and photography during a stage.

Personal photos and videos may be taken at the tournament (excluding the stages) as long as (i) they are only used for personal non-commercial purpose; (ii) they are not in conflict with European and Austrian law (see §78 Urheberrechtsgesetz/Austrian copyright law).

Notwithstanding the foregoing, the AYPT organization committee reserves the right to prohibit any filming or photography during the tournament for any reason.

The Regulations of the Austrian Young Physicists' Tournament

I. Austrian Young Physicists' Tournament

The Austrian Young Physicists' Tournament (AYPT) 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 Rounds. It is carried out by the association "AYPT – Forschungsforum junger Physiker" according to the articles of association, appendix A. The Organizing Committee for the AYPT is selected by the Executive Committee of the association.

II. The problems of the AYPT

The problems of the AYPT will be the same as for the IYPT (International Young Physicists' Tournament), in accordance with Article II of the Regulations of the International Young Physicists' Tournament

III. The participants of the AYPT

1. *The Austrian teams*

Any team composed of students enrolled in Austrian secondary schools is eligible for participation.

2. *Foreign teams*

The Organizing Committee may invite any number of foreign teams. Those teams compete in the same way as the others but they are not taken into account when compiling the Austrian National Team (see Section XIV).

3. *The membership of the teams*

The AYPT team is composed of three secondary school students. The secondary school graduates could participate in the AYPT in the year of their graduation. The participation of university students is not allowed. 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 round.

4. *Team Leader*

The team is accompanied by a team leader.

IV. The Jury

The Jury is nominated and organized by the Organizing Committee. The Jury consists of at least five members. Team leaders may be included in the Jury. The team leaders cannot be members of the Jury in the Round where their teams participate and should not, if possible, grade the same team more than twice.

V. The agenda of the AYPT

The AYPT is carried out in a period determined by the Organizing Committee. All teams participate in the Selective Rounds. Selective Rounds are carried out according to a special schedule determined by the Organizing Committee according to the number of participating teams, following the rule that, if possible, no team meets another team more than twice. This schedule should be known before numbers are ascribed to the teams by lot. The best teams participate in the Final Round.

VI. The Round regulations

Three or four teams participate in a Round, depending on the total number of teams. In the course of a Round the members of a team communicate only with each other.

Before the beginning of a Round, the Jury and the teams are introduced.

The Round 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 Round, the teams change their roles according to the schemes:

<i>Three teams round</i>				<i>Four teams round</i>					
Stage	1	2	3	Stage	1	2	3	4	
Team				Team					
Stage				Stage					
1	Rep	Rev	Opp	1	Rep	Obs	Rev	Opp	
2	Opp	Rep	Rev	2	Opp	Rep	Obs	Rev	
3	Rev	Opp	Rep	3	Rev	Opp	Rep	Obs	
				4	Obs	Rev	Opp	Rep	

1.

VII. The Stage regulations

The performance order in the Stage of a Round: Reserved time in minutes

The Opponent challenges the Reporter for the problem	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 4 min. and discussion between the Reporter and the Opponent	14
The Opponent summarizes the discussion	1
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 Round the procedure of challenge is omitted.

The official language of the AYPT is English.

VIII. The teams 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 Round.

During one Round 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. During the Final Round any team member can take the floor only once.

IX. The rules of problem-challenge and rejection

2. Preparation

Prior to the Tournament, each single participant prepares a report on one of the problems and publicly announces their choice during the opening ceremony. Thereby, the problem is assigned to the individual participant for the course of the Tournament. In the following, the chosen problem will be referred to as the participant's assigned problem. Within a team, no two team members may have the same assigned problem.

3. Selective Round

The Opponent may challenge the Reporter on any of the problems assigned to a member of the Reporter team that the Reporter team has not presented before. The team member whose assigned problem is challenged has to accept the challenge and act as Reporter in this stage.

If possible, the Opponent must challenge a problem which has not already been presented in the same Round.

4. Final Round

In the Final Round, teams choose which of their three assigned problems they wish to present again. All problems presented in the Final Round have to be different. In case teams choose the same problem, priority of selecting problems for the Final is determined by the TSP (see section XI), in case of equality by lot.

All teams hand in a prioritization of their assigned problems before they leave the room at the end of the last Selective Round. After the results of the Selective Rounds are known, the choice of the teams participating in the Final is published 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 for the Reporter, 2.0 for the Opponent, 1.0 for the Reviewer and then transformed into points.

In the Final, grading is done in secret. Jurors write down their grades on the grading sheets, sign them, and give them to the Final's Tournament Assistants. The Chair asks the jurors of the highest and lowest grades to justify and explain their grades. This is done without mentioning the actual grade. The results are kept secret until they are officially announced during the award ceremony. After the announcement, all grading sheets and the detailed results are published online so that anyone can check the result.

XI. The resulting parameters

1. For a team in the Round

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

2. For a team in the Tournament

The total sum of points (TSP) equals the sum of SP of the team in all Selective Rounds.

XII. The Final

The three teams having the highest TSP in the Selective Rounds participate in the Final. In case teams have equal TSP, their participation in the Final is decided by which team won more Selective Rounds, in case of equality by lot.

The order of presentation in the Final is determined by position by entering the final: the higher the *position*, the higher the number in the scheme of section VI.

XIII. The final team ranking of the AYPT

The winner of the Final obtains the 1st place. If two or three teams have the same SP result in the final, the winner is nominated according to the highest TSP. The other two teams participating in the Final share the 2nd place. For teams not participating in the Final, the Organizing Committee decides, according to the TSP obtained, which teams will share the 3rd place.

XIV. Compiling the Austrian National Team

After the end of the AYPT the decision about the composition of the Austrian national team is made according to the procedure outlined in appendix A of the articles of association.

XV. The status of the regulations of the AYPT

The regulations are established by the Executive Committee of the association and may be changed only by the Executive Committee.

Accepted by email, 2016-08-24

REPORTER

Start from 1 and add/subtract

1 + + - =

REPORT	phenomenon explanation	theory/model	relevant experiments	comparison between theory and experiment	own contribution	task fulfilment	science communication	DISCUSSION WITH OPPONENT	ANSWERS TO JURY, OPPONENT, and REVIEWER'S QUESTIONS
0	almost no	almost no	almost no	almost no	almost no	misunderstood	unclear, chaotic	reporter's conduct in the discussion	concise and correct or no questions asked
1	some	some	some	some	review of sources, cited	partly	partly clear	relevant arguments/responses	questions asked
2	fair	fair	fair	qualitative agreement	some own input	average	average	too few	some incorrect, inconclusive or too long
3	good	good	good	quantitative agreement	+ some interesting results	above average	some aspects well done	some	deeply incorrect or shows deep misconceptions
4	detailed demonstrative	quite detailed, correct	multitude of parameters examined	+ limits discussed	considerable experimental	interesting solution	overall clear, demonstrative	many	
5			OR		considerable theoretical			+ data/theory supported	
6	deep and comprehensible, shows physical insight	detailed, complex, completely testable	errors analysis	well fitting, deviations analysed, conclusive		greater extent than expected	+ complex concepts well communicated	proved deep understanding	
7			and					overall efficient	

NOTES:

OPPONENT

Start from 1 and add/subtract

1 + + - =

QUESTIONS ASKED	understanding of presentation	topics raised and their prioritisation	own opinions presented	time management	DISCUSSION WITH REPORTER	own opinions presented	opponent's conduct in the discussion	ANSWERS TO JURY and REVIEWER'S QUESTIONS
0	too few, mostly irrelevant	almost nothing	too few	poor	almost none	too few	poor/aggressive	concise and correct or no questions asked
1	relevant, aimed at resolving unclear points in the report	some main points	some	reasonable	too few/many	some	some aspects fine	questions asked
2	+ short, apt and clear, well prioritised, all time used	main points	some correct	fair	partially relevant	some correct	good	some incorrect, inconclusive or too long
		all relevant points	many correct	efficient	mostly relevant	many correct	some aspects efficient	deeply incorrect or shows deep misconceptions
		practically all points	+ improvement suggestions	+ all time used	+ well prioritised	+ improvement suggestions	overall efficient	

NOTES:

REVIEWER

Start from 1 and add/subtract

1 + + + - =

QUESTIONS ASKED	evaluation & understanding	pros & cons prioritisation	REVIEW OF REPORT	speech evaluation	pros & cons prioritisation	DISCUSSION ANALYSIS	MISSED POINTS POINTED OUT	ANSWERS TO JURY QUESTIONS
0	too few, mostly irrelevant	irrelevant	poor/wrong	poor/wrong	irrelevant	poor	-1 irrelevant	concise and correct or no questions asked
1	relevant, meant to clarify unclear points	partially relevant/correct	superficial	superficial	partially relevant/correct	superficial	0 none	some incorrect, inconclusive or too long
2	+ suitably allotted to Rep & Opp, most time used	mostly correct/prioritised	good	good	mostly correct/prioritised	relevant parts accurate, convincing	1 relevant, constructive	deeply incorrect or shows deep misconceptions
3	+ short, apt and clear, well prioritised, time managed efficiently	fully adequate, well prioritised	apt, accurate	apt & accurate	fully adequate, well prioritised			

NOTES:

Problems for the AYPT 2024

Note: According to the regulations of the AYPT the problems for the AYPT are the same as for the IYPT. These problems, which have been formulated by the IOC, are used in the AYPT in accordance with article 2 of the IYPT regulations.

1. Invent Yourself

Take a box (e.g. a matchbox), filled with identical objects (e.g. matches, balls, ...). Find a method to determine the number of objects in the box solely by the sound produced while shaking the box. How does the accuracy depend on the properties of the objects, the box, and the packing density?

2. Droplet Microscope

By looking through a single water droplet placed on a glass surface, one can observe that the droplet acts as an imaging system. Investigate the magnification and resolution of such a lens.

3. Rigid Ramp Walker

Construct a rigid ramp walker with four legs (e.g. in the form of a ladder). The construction may begin to 'walk' down a rough ramp. Investigate how the geometry of the walker and relevant parameters affect its terminal velocity of walking.

4. Shooting Rubber Band

A rubber band may fly a longer distance if it is non-uniformly stretched when shot, giving it spin. Optimise the distance that a rubber band with spin can reach.

5. Ping Pong Rocket

A ping pong ball is placed in a container of water. When the container is dropped, the ping pong ball will get launched to a great height. What maximum height can you reach with up to 2 liters of water?

6. Non-contact Resistance

The responses of a LRC circuit driven by an AC source can be changed by inserting either a non-magnetic metal rod or a ferromagnetic rod into the inductor coil. How can we obtain the magnetic and electric properties of the inserted rod from the circuit's responses?

7. Giant Sounding Plate

When a large, thin and flexible plate (e.g. plastic, metal or plexiglass) is bent, it may produce a loud and unusual howling sound. Explain and investigate this phenomenon.

8. Another Magnetic Levitation

Place a large disk-shaped magnet on a non-magnetic conductive plate. When a smaller magnet is moved under the plate, the magnet on top may levitate under certain conditions. Investigate the levitation and the possible motion of the magnet on top.

9. Juicy Solar Cell

A functional solar cell can be created using conducting glass slides, iodine, juice (eg. blackberry) and titanium dioxide. This type of cell is called a Grätzel cell. Make such a cell and investigate the necessary parameters to obtain maximum efficiency.

10. Magnetic Gear

Take several identical fidget spinners and attach neodymium magnets to their ends. If you place them side by side on a plane and rotate one of them, the remaining ones start to rotate only due to the magnetic field. Investigate and explain the phenomenon.

11. Pumping Straw

A simple water pump can be made using a straw shaped into a triangle and cut open at the vertices. When such a triangle is partially immersed in water with one of its vertices and rotated around its vertical axis, water may flow up through the straw. Investigate how the geometry and other relevant parameters affect the pumping speed.

12. The Soap Spiral

Lower a compressed slinky into a soap solution, pull it out and straighten it. A soap film is formed between the turns of the slinky. If you break the integrity of the film, the front of the film will begin to move. Explain this phenomenon and investigate the movement of the front of the soap film.

13. Charge Meter

A lightweight ball is suspended from a thread in the area between two charged plates. If the ball is also charged it will be deflected to one side at a certain angle. What is the accuracy of such a device for measuring the amount of charge on the ball? Optimise your device to measure the smallest possible charge on the ball.

14. Ruler Trick

Place a ruler on the edge of a table, and throw a ball at its free end. The ruler will fall. However, if you cover a part of the ruler with a piece of paper and repeat the throw, then the ruler will remain on the table while the ball will bounce off it. Explain this phenomenon, and investigate the relevant parameters.

15. Wet Scroll

Gently place a piece of tracing paper on the surface of water. It rapidly curls into a scroll and then slowly uncurls. Explain and investigate this phenomenon.

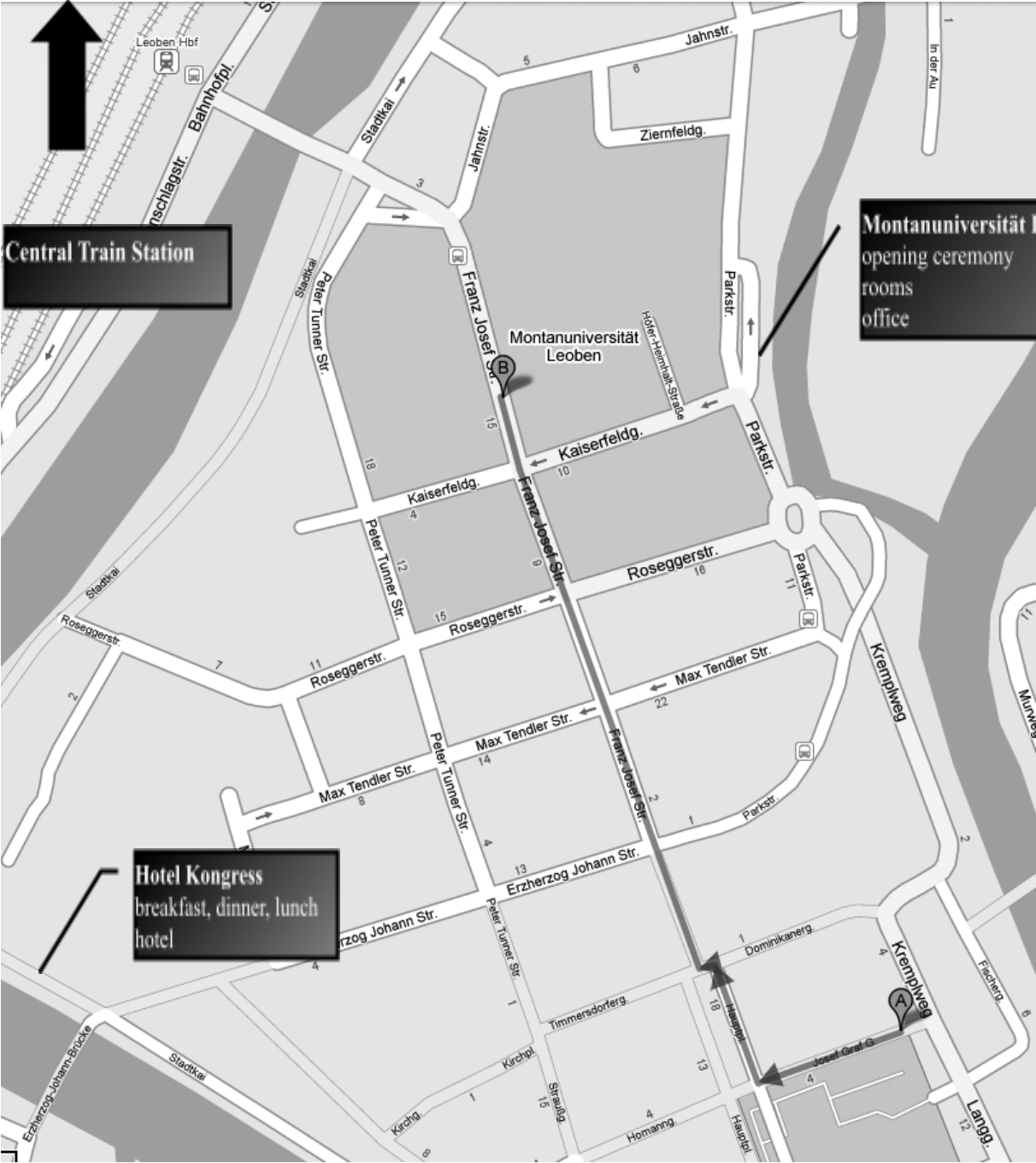
16. Cushion Catapult

Place an object on a large air cushion and drop several other objects in such a way that the first object is catapulted away. Investigate how the exit velocity depends on relevant parameters.

17. Quantum Light Dimmer

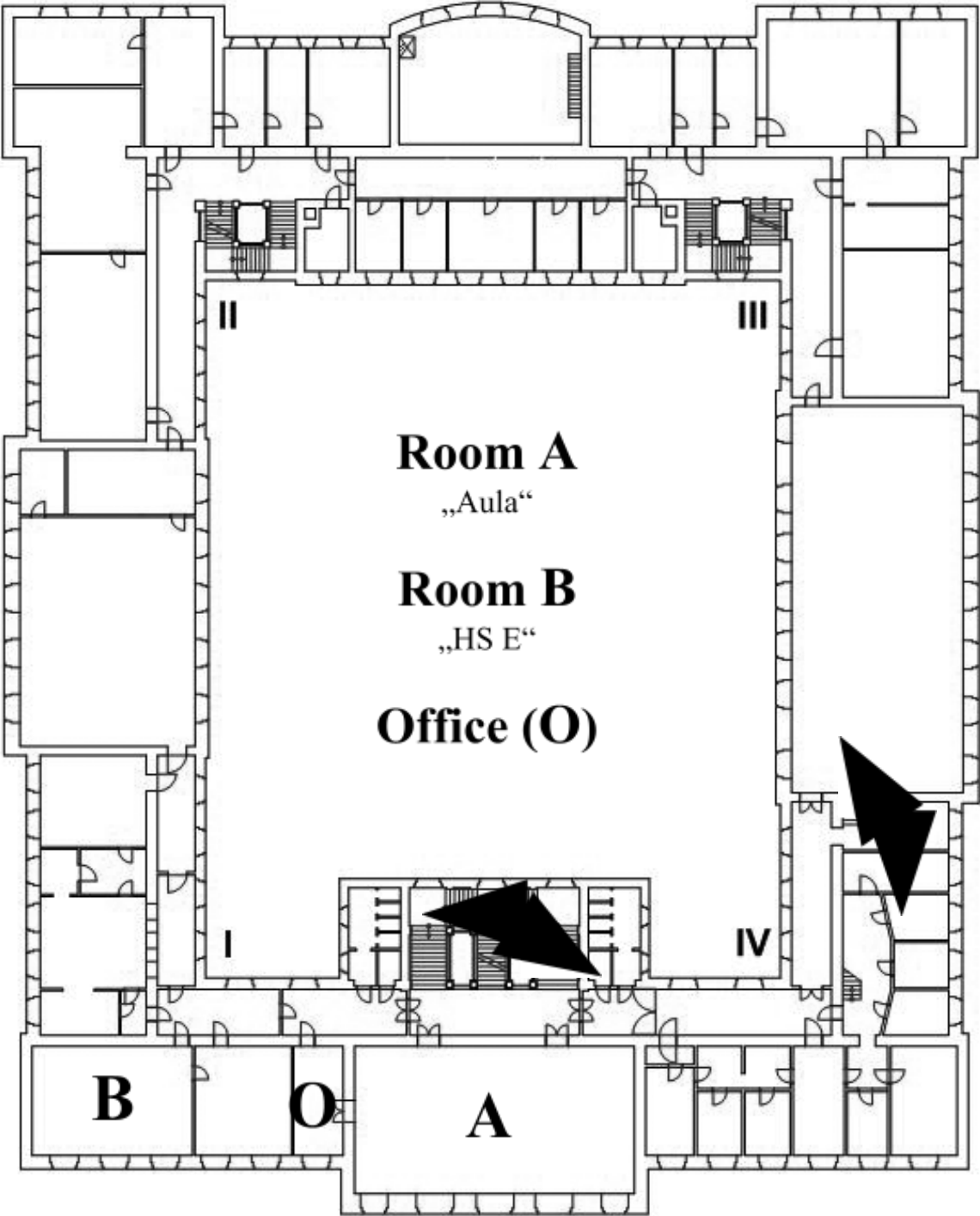
If you put a flame with table salt added in front of a vapour sodium lamp, the flame casts a shadow. The shadow can become lighter, if the flame is put into a strong magnetic field. Investigate and explain the phenomenon.

Leoben City Map

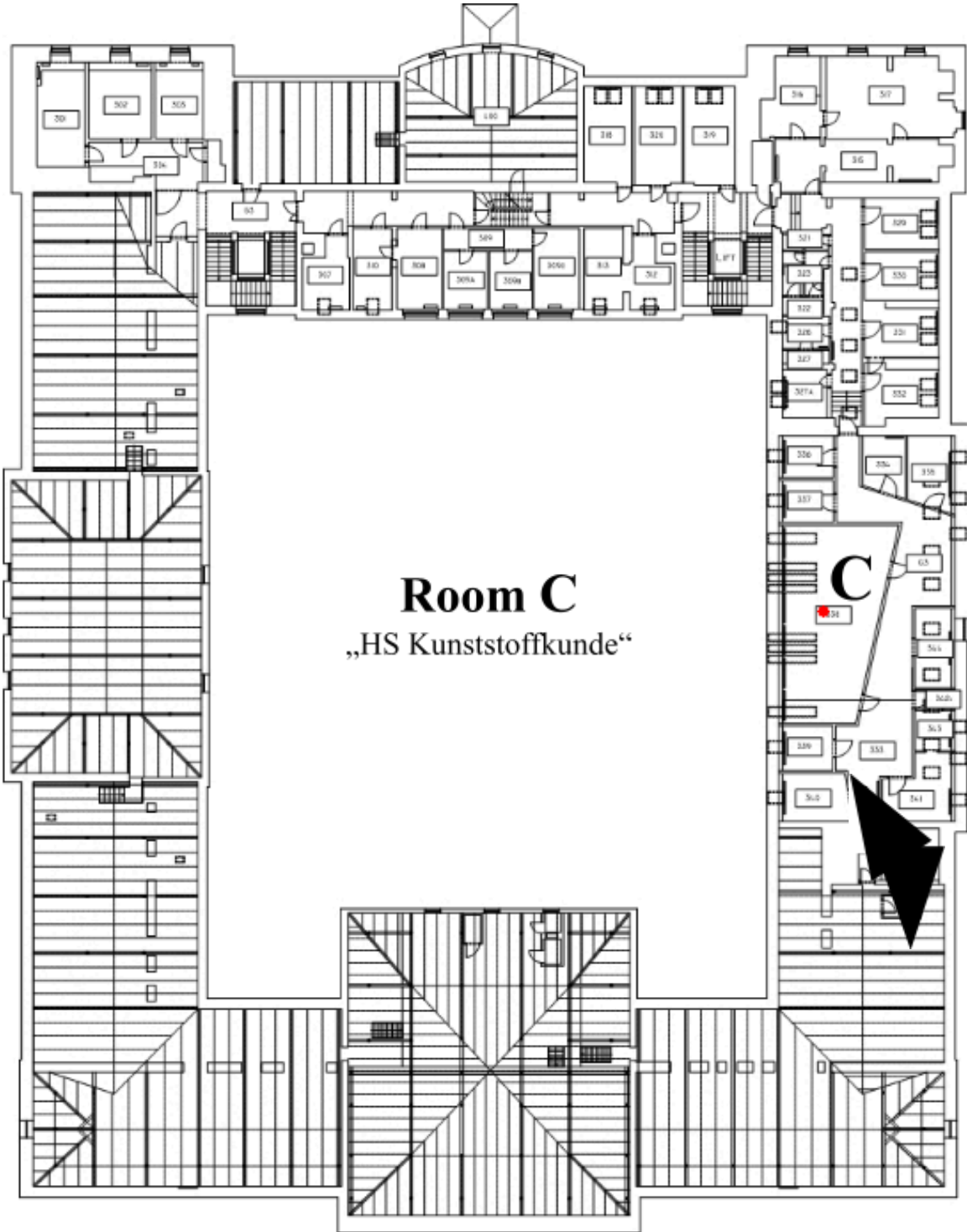


<http://maps.google.at>

Second Floor



Third Floor



Basic Information about Austria

This section summarizes the most important general information about Austria. It is intended to help our guests from abroad. For any further information please contact one of the organizers (wearing yellow badges).

Currency

The official currency in Austria is **Euro**, abbreviated **EUR** or **€**.

1 Euro = 100 Cent (abbr. "ct")

There are 8 different coins:

1 ct, 2 ct, 5 ct, 10 ct, 20 ct, 50 ct, 1 €, 2 €

There are 7 different bank notes:

5 €, 10 €, 20 €, 50 €, 100 €, 200 €, 500 €

Electricity

Electric power plugs are operated at 230 Volt AC with a frequency of 50 Hertz. Power outlets are compatible with type F and type C plugs.

Tap Water

The tap water in Austria is of good quality and safe to drink.

Emergency Phone Numbers

There are several emergency phone numbers available. All these numbers can be dialed from any phone free of charge and without any prefix.

122 Fire Brigade

133 Police

144 Ambulance

112 Universal European Emergency Number

Remember to call these numbers only in case of a serious emergency.

Organizers' Phone Numbers

In case you got lost or otherwise need assistance you can contact the organizers through one of the following phone numbers:

+43 676 7019116

Gerhard Haas

+43 664 4260809

Julian Ronacher

(Note: Use the numbers above when dialing from a mobile phone. On hardwired phones within Austria dial "0" instead of "+43".)

Addresses and Locations

The hotel and the university are within 5-10 minutes walking distance. A map of the city center is provided within this booklet. In case you get lost you can use the following addresses to ask for your way.

Hotel

The address of your hotel is:
Hotel Kongress Leoben (Phone: +43 3842 46800)
Hauptplatz 1, 8700 Leoben

University

The competition takes place at the University of Leoben.
Montanuniversität Leoben
Franz-Josef-Straße 18, 8700 Leoben

Europagymnasium Leoben

The barbecue party takes place in the court of „ Europagymnasium Leoben “ High School.
BG/BRG Leoben Neu
Moserhofstraße 7a
8700 Leoben

Information on Law for the Protection of the Youth

Each federal state in Austria has its own law for the protection of the youth. The city of Leoben is located in the state of Styria. The following section will sum up briefly the most important aspects of the relevant law for the protection of the youth of the state of Styria. The organizing committee takes no responsibility for participants violating this law.

In Austria you must be older than 18 years to be considered a legal adult. People who are younger are restricted by the law as stated below.

Alcohol

In Styria it is illegal to buy and/or consume alcoholic beverages if you are below the age of 16. For buying/consuming beverages with more than 14 percent (of volume) of alcohol you must be over the age of 18.

Tobacco

For buying/consuming cigarettes or other tobacco products you must be over the age of 16.

Night Time

Children and adolescents below the age of 14 are not allowed to be out on the streets without supervision by an authorised adult between 09.00pm and 05.00am.

Between the age of 14 and the age of 16 the respective time is 11.00pm to 05.00am.
Between the age of 16 and the age of 18 it is from 02.00am to 05.00am.

The Association AYPT – Forschungsforum junger Physiker

The history of the AYPT dates back to the year 1999 when the first tournament took place. In 2002 the legal association AYPT – Forschungsforum junger Physiker has been founded (originally named “AYPT – Österreichisches Turnier junger Physiker”) to organize further AYPTs, to represent Austria in the IYPT and to promote the goals behind the AYPT and IYPT.

Detailed information about the association AYPT – Forschungsforum junger Physiker can be obtained on the official website <http://www.aypt.at/> which is available in German and English language.

Membership

If you would like to support the association in realizing further AYPTs and promoting the cause of AYPT and IYPT then please consider becoming a member of the association. An application form is provided within this booklet. Just cut it out, fill it out and hand it to one of the organizers. Further forms can be obtained from the organizers or from the website www.aypt.at. For legal reasons the application form is provided in German language only. Non-German speakers can contact the organizers for help in filling out the form if necessary.

There are two different types of membership:

- ordinary membership
- extraordinary membership

Ordinary members have to pay an annual membership fee of (at least) 10 Euro. Donations in terms of (voluntary) higher fees are always welcome.

Extraordinary members only support the goals of the association ideational and do not have to pay a minimum fee but donations are welcome from them as well.

Extraordinary members are, in contrast to ordinary members, not entitled to vote in the general assembly. Details can be found in the Articles of Association, available on the website www.aypt.at.

Antrag auf Mitgliedschaft

Ich stelle Antrag dem Verein „AYPT – Forschungsforum junger Physiker“ als

ordentliches Mitglied *)

(jährlicher Mitgliedsbeitrag: 10 Euro)

außerordentliches Mitglied *)

(jährlicher Mitgliedsbeitrag: Freie Spende)

*) zutreffendes bitte ankreuzen

beizutreten.

Persönliche Daten:

Frau Herr

Titel:

Vorname(n):

Nachname:

Adresse:

Straße und Hausnummer:

Postleitzahl:

Ort:

Sonstiges:

Email Adresse:

Telefonnummer (optional):

Faxnummer (optional):

Ich bestätige, dass ich das vorliegende Formular vollständig und korrekt ausgefüllt habe. Ich erkläre mich damit einverstanden, dass meine Angaben elektronisch gespeichert und verwaltet werden. Eine Veröffentlichung der Angaben (ausgenommen Name) im Mitgliederverzeichnis findet nur auf meinen ausdrücklichen, jederzeit widerrufbaren Wunsch statt. Keinesfalls werden meine Daten an Dritte weitergegeben.

Ich erkläre mich mit den Statuten des Vereins einverstanden.

Ort, Datum:

Unterschrift:

Take your Notes

Take your Notes

Sponsors and Supporters

The association AYPT - Forschungsforum junger Physiker thanks all its sponsors and supporters. Without their support it would not be possible to execute the AYPT.



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wien

Faculty of Physics



Co-funded by the
Erasmus+ Programme
of the European Union



STADT : SALZBURG



Das Land
Steiermark

