



Swiss Young Physicists' Tournament 2018

Universität Basel
17/18 March 2018



Source: University of Basel

Swiss Young Physicists' Tournament

Where tomorrow's scientists meet.

Welcome to the SYPT 2018

Dear participants, teachers and jurors

Entering its second decade, the **Swiss Young Physicists' Tournament** is still growing in popularity. This year we are expecting 75 participants in 25 teams from all around Switzerland, more than ever before! They have all been working on one of the **17 IYPT problems** for 2018. Innumerable hours have been spent on digging into the underlying theory, planning and setting up experiments and analysing data. They all look forward to present their findings to other students and the jurors.

We are proud that the SYPT 2018 will be hosted at the **University of Basel**, Switzerland's oldest University. Our thanks go to the Physics Department, which made this possible.

With more than one hundred students, jurors and staff, the SYPT 2018 will be the greatest tournament so far, which is only possible thanks to the financial contributions from our supporters, but also thanks to the work of many helpers.

As the President of Pro IYPT-CH it is my pleasure to welcome you all to an exciting weekend in Basel!



Samuel Byland (samuel.byland@sypt.ch), President Pro IYPT-CH

Visit www.sypt.ch for the latest information on the SYPT 2018.



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IYPT

The **International Young Physicists' Tournament** (IYPT, see www.iypt.org), sometimes also referred to as „Physics World Cup“, is a scientific competition among secondary school students interested in physics. A so-called **Physics Fights** lines up three teams of five students each. They in turn present and discuss their solutions to one of the problems, criticise the opponent's solution and review the performances of the other teams. All three teams get scores from a jury.

The **problems** are published a year before the tournament. They are chosen such that no single correct solution exists. Each presentation will show different aspects of the problem. Careful preparation and creativity in solutions are as important for creating a good impression, as are correct school physics and mathematics.

In **preparing** for the IYPT students do not just learn how to tackle difficult physics problems, but also how to work in a **team**, use computers to **collect and analyse data**, **present** scientific results and **debate**. The Physics Fights are **in English**, helping the students prepare for their future at university where an increasing number of lectures and seminars are held in English.

Pro IYPT-CH

The **aim** of Pro IYPT-CH is that of making the idea behind the IYPT better known in Switzerland. It provides support for students and teachers in preparing problems and organises the selection of the Swiss team for the international tournament.

Since the first participation of Switzerland in the IYPT (2002) the number of students, teachers and schools participating has increased steadily. In 2005 Pro IYPT-CH organised the International Young Physicists' Tournament in Switzerland (Winterthur). This will be the eighth **national tournament** modelled on the international archetype.

If you would like to support Pro IYPT-CH and the SYPT and would like to be informed about our activities, you are very welcome to **become a member**. We also appreciate the help of former participants during the preparation for the SYPT and IYPT. Please contact Lioba Heimbach (see below) to get more information about membership or register online (www.sypt.ch).

President: Samuel Byland (president@sypt.ch)

Members: Lioba Heimbach (members@sypt.ch)

Website: www.sypt.ch

Agenda of the SYPT 2018

Date: Saturday/Sunday, 17/18 March 2018

Venue: University of Basel, Kollegienhaus (Petersplatz 1, 4051 Basel)

Fees: Participation at the SYPT is **free**. Lunch (Saturday and Sunday) and dinner (Saturday) are offered by the organiser. Train tickets (half-fare) can be reimbursed via our website (www.sypt.ch) within two weeks after the tournament.

Saturday, 17 March

from 7:45	Arrival, coffee & orange juice (entrance hall)
8:30	Address of welcome (auditorium 102)
9:00	Team photos (entrance hall) / Jury meeting (room 103)
9:00	Physics Fight round 1 for teams in room 212 (see fight plan)
9:45	Physics Fights round 1 in all other rooms (see fight plan)
12:45	Lunch (entrance hall)
13:30	Presentation University of Basel
14:30	Physics Fight round 2 for teams in room 212 (see fight plan)
15:00	Physics Fights round 2 in all other rooms (see fight plan)
18:15	Dinner (meeting point: entrance hall)

Sunday, 19 March

from 8:00	Registration (entrance hall)
8:15	Physics Fight round 3 for teams in room 212 (see fight plan)
9:00	Physics Fights round 3 in all other rooms (see fight plan)
12:00	Lunch (entrance hall)
13:15	Final Fight (auditorium 102)
16:30	Award ceremony, Apéro (entrance hall)

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Problems for the SYPT 2018

- Invent Yourself:** Construct a simple seismograph that amplifies a local disturbance by mechanical, optical or electrical methods. Determine the typical response curve of your device and investigate the parameters of the damping constant. What is the maximum amplification that you can achieve?
- Colour of Powders:** If a coloured material is ground to a powder, in some cases the resulting powder may have a different colour to that of the original material. Investigate how the degree of grinding affects the apparent colour of the powder.
- Dancing Coin:** Take a strongly cooled bottle and put a coin on its neck. Over time you will hear a noise and see movements of the coin. Explain this phenomenon and investigate how the relevant parameters affect the dance.
- Heron's Fountain:** Construct a Heron's fountain and explain how it works. Investigate how the relevant parameters affect the height of the water jet.
- Drinking Straw:** When a drinking straw is placed in a glass of carbonated drink, it can rise up, sometimes toppling over the edge of the glass. Investigate and explain the motion of the straw and determine the conditions under which the straw will topple.
- Ring Oiler:** An oiled horizontal cylindrical shaft rotates around its axis at constant speed. Make a ring from a cardboard disc with the inner diameter roughly twice the diameter of the shaft and put the ring on the shaft. Depending on the tilt of the ring, it can travel along the shaft in either direction. Investigate the phenomenon.
- Conical Piles:** Non-adhesive granular materials can be poured such that they form a cone-like pile. Investigate the parameters that affect the formation of the cone and the angle it makes with the ground.
- Cusps in a Cylinder:** A horizontal cylinder is partially filled with a viscous fluid. When the cylinder is rotated around its axis, unusual fluid behaviour can be observed, such as cusp-like shapes on the walls of the cylinder. Investigate the phenomenon.
- Candle in Water:** Add some weight to a candle such that it barely floats in water. As the candle burns, it may continue to float. Investigate and explain this phenomenon.
- Tesla Valve:** A Tesla valve is a fixed-geometry, passive, one-direction valve. A Tesla valve offers a resistance to flow that is much greater in one direction compared to the other. Create such a Tesla valve and investigate its relevant parameters.
- Azimuthal-Radial Pendulum:** Fix one end of a horizontal elastic rod to a rigid stand. Support the other end of the rod with a taut string to avoid vertical deflection and suspend a bob from it on another string. In the resulting pendulum the radial oscillations (parallel to the rod) can spontaneously convert into azimuthal oscillations (perpendicular to the rod) and vice versa. Investigate the phenomenon.
- Curie Point Engine:** Make a nickel disc that can rotate freely around its axis. Place a magnet near the edge of the disc and heat this side of it. The disc starts to rotate. Investigate the parameters affecting the rotation and optimize the design for a steady motion.
- Weighing Time:** It is commonly known that an hourglass changes its weight (as measured by a scale) while flowing. Investigate this phenomenon.
- Radiant Lantern:** When taking a picture of a glowing lantern at night, a number of rays emanating from the centre of the lantern may appear in the pictures. Explain and investigate this phenomenon.
- Blowing Bubbles:** When blowing on a soap film in a ring, a bubble may be formed. The liquid film may pop or continue to exist. Investigate how the number of bubbles produced from a single soap film and the characteristics of the bubbles depend on the relevant parameters.
- Acoustic Levitation:** Small objects can levitate in acoustic standing waves. Investigate the phenomenon. To what extent can you manipulate the objects?
- Water Bottle:** The current craze of water bottle flipping involves launching a partially filled plastic bottle into the air so that it performs a somersault before landing on a horizontal surface in a stable, upright position. Investigate the phenomenon and determine the parameters that will result in a successful flip.

(Problems from www.iypt.org)

Fight Plan SYPT 2018

Round 1 (Saturday, 17 March, 9:45 – 12:30)

Fight	Reporter	Opponent	Reviewer	
Fight 1.1 Seminar- raum 103	Cooper Triple	Cutie π's	ELV	
	Thomas Jany Weighing Time	Ines Herceg	Elio Wanner	
	Cutie π's	ELV	Cooper Triple	
	Stefan Bjelajac Cusps in a Cylinder	Lea Steiner	Anton Praetorius	
ELV	Cooper Triple	Cutie π's		
Vincent Grumbacher Heron's Fountain	Tanmay Kasi	Gürcan Kartaloglu		
Fight 1.2 Seminar- raum 104	Reporter	Opponent	Reviewer	
	Supercharged Neutrinos	Newton's Fanboys	23K	
	Robin Yeboah Dancing Coin	Melih Elik	Moritz Tschudin	
	Newton's Fanboys	23K	Supercharged Neutrinos	
	Jonas Bachmann Heron's Fountain	Alexander Hadjistamov	Andreas Breum	
23K	Supercharged Neutrinos	Newton's Fanboys		
David Tschan Water Bottle	Ankit Singhal	Daniel Swingler		
Fight 1.3 Seminar- raum 105	Reporter	Opponent	Reviewer	
	(Insert Name Here)	Anti Matters	H2ONii	
	Hugo Lindskog Candle in Water	Leah Heuri	Salome Wehri	
	Anti Matters	H2ONii	(Insert Name Here)	
	Nicola Widmer Weighing Time	Fiona Santarossa	Carter Hughes	
H2ONii	(Insert Name Here)	Anti Matters		
Djahan Lamei Heron's Fountain	Oliver Mak	Samuel Huber		
Fight 1.4 Seminar- raum 106	Reporter	Opponent	Reviewer	
	Almost π	Magnetic Tripole	Polar Boys	
	Adrian Bradosche Pallares Heron's Fountain	Kevin Nguyen	Luca Formenti	
	Magnetic Tripole	Polar Boys	Almost π	
	Daniel Gotsmann Weighing Time	Laslo Dosa	Edward Grantham	
Polar Boys	Almost π	Magnetic Tripole		
Lukas Frey Curie Point Engine	Carlo Rossetto	Philippe Hugo		
Fight 1.5 Seminar- raum 107	Reporter	Opponent	Reviewer	
	Evil Geniuses	Klein and the Bottles	Subzero	
	Bassem Darwish Tesla Valve	Piotr Salustowicz	Silvan Stark	
	Klein and the Bottles	Subzero	Evil Geniuses	
	Michael Klein Weighing Time	Nam-Khang Nguyen	Neil Thakur	
Subzero	Evil Geniuses	Klein and the Bottles		
Henrik Jentgens Water Bottle	Kirby Key	Léa Le Bars		
Fight 1.6 Regenz- zimmer 111	Reporter	Opponent	Reviewer	
	Dreistein	Infinity and More	Blueshift	
	Nina Chromec Radiant Lantern	Melissa Kundert	Nic Baruffol	
	Infinity and More	Blueshift	Dreistein	
	Alberto Ferro Weighing Time	Natalia Lopez-Edge	Lukas Jabornegg	
Blueshift	Dreistein	Infinity and More		
Jakob Storp Curie Point Engine	Michael Heider	Apostolos Papisikas		
Fight 1.7 Fakultäten- zimmer 112	Reporter	Opponent	Reviewer	
	Tachyons	Elements	Die Chloroplasten	
	Bo Frohlich Weighing Time	Alisa Miloglyadova	Björn Bucher	
	Elements	Die Chloroplasten	Tachyons	
	Elena Zarkovic Heron's Fountain	Samuel Schuetz	Ilaria Nissotti Revel	
Die Chloroplasten	Tachyons	Elements		
Milos Hirsl Invent Yourself	Remo De Angelis	Emma Cook		
Fight 1.8 Seminar- raum 212	Reporter	Opponent	Reviewer	Observer
	The Fifth Fundamental Force	Quantum of Solace	The Certainty Principle	The Algebras
	Charan Vadrevu Weighing Time	Daniil Lozner	Senhong Cao	
	Quantum of Solace	The Certainty Principle	The Algebras	The Fifth Fundamental
	Daniel Repérant Invent Yourself	Kedar Krishnan	Akitaka Ujita	
	The Certainty Principle	The Algebras	The Fifth Fundamental Force	Quantum of Solace
Tejas Krishnan Cusps in a Cylinder	Conor Rainsby	Paul Berggren		
The Algebras	The Fifth Fundamental Force	Quantum of Solace	The Certainty Principle	
Ariba Mbeche Heron's Fountain	Sagar Subramaniam	Buyi Chen		

Fight Plan SYPT 2018

Round 2 (Saturday, 17 March, 15:00 – 17:45)

	Reporter	Opponent	Reviewer	
Fight 2.1 Seminar- raum 103	Blueshift	Polar Boys	The Fifth Fundamental Force	
	Nic Baruffol Dancing Coin	Lukas Frey	Sagar Subramaniam	
	Polar Boys	The Fifth Fundamental Force	Blueshift	
	Luca Formenti Candle in Water	Charan Vadrevu	Natalia Lopez-Edge	
	The Fifth Fundamental Force	Blueshift	Polar Boys	
	Paul Berggren Tesla Valve	Jakob Storp	Laslo Dosa	
Fight 2.2 Seminar- raum 104	Reporter	Opponent	Reviewer	
	Klein and the Bottles	H2ONii	Cooper Triple	
	Piotr Salustowicz Acoustic Levitation	Salome Wehri	Thomas Jany	
	H2ONii	Cooper Triple	Klein and the Bottles	
	Fiona Santarossa Invent Yourself	Anton Praetorius	Michael Klein	
	Cooper Triple	Klein and the Bottles	H2ONii	
	Tanmay Kasi Azimuthal-Radial Pendulum	Léa Le Bars	Djahan Lamei	
Fight 2.3 Seminar- raum 105	Reporter	Opponent	Reviewer	
	Newton's Fanboys	Subzero	[Insert Name Here]	
	Daniel Swingler Ring Oiler	Henrik Jentgens	Hugo Lindskog	
	Subzero	[Insert Name Here]	Newton's Fanboys	
	Silvan Stark Weighing Time	Carter Hughes	Melih Elik	
	[Insert Name Here]	Newton's Fanboys	Subzero	
	Oliver Mak Curie Point Engine	Jonas Bachmann	Nam-Khang Nguyen	
Fight 2.4 Seminar- raum 106	Reporter	Opponent	Reviewer	
	Quantum of Solace	Tachyons	Almost π	
	Daniil Lozner Heron's Fountain	Ilaria Nissotti Revel	Carlo Rossetto	
	Tachyons	Almost π	Quantum of Solace	
	Remo De Angelis Cusps in a Cylinder	Adrian Bradosche Pallares Daniel	Repérant	
	Almost π	Quantum of Solace	Tachyons	
	Edward Grantham Azimuthal-Radial Pendulum	Buyi Chen	Bo Frohlich	
Fight 2.5 Seminar- raum 107	Reporter	Opponent	Reviewer	
	Cutie π 's	The Certainty Principle	Evil Geniuses	
	Ines Herceg Candle in Water	Senhong Cao	Kirby Key	
	The Certainty Principle	Evil Geniuses	Cutie π 's	
	Kedar Krishnan Weighing Time	Bassem Darwish	Stefan Bjelajac	
	Evil Geniuses	Cutie π 's	The Certainty Principle	
	Neil Thakur Curie Point Engine	Gürcan Kartaloglu	Tejas Krishnan	
Fight 2.6 Regenz- zimmer 111	Reporter	Opponent	Reviewer	
	Anti Matters	Dreistein	23K	
	Leah Heuri Heron's Fountain	Lukas Jabornegg	David Tschan	
	Dreistein	23K	Anti Matters	
	Michael Heider Ring Oiler	Moritz Tschudin	Nicola Widmer	
	23K	Anti Matters	Dreistein	
	Alexander Hadjistamov Tesla Valve	Samuel Huber	Nina Chromec	
Fight 2.7 Fakultäten- zimmer 112	Reporter	Opponent	Reviewer	
	ELV	The Algebros	Die Chloroplasten	
	Elio Wanner Curie Point Engine	Akitaka Ujita	Milos Hirsl	
	The Algebros	Die Chloroplasten	ELV	
	Conor Rainsby Weighing Time	Björn Bucher	Lea Steiner	
	Die Chloroplasten	ELV	The Algebros	
	Samuel Schuetz Ring Oiler	Vincent Grumbacher	Ariba Mbeche	
Fight 2.8 Seminar- raum 212	Reporter	Opponent	Reviewer	Observer
	Supercharged Neutrinos	Magnetic Tripole	Infinity and More	Elements
	Andreas Breum Acoustic Levitation	Daniel Gotsmann	Alberto Ferro	
	Magnetic Tripole	Infinity and More	Elements	Supercharged Neutrinos
	Philippe Hugo Azimuthal-Radial Pendulum	Apostolos Papisikas	Elena Zarkovic	
	Infinity and More	Elements	Supercharged Neutrinos	Magnetic Tripole
Start 14.30	Melissa Kundert Heron's Fountain	Emma Cook	Ankit Singhal	
	Elements	Supercharged Neutrinos	Magnetic Tripole	Infinity and More
	Alisa Miloglyadova Invent Yourself	Robin Yeboah	Kevin Nguyen	

Fight Plan SYPT 2018

Round 3 (Sunday, 18 March, 9:00 – 11:45)

Fight	Reporter	Opponent	Reviewer			
Fight 3.1 Seminar- raum 103	Infinity and More		Opponent		Reviewer	
	[Insert Name Here]		[Insert Name Here]		ELV	
	Apostolos	Papasikas	Cusps in a Cylinder	Hugo	Lindskog	Vincent Grumbacher
	[Insert Name Here]		ELV		Infinity and More	
	Carter	Hughes	Acoustic Levitation	Elio	Wanner	Melissa Kundert
	ELV		Infinity and More		[Insert Name Here]	
	Lea	Steiner	Tesla Valve	Alberto	Ferro	Oliver Mak
Fight 3.2 Seminar- raum 104	Reporter		Opponent		Reviewer	
	23K		Almost π		Cutie π 's	
	Moritz	Tschudin	Curie Point Engine	Edward	Grantham	Ines Herceg
	Almost π		Cutie π 's		23K	
	Carlo	Rossetto	Tesla Valve	Stefan	Bjelajac	Alexander Hadjistamov
	Cutie π 's		23K		Almost π	
	Gürçan	Kartaloglu	Conical Piles	David	Tschan	Adrian Bradosche Pallares
Fight 3.3 Seminar- raum 105	Reporter		Opponent		Reviewer	
	Subzero		The Fifth Fundamental Force		Anti Matters	
	Nam-Khang	Nguyen	Heron's Fountain	Paul	Berggren	Leah Heuri
	The Fifth Fundamental Force		Anti Matters		Subzero	
	Sagar	Subramaniam	Acoustic Levitation	Nicola	Widmer	Henrik Jentgens
	Anti Matters		Subzero		The Fifth Fundamental Force	
	Samuel	Huber	Radiant Lantern	Silvan	Stark	Charan Vadrevu
Fight 3.4 Seminar- raum 106	Reporter		Opponent		Reviewer	
	Die Chloroplasten		Cooper Triple		Magnetic Tripole	
	Björn	Bucher	Curie Point Engine	Thomas	Jany	Daniel Gotsmann
	Cooper Triple		Magnetic Tripole		Die Chloroplasten	
	Anton	Praetorius	Candle in Water	Philippe	Hugo	Samuel Schuetz
	Magnetic Tripole		Die Chloroplasten		Cooper Triple	
	Kevin	Nguyen	Radiant Lantern	Milos	Hirsl	Tanmay Kasi
Fight 3.5 Seminar- raum 107	Reporter		Opponent		Reviewer	
	Polar Boys		Supercharged Neutrinos		Klein and the Bottles	
	Laslo	Dosa	Dancing Coin	Andreas	Breum	Piotr Salustowicz
	Supercharged Neutrinos		Klein and the Bottles		Polar Boys	
	Ankit	Singhal	Curie Point Engine	Michael	Klein	Lukas Frey
	Klein and the Bottles		Polar Boys		Supercharged Neutrinos	
	Léa	Le Bars	Colour of Powders	Luca	Formenti	Robin Yeboah
Fight 3.6 Regenz- zimmer 111	Reporter		Opponent		Reviewer	
	The Certainty Principle		Blueshift		Tachyons	
	Senhong	Cao	Acoustic Levitation	Nic	Baruffol	Remo De Angelis
	Blueshift		Tachyons		The Certainty Principle	
	Natalia	Lopez-Edge	Cusps in a Cylinder	Bo	Frohlich	Kedar Krishnan
	Tachyons		The Certainty Principle		Blueshift	
	Ilaria	Nissotti Revel	Curie Point Engine	Tejas	Krishnan	Jakob Storp
Fight 3.7 Fakultäten- zimmer 112	Reporter		Opponent		Reviewer	
	The Algebros		Quantum of Solace		Elements	
	Akitaka	Ujita	Acoustic Levitation	Daniel	Repérant	Alisa Miloglyadova
	Quantum of Solace		Elements		The Algebros	
	Buyi	Chen	Weighing Time	Elena	Zarkovic	Conor Rainsby
	Elements		The Algebros		Quantum of Solace	
	Emma	Cook	Candle in Water	Ariba	Mbeche	Daniil Lozner
Fight 3.8 Seminar- raum 212 Start 8.15	Reporter		Opponent		Reviewer	Observer
	Newton's Fanboys		Evil Geniuses		H2ONii	Dreistein
	Melih	Elik	Acoustic Levitation	Neil	Thakur	Fiona Santarossa
	Evil Geniuses		H2ONii		Dreistein	Newton's Fanboys
	Kirby	Key	Weighing Time	Djahan	Lamei	Michael Heider
	H2ONii		Dreistein		Newton's Fanboys	
	Salome	Wehrli	Curie Point Engine	Nina	Chromec	Jonas Bachmann
	Dreistein		Newton's Fanboys		Evil Geniuses	
	Lukas	Jabornegg	Candle in Water	Daniel	Swingler	Bassem Darwish

Swiss Young Physicists' Tournament

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Regulations for the SYPT 2018

1. Swiss Young Physicists' Tournament

The **Swiss Young Physicists' Tournament** (SYPT) is a physics competition for students in secondary school. Participants are challenged to prepare a theoretical and experimental solution to a complex problem and to present and defend their solution in a debate (Physics Fight) against the opposing team's scrutiny.

The SYPT takes place on two consecutive days (e.g. Saturday and Sunday) before the International Young Physicists' Tournament (IYPT) of the same year (i.e. usually between March and May). The tournament is organised by the association Pro IYPT-CH.

In order to facilitate preparation for students wishing to participate at the SYPT, Pro IYPT-CH organizes the SYPT Physics Week. The **SYPT Physics Week** is a week-long preparation course during which participants can conduct measurements and learn the basic skills required at the SYPT.

The **problems** for the SYPT are identical to the ones at the IYPT. However, due to organizational reasons, Pro IYPT-CH may offer preparation courses only to a selection of the problems during the SYPT Physics Week. The problems are published online on www.iypt.org and on www.sypt.ch at least four months before the SYPT.

2. Website

Important information (deadlines, problems, results, etc.) about the SYPT and the Swiss team at the IYPT are published on the SYPT website (www.sypt.ch).

3. Preregistration and Application

The **deadline** for registration is 31 December 2017. This date applies both for students wishing to participate at the SYPT and the SYPT Physics Week as well as for students who only wish to participate at the SYPT.

An application is only valid if the **terms of participation** arrive on time and with the respective signatures. The terms of participation can be found on www.sypt.ch.

There are two possible ways to apply. In any case the deadline mentioned above apply:

- School teams: Any secondary school (including international schools, private schools and others) in Switzerland can nominate one or several **teams of three students**. As an exception the organiser may allow teams of two or four students.
- Individual participants: The organiser will try to match students applying as **individuals** with other students to form teams of three students.

Each student in a team has to present the solution to a different problem.

4. Fees

The participation at the SYPT and SYPT physics week is **free**. The costs for train tickets (half-fare), food and, if necessary, accommodation are covered by the organiser and/or the host in accordance with the "Spesenreglement" of Pro IYPT-CH. Pro IYPT-CH has a limited budget for experimental equipment. Please contact the president in due time if you would like to benefit from financial support. The exact procedure is defined by the "Beschaffungsreglement" of Pro IYPT-CH.

5. Preparation

Pro IYPT-CH seeks the support of **universities and research institutes** (e.g. ETH, Empa, etc.) in order to allow the students to use adequate experimental equipment where the schools cannot provide this or to get in contact with experts in the respective field. In addition, Pro IYPT-CH organizes the SYPT Physics Week during which students receive coaching and can prepare for

the tournament.

6. Fight Plan

All teams participate in three rounds of **preliminary Physics Fights**. The fight plan is published two weeks before the start of the SYPT. Each student in a team takes the role of Reporter, Opponent and Reviewer exactly once. The Physics Fights are in **English**. In justified cases the organiser may allow exceptions.

7. Physics Fight regulations

7.1. Stages and Time Schedule

At the start of a round the jury members and the teams briefly introduce themselves.

A Physics Fight with three teams is divided into three stages. In each stage the roles of the **Reporter**, **Opponent** and **Reviewer** are assigned according to the table below. If there are teams with more or less than three students or Physics Fights with more or less than three teams, similar schemes apply.

Physics Fight with three teams			
Stage	1	2	3
Team 1	Rep	Rev	Opp
Team 2	Opp	Rep	Rev
Team 3	Rev	Opp	Rep



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The tasks for the three students actively involved in a fight are as follows:

- The **Reporter** presents his/her solution for the selected problem. The solution is expected to cover at least an important aspect of the problem with a theoretical model and experimental results verifying this model. The solution should be understandable for a secondary school student.
- The **Opponent** asks clarifying and critical questions and points out possible shortcomings and mistakes in the solution presented by the Reporter. He/She shows the presentation's strengths and weaknesses. The discussion has to be based on the solution presented by the Reporter (not on the Opponent's). A good Opponent should lead the discussion in a way that both participants can learn something new.
- The **Reviewer** comments on the performances of both Reporter and Opponent.

The Physics Fight follows a strict timetable (see table below). After the time reserved for a phase has been used up no new thought may be added. If the preparation time is exceeded, the time for the next phase is shortened accordingly.

Phase	Time (total 45')
Presentation of the Reporter	12'
Clarifying questions of the Opponent to the Reporter	2'
Preparation of the Opponent	3'
Review of the presentation (maximum 5') and discussion between Opponent and Reporter	11'
Summary of the discussion by the Opponent	1'
Questions of the Reviewer to the Reporter and the Opponent	3'
Preparation of the Reviewer	2'
Review of the performances of the Reporter and the Opponent by the Reviewer	4'
Concluding remarks of the Reporter	2'
Questions of the jury to all three teams	5'

7.2. Team work and aids

During a Physics Fight the team members are allowed to communicate with each other. Support from outside the team (e.g. from their physics teacher) is strictly forbidden. The use of internet during a fight is strictly forbidden.

During each stage of a Physics Fight there is only one active participant per team. The other team members are allowed to help with short comments or give technical support).

8. Jury

The Jury is organised by Pro IYPT-CH. There are at least three jurors in each Physics Fight of which one acts as chairperson and ensures that the SYPT regulations are obeyed

At the end of each stage the jury assesses the performances and every juror shows marks from 1 to 10 for each of the teams involved in the stage. The **score** for a team corresponds to the weighted average (highest and lowest mark with 50 %, all others with 100 %) multiplied by 3 (Reporter), 2 (Opponent) and 1 (Reviewer).

9. Ranking

The grades of each fight are used to make a team and an individual ranking. Both rankings will be published.

10. Final Fight

The three teams with the **highest total score** after three rounds qualify for the **Final Fight**. In case of two teams in third place with the same total score the more balanced individual scores are preferred. In the Final Fight the third team after three rounds presents first, the first team last.

Within thirty minutes after announcing the participants of the Final Fight, the teams notify the organiser of their favourite problem. If two teams intend to present the same problem, the better-placed team has higher priority. The accepted problems are announced immediately.

The Final Fight follows the same regulations as the normal Physics Fights. Each team member has to be on stage in at least one role. In a team of two the reporter may be on stage only once.

11. Team Qualification

The organiser (in cooperation with the jury) **invites up to nine** (in exceptional cases ten) participants (SYPT champion and up to six or seven more) for the team qualification where the Swiss team for the IYPT is selected.

Only participants in the individual ranking (see point 12) are eligible to participate at the team qualification.

12. Absence of a team member

In case one or more team members are unexpectedly **unable to attend** a Physics Fight, the team must inform the organizers immediately.

The team is expected to perform the roles of the missing team members. The grades the remaining team members receive in these stages count as follows:

- The grades in the opposition count 25% and the grades in the review count 50% for the team ranking. The grades in the report do not count for the team ranking.
- The other fractions (75% opposition, 50% review) are made up out of the average grades the present team members received in their originally planned stage. The weighted average of these marks is then counted as the final grade for the team ranking.
- The grades in these stages do not influence the individual ranking.

In case a team is reduced to only one team member, the remaining team member may find one additional helper who is eligible to participate at the SYPT and is not active in another fight. The helper is not allowed to take a role on stage. The organizers then must be informed immediately.

A participant must perform at least one report and one opposition in the three preliminary physics fights in order to be ranked in the individual ranking.

13. Disciplinary action and Violations of Regulations

Participants or teams that violate the SYPT regulations can be sanctioned by a point deduction of up to 10 points per participant or disqualification.

All participants must behave in an appropriate manner. Unfair behaviour can lead to point deduction of up to 10 points per participant or disqualification.

The final decision on any possible sanctions is taken by Pro IYPT-CH.

Swiss Young Physicists' Tournament

Where tomorrow's scientists meet.

14. Appeal

In case one or several participant or juror feels an action or behaviour of an individual or group does not comply with the SYPT regulations, he or she may choose to report this. The procedure is as follows:

For incidents not concerning grading:

- For incidents occurring during a Physics Fight:
The incident must first be reported to the chair of the jury. In case the matter cannot be resolved, the incident may be reported to the organizers. Pro IYPT-CH will decide on further actions or consequences.
- For other incidents:
The incident must be reported to the organizers. Pro IYPT-CH will decide on further actions or consequences.

For incidents concerning grading:

- The incident must be reported to the organizers no later than one hour after the respective fight round has finished. The report must include a justification why the grading should be reconsidered. Pro IYPT-CH will then make a final decision. Pro IYPT-CH will in any case justify its decision towards the involved parties.

Note: A retrospective change of a grade or its weighting will only be considered in extreme cases. Due to organisational reasons any change of grades will only influence the individual ranking.

15. Responsibilities

The regulations have been approved by the association Pro IYPT-CH.

Zurich, 14/12/2016



Ranking, Team Qualification and Awards

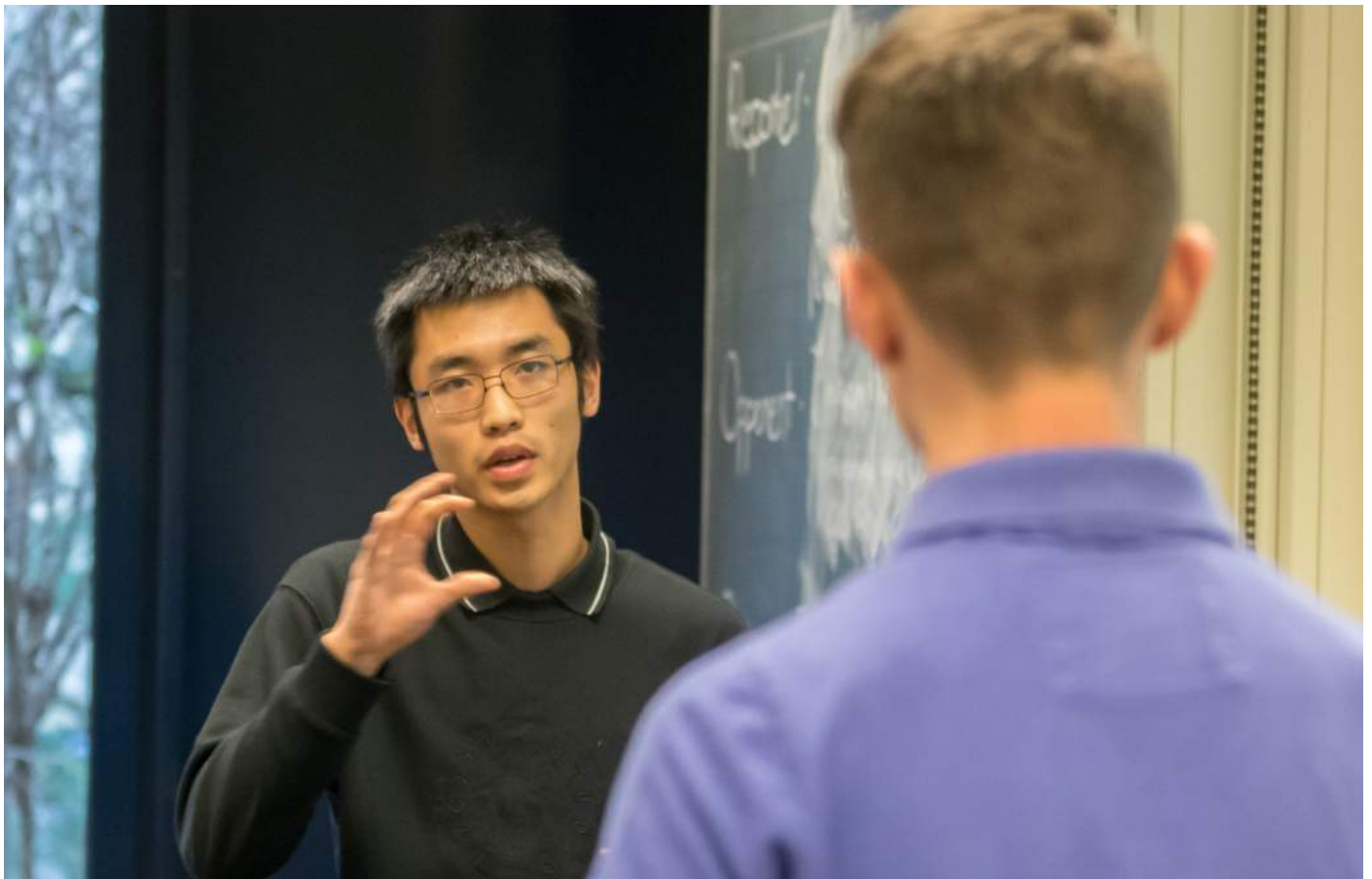
In addition to the **team ranking**, a ranking of the scores of all participants (**individual ranking**) is published. The latter is based on the weighted sum of all individual scores in the first three rounds.

The team with the highest score in the Final Fight wins the **SYPT Team Competition**.

Nine participants qualify for the **IYPT team qualification**. They are selected by Pro IYPT-CH (in cooperation with the jury) based on their skills shown during the physics fights. Students participating in the team qualification have to prepare a second problem and participate in the team qualification event (MNG Rämibühl Zürich, 16/17 April).

All participants receive a **certificate** confirming their successful participation at the SYPT, and a small gift. The final teams and up to five additional teams will be awarded with medals and attractive prizes.

Rankings are published on www.sypt.ch.



Marking guidelines

Presentation:

- Structure (balanced theoretical and experimental parts, focus on relevant results)
- Comprehensibility (adequate level, good visuals, clear statements)
- Completeness (greater context of problem, theoretical prediction for relevant aspect, comparison with own measurements, questions in task answered, bibliography)
- Correct physics (valid approach, correct formal solutions, consistent notation, units)
- Diagrams (correct axis labels, error bars, justified fit functions, fit parameters with correct units)
- Errors (reasonable error estimates, properly rounded results, comparison with theoretical predictions and/or literature)
- Layout (appealing and consistent design, titles, captions for figures and table, formulae set with formula editor)

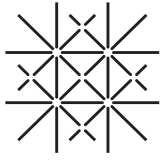
Discussion :

- Analytical skills (grasp strengths and weaknesses, reaction to new ideas)
- Understanding of physics (broad and deep knowledge base, quickly grasps new concepts)
- Politeness (objective feedback, polite and calm discussion)

Personal skills:

- Language (understandable English, clear pronunciation, vivid speech, convincing body language)
- Teamwork (shares and explains own results, helps team with own skills, persuasive and motivating personality)
- Reaction to critique (can accept critique and reacts in a positive way)

Pro IYPT-CH and the SYPT are greatly supported by:



Universität
Basel

Departement
Physik

the **cogito** foundation



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