

# International Physicists' Tournament Rules

January 24, 2017

The International Physicists' Tournament (IPT) is a competition between teams of university students from different countries. The teams solve challenging scientific problems and defend their solutions in scientific discussions during the Physics Fights (PF).

## 1 Organizational rules

### 1.1 General provisions

1. The main guiding body of the IPT is the International Organizing Committee (IOC). It is elected from representatives of the countries participating in the tournament. Each country is represented by only one person in the IOC.
2. The head of the IPT is the President. He/she is elected for 2 years in a simple majority vote by the members of IOC. Every official IPT document should be signed by the IPT President and stamped with the IPT seal which is kept by the Secretary. IOC members, including the President and Secretary can be part of the Executive Committee (ExeCom), which regroup the most active members of the IOC. The members of the ExeCom are in charge of executing the IOC tasks not related to specific countries, and have no decisive power neither extended privileges over other IOC members that has not been approved by the IOC.
3. The IOC is responsible for selection of a country hosting the IPT next year. The IOC cooperates with the LOC in deciding on the dates of the IPT.
4. The official language of the tournament is English. This applies to all official documentation, the Physics Fights and tournament ceremonies. The official website of the tournament is [www.iptnet.info](http://www.iptnet.info)
5. The amount of the entry fees is by default 1000 Euro per team. The IOC and LOC may provide a discount on the registration fees for the countries participating for the first time in the tournament. The LOC is responsible for covering the catering and accommodation expenses of a team consisting of four to six team members and no more than two team-leaders. The LOC can suggest a modification of the entry fees at the latest six months prior the tournament.
6. Any member of the IOC can suggest a modification to the rules. The executive committee is in charge of expressing the modification in a proper format. The whole IOC is asked to vote on each modification. The modification is accepted if more than 50% of the voters are in favor. In case of equal number of votes in favor and against the modification, the President has a decisive vote. The default voting period is 10 days since the IOC is called for voting.

### 1.2 IPT problems

1. Each edition of the IPT is composed of 17 problems, whose final formulation is adapted by the IOC. The final problem list is publicly announced at the latest eight months before the next edition.
2. Anyone can propose problems to the IOC. Favored problems are the one that can be solved both in a simple approach or in a very challenging and elegant way.
3. The IPT Secretary is in charge of collecting problems at any time during the year. The deadline for submitting problems for a given edition is one month after the end of the previous edition.

4. A special committee formed by the IPT secretary is in charge of building a shortlist of maximum 80 problems, to be ready two weeks after the deadline submission. The problems are selected following a weighting of four criteria: 1) The problem originality; 2) How challenging is the problem; 3) Does the problem formulation allows a theoretical and experimental solution ? (although we also occasionally accept purely theoretical or experimental problems) 4) Does the problem solving comply to basic safety regulations and is it reasonably easy and/or cheap to perform experiments on it?  
The problems can be adapted from their original formulation to better fulfill the previous criteria.
5. Once ready, the shortlist is sent by default to every IOC representative, as well as specific institutions upon written and motivated request. The person receiving the problems distributes them to all people involved in their country, gathers scores for the problems and reports them back to the IOC. Each country with an IOC representative can split 100 points between the problems. Countries without IOC representative and specific institutions can split 50 points between the problems.
6. The IPT Secretary sums up the scores from all countries and formulates the final list of 17 problems out of the ones with the highest score. He/she and the executive committee reserve the right to include the problems limiting themselves to the top part of the voting list to insure: a) The safety of the participants when performing the experiments; b) The availability of the equipment for most of the potential participants; c) Reasonable coverage of different fields of physics. d) The originality of the problems considering possible new referenced work or relevant comments from voting countries appear to be found.

### 1.3 Organization of the tournament

1. The LOC must announce the exact date, place and entry fee for the IPT no later than 5 months before it. The LOC is responsible for sending the official invitation letters, signed by the President and stamped with the IPT seal, to all requesting countries. The letter is published on the official IPT website.
2. All countries should confirm their participation no later than 3 months before the tournament.
3. The LOC must distribute the information necessary to pay the entry fee no later than 2 months before the tournament.
4. The participating countries must pay the entry fee no later than 30 days before the tournament. The deadline for paying the entry fee is fixed by the LOC, and participation of a team that fails to observe the deadline is at the discretion of the LOC.

### 1.4 Registration and preselection

1. IOC members represent the IPT in their own country. Each IOC representative is responsible for the national selection in its own country and for the registration of a national team to the international tournament. Teams from countries with active IOC representative submit their applications directly to him/her. The IOC representative should do his/her best to ensure the equal judgement of all applying teams from his country and is encouraged to organize a national tournament. Any problem with an IOC representative should be reported to the President as soon as possible.
2. Registration from teams without an active IOC representative are submitted to the IOC Secretary and LOC.
3. Only one team per country can register. Exception is made for the host university, see 4.10.
4. The maximum number of participating teams is determined by the LOC before the registration deadline, and cannot exceed 18. If more than 18 teams apply, the IOC will engage a preselection process to select the participating countries/team.
5. When more than 18 teams apply, the teams representing the countries that took part in the final of the last edition are automatically qualified, as well as the first team from the host university. All the other teams, whether selected through a national selection or applying directly, must complete a written report outlining the solution to one problem selected from a shortlist taken from the

official list selected by the IOC. The shortlist is composed of two problems that can be reported by any teams, and two problems restricted to the teams that won their respective national selections. The problems are announced when the registration opens.

6. The teams have 4 weeks after the registration deadline to send their written report. The report must have a .pdf format and cannot exceed 5 pages (except the title page). The team is free to enclose his own experimental material (videos, photos, computer programmes - smaller than 10 mb in total) and to cite it properly in the report.
7. Each report will be judged on the basis of three main criteria: 1) does it give a plausible physical answer to the initial question, 2) is the approach innovative, and is it supported by experiment and/or theory, 3) has the problem been explored in sufficient depth, i.e. have all the possible approaches been considered. The form of the report (layout, phrasing, presentation) is also important. It should be written in a clear and concise manner.
8. The reports will be anonymized before being judged by the IOC and an IOC appointed external jury. The list of participating teams will be announced no more than two weeks after the report submission deadline.
9. If more than one team from a country (without an active IOC representative) wishes to participate, the selection of the team from that country will be performed by the IOC, prior to any international preselection process, but following the same criterias used for the preselection process. Only the best report from each country will be considered for the international preselection process.
10. The host country can register two teams to the tournament. If a team from the host country was amongst the finalists of the previous edition, it is qualified by default, and the second team qualified is the winner of the national selection. Otherwise, the two best teams from the national selection are qualified.

## **2 Tournament procedure rules**

### **2.1 General provisions**

1. Every team consists of up to 6 students and up to 2 team-leaders. Additional participants may join the tournament, but are not allowed to actively participate to the competition.
2. The tournament is composed of selective Physics Fights (PFs), leading to the final PF.

### **2.2 The jury**

1. The jury is nominated and organized by the LOC in cooperation with IOC. The jury consists of at least five members, preferably from different countries.
2. Team leaders, at least one from each team, are included in the jury. Multiple jury members from the same country must be distributed uniformly across the fights (for example 1-1-0). Team leaders must not be members of the juries judging their own country's team.

### **2.3 The PF regulations**

1. Depending on the total number of teams, a PF involves preferably three or, optionally, four teams. In the course of a PF, team members are only allowed to communicate with participants of the same PF. Before the beginning of a PF, the jury and the teams are introduced.
2. The PF consists of three (or four) Rounds. In each Round, a team plays one of the three (four) roles: Reporter, Opponent, Reviewer (Observer). In the subsequent rounds of the PF, the teams change their roles according to the following schemes:
3. Team captains may choose any available position in the PF (i.e. A, B, C). The order in which the captains choose their positions is determined at the beginning of each PF via the Captains' Fight. The fight's winner chooses whether he wants to be the first, second or third to write down his team's position. Then the captain that arrived second in the fight chooses and finally the teams'

Three teams PF				Four teams PF				
Team/Round	1	2	3	Team/Round	1	2	3	4
A	Rep.	Rev.	Opp.	A	Rep.	Obs.	Rev.	Opp.
B	Opp.	Rep.	Rev.	B	Opp.	Rep.	Obs.	Rev.
C	Rev.	Opp.	Rep.	C	Rev.	Opp.	Rep.	Obs.
				D	Obs.	Rev.	Opp.	Rep.

positions are decided. The problems for Captains' Fights are prepared by the LOC. The captain fights consist of a challenging little task or test in physics/math, and cannot exceed 3 minutes, except during the final where they can be extended to 30 minutes and multiple problems to solve.

## 2.4 The stage regulations

1. The PF is ruled by a chairperson, selected by the LOC. Each Stage schedule is regulated by the chair according to the following table:

The performance order in the Stage of a PF	Reserved time in minutes
1. The Opponent challenges the Reporter to present a problem	1
2. The Reporter accepts or rejects the challenge	1
3. Preparation of the Reporter	5
4. Presentation of the report, Selective PF (final)	10(12)
5. Questions from the Opponent to the Reporter and answers of the Reporter	2
6. Preparation of the Opponent	3
7. The Opponent's speech	5
8. Discussion between the Reporter and the Opponent	5
9. Questions from the Reviewer to the Reporter and the Opponent and their answers	2
10. Preparation of the Reviewer	1
11. The Reviewer's Speech	3
12. Discussion between the Reviewer, Reporter and the Opponent	4
13. General discussion between the teams (any member of any team except Observers)	5
14. Concluding remarks by the Reporter	1
15. Questions from the Jury	6
16. Jury decides marks	1
17. Jury remarks/comments	4
Total Time for a Physics Fight	58

2. Each team participating in a PF has the right to use one time-out during the whole PF (consisting of three or four rounds). The time-out lasts for one minute and during the time-out every participant of the round can consult with his team. The time-out cannot be taken during any team's presentation.
3. In the Final PF the challenge procedure is omitted. The chair of the fight is responsible for the teams and juries' introduction, the Captain's Fight, timing and fair play in general. In some cases, the chairperson is allowed to give a mark as an additional jury member (this is reserved for experienced chairs only).

## 2.5 Security concerns

1. When working on the problems, participants and individual IOC representative must abide by the laws and regulations of their country and university. The IOC as a whole cannot be held responsible for any damage caused when working on the experiments.
2. The participants can ask the LOC at the latest three weeks in advance for supplementary safety material (wooden box, safety walls, etc...) to be used during the tournament. Providing or not this material is at the discretion of the LOC.

3. The chairperson can forbid the participants to perform an experiment live if he/she thinks the safety of the public and/or jury members is compromised. Prior to the tournament, the participants can ask the LOC if they are unsure about the possibility to perform an experiment.
4. During the competition, the participant(s) performing an experiment will not hold the organizers responsible for any damage or injury which may result thereof.

## 2.6 Team's performance in rounds

1. The Reporter presents the essence of the solution to the problem, attracting the attention of the audience to the main physical ideas and conclusions. It is strongly recommended that the Reporter presents some original ideas and a self-made experiments in the report.
2. The Opponent puts questions to the Reporter and criticizes the report, pointing to qualities and/or possible inaccuracies 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 between the Opponent and Reporter should focus on how to correct or improve the Reporter solution. Some experimental results obtained by the Opponent that clearly exhibit the inconsistencies of the Reporter's model and/or short calculations that show the errors or inapplicability of Reporter's theory can be presented in a very brief way. The Jury should decide on the relevance of such elements for the discussion. At the end of the discussion, the participants should agree on what can be changed/improved on the Reporter solution.
3. The Reviewer presents a short summary of the presentation of the Reporter and Opponent. The Reviewer presentation should mention in particular if the discussion between the Reporter and Opponent has been fruitful or not, and why. The Reviewer can mention which aspects of the problem could have been addressed, but cannot mention his own results on the problem. The main goal of the Reviewer is to summarize the work done by the Reporter and the Opponent as from a jury member point of view, in order to help the jury decide their marks. In the following discussion between all the participants, the Reviewer will moderate the discussion between the Reporter and Opponent, helping them to focus on the most important physical points of the problem.
4. The Observer does not participate in the PF.
5. During a PF only one member of a team takes the floor as an Opponent or a Reviewer but there can be up to two Reporters. Other members of the teams are allowed to help with the presentations technically. There are no limitations on communication between team members during the preparation time. The team members are allowed to give their players brief remarks in written form at any time, except for the Reporter's, Opponent's and Reviewer's presentations.
6. No member of a team is allowed to take the floor more than twice during a Selective PF. During the Final PF any team member can take the floor only once.

## 2.7 The rules of the problem challenges and rejections

1. All problems presented during a PF must be different.
2. Selective Physics Fight: The Opponent may challenge the Reporter on any problem with the exception of a problem that: a) was permanently 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 no problems left to challenge, the bans d), c), b), a) are successively removed, in that order.
3. The Reporter may tactically reject the challenge of three different problems in each selective PF without penalty. In addition to this, each team has one permanent rejection that once made, applies to all future Selective PFs.
4. Every additional rejection is considered as a tactical or permanent rejection (by team choice) and induces a penalty. For each penalty the coefficient of the Reporter is decreased by 0.2. This reduction continues to apply during the following Selective PFs.

5. Final Physics Fight: The teams participating in the Final choose the problems they will report themselves and proclaim them at a meeting of all the finalists. The teams choose their final problems in the order determined by selective PFs results, the team with the most points first. No team can choose a problem already chosen by another team.

## 2.8 The grading

1. After each stage the jury grades the teams, taking into account the presentations, questions, answers to the questions and participation in the discussion.
2. Each jury member shows integer marks from 1 to 10. If there are five or six jury members one lowest mark is discarded, if there are seven or eight jury members one lowest and one highest mark is discarded. For larger jury numbers, the number of discarded marks is quarter that of the jury members, rounded up (if this number is odd, one more of the lowest marks is discarded than of the highest).
3. This sum is used to calculate the mean mark for the team. The mean marks are multiplied by different coefficients: 3.0 or less (see section 2.7 — “The rules of problem challenges and rejections”) for the Reporter, 2.0 for the Opponent, 1.0 for the Reviewer and then transformed into points.

## 2.9 The resulting parameters

1. For a team in a PF the sum of points (SP) is the sum of mean marks, multiplied by the corresponding coefficients and rounded to one decimal. Additionally, the team which won the PF receives 2 additional points and the team which arrived second 1 extra point. In case of ex aequo, 3 points are divided between all teams that won the first place in the PF.
2. The total sum of points (TSP) of a team in the tournament is equal to the sum of SPs in all Selective PFs. The number of fights won (FW) is the number of Selective PFs, in which a team received the highest SP amongst the three or four teams participating in the same PF.

## 2.10 The final

1. The three or four teams having the highest TSP in the Selective PFs participate in the final.
2. The total sum of points of the third, fourth and the fifth teams are defined as TSP3, TSP4 and TSP5 respectively. The fourth team enters into the final if and only if  $(TSP3 - TSP4) \leq (TSP4 - TSP5)/2$ . In the case of teams having equal TSP, their participation in the final is decided by fights won.

## 2.11 Research ethics requirements and Penalties

1. All the equations, their derivations as well as simulation and experimental results must be documented properly, with clear links to all the sources used.
2. The participant’s original work and results must be documented either in the main part of the presentation or on additional slides that must be presented upon request. The documentation must be detailed enough to establish the authorship of the work: a) For a theoretical result, it is advised to have all the calculations leading to this result on additional slides. b) For numerical simulations, it is advised to prepare the program source as well as some tables or plots from its output. c) For the experimental work, it is requested to have a photo/video of the experimental setup in the main part of the presentation. Questions can be asked during or after the fights by the jury members about specific part of the setup or certain data points; it is thus advised to have enough supplementary material to answer any questions related to the steps of the experimental process.
3. The opponent and the reviewer teams are allowed to request the documentation listed above and to point out to the jury the acts of plagiarism if they are discovered. The jury members take into account the penalties according to internal guidelines.
4. If an act of plagiarism is discovered after the PF, the jury reserves a right to apply punishment measures in the period between the selective PF and the final, if the foul happened during the selective PF, or within one year after the final, in which the act of plagiarism occurred.

5. The severity of a case is decided by the jury members as soon as possible. Light foul measures are decided by jury members of the corresponding fight. In case of severe rules violation the penalty is decided by a council formed by the IPT President and ruled by the President of the Jury, in attendance of the offending team and team leaders during some parts of the hearing. The offending team may appeal against light foul penalties to a council decision. The jury council decision is irrevocable.
6. Unethical, sarcastic, discriminatory and other disrespectful behaviour leads to penalties ranging from a warning to disqualification of the team.

## **2.12 Alternative presentations sessions**

1. After the end of the selective PFs and before the Final, if the schedule allows, the LOC organises one or two alternative presentations sessions. It determines the place, time and format of these events.
2. The teams that are not participating in the final are invited to present their solutions to the problems they haven't presented in the selective PF. These sessions are facultative, and have no impact on the final ranking.
3. Problems to be presented in the Final cannot be reported during the alternative presentations sessions.

*These rules have been accepted by IOC on November 15th 2016*