

# Organising the Physics League Across Numerous Countries for Kickass Students by {iaps}

PLANCKS is an annual physics theoretical-problem-solving competition contested by upwards of 30 teams, each with 3 or 4 bachelor's or master's degree students, from countries around the world. Since founded by Dutch members of International Association of Physics Students in 2014, the competition has grown to become one of IAPS' central events, and it is now hosted in a different city each year on foot of bids made at the Annual General Meeting. Bids from who, you ask? From members of IAPS, like you!

Bidding for, and organising, PLANCKS functions a lot like it does for the International Conference of Physics Students, IAPS' other major event. Members prepare bids in the months leading up to the AGM, then one Organising Committee (OC) is awarded hosting rights for the competition two years in the future. In the intervening year, the OC updates the membership at the next AGM. Following the competition, the OC prepares an event report and a final statement of accounts, before being discharged of their responsibility at the AGM after their event.

PLANCKS itself takes place in May or June each year, before ICPS in August. It lasts 3 - 4 days, where the main event is the competition: a four-hour test of the teams' problem-solving skills. (The rules are governed by a document approved by IAPS, the PLANCKS General Rules.) The teams compete for the glory of winning the latest edition of PLANCKS, and money.  $\epsilon h \times 10^{37}$ , to be precise<sup>1</sup>. On the surrounding days, talks from high-profile speakers (the late, great Stephen Hawking featured at the inaugural PLANCKS!) and a course of social events round out the days.

Much of the guidance in the document [Organising the International Conference of Physics Students](#) applies to organising PLANCKS as well, both because it has similar requirements to ICPS in being an IAPS major event, and because organising speakers, social events, accommodation, food, registration and goodies - among other things - for your participants is common to both. Therefore, this guide will go over more of what PLANCKS is, and point out the essential elements you must organise that differ from ICPS. For more practical experience, you can contact a past OC; for any questions, the IAPS Executive Committee are available at [events@iaps.info](mailto:events@iaps.info) and documents on past PLANCKS are on [iaps.info](http://iaps.info) too.

So, ready to find out what you're getting yourselves in for? Then read on!

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<sup>1</sup> €6,626.07. Actually, only factors of this amount are usually awarded, commonly  $h/2\pi = \epsilon 1,054.57$ .

# The bid

First, since it's most important, a brief overview of what should go into your bid:

- The date
  - Always in May (or June)
  - Lasts 3 days (with optional 4th)
- The locations
  - Your university
    - The competition venue, if it's not the university
  - Your city
    - What are the sights to see and what will you show us?
  - Your country
    - How can participants get there, what will it cost them?
- The teams
  - About 30 (depending on what you have space / money for)
  - 3 or 4 members each
  - Need a room, or some separate space, for each during the competition
- The problems
  - 10 problems
  - From a range of different fields in physics
  - Can you source them all from professors at your university?
  - Can you nab some from prior competitions, or preliminaries?
- The speakers
  - Plan a symposium to open
  - High-profile lecturers
  - Local professors
  - Physics-adjacent speakers?
- The science
  - Lab tours, in your university or further afield
  - Excursions at physics facilities around the country
- The socialising
  - A Nations Evening? A barbeque? A party? Wine and dinner?
- The budget
  - How much will all this cost - typically **€30 000 to €50 000**
  - How will you get the money - at most 50% from participation fees and IAPS
  - Potential sponsors, university help
- Accommodation
  - 90 - 120 or more participants, 20+ observers

Most critical for your bid are the programme, location, and the projected budget!

## The symposium

ICPS' lectures are typically spread out over the course of the week-long conference, as a number of separate plenary sessions. By contrast PLANCKS, with its shorter programme and more scientific focus, arranges its lectures as a symposium held as the opening ceremony. Some lectures have usually been moved outside of this in recent years, with the symposium itself hosting the headline guest speaker of the event. It's also a great place to put the "what is IAPS?" talk 😊

Alongside trying to get a very high-profile, possibly Nobel-Prize-winning speaker to top your list, it will most likely contain a number of lecturers from your university or country who you can easily invite. Something that has worked well for previous organisers is rounding out the lineup with a bit of levity; PLANCKS 2019 invited Dr. Colin Wright who is more known for his entertaining lectures on the physics of juggling than his research work; PLANCKS 2015 had among others Prof. John Ellis, former head of the theoretical physics department at CERN and who included many anecdotes about his tenure there alongside his particle physics. The idea behind the symposium is to highlight top research to competitive students, but variety always makes for a more interested audience!

The usual advice about contacting speakers, especially high-profile ones, very early applies: they may reply slowly and after a long time. It's also good to ensure your publicity is live and ready as you invite speakers; if they can see the prestige of attending PLANCKS and that you have prepared your event well, they are more likely to attend.

Past PLANCKS events have opened the symposium to members of the public for free, as well as to participants. This is a good idea to raise the profile of the event, however, be aware that the lectures in the symposium are appropriately targeted as this will mix experienced physics students with lay members of the public. It is advised to favour the paying attendees, not the public!

## The competition

The central element of PLANCKS is the problems. Unlike for example the unaffiliated International Young Physicists' Tournament, PLANCKS is based on solving theoretical problems in physics, much like problems you might see in an examination. 10 problems are created by professors, solved by bachelor and master students, and marked by at least doctoral students. Generally, the problems cross a wide range of fields of physics, and some range of difficulties as well. Since problems must be sourced from university professors, who are of course known for their great deal of free time!- this work should be started relatively early in the organisation. You can also take unused problems from prior editions or from preliminary competitions (more on those later), if they exist. Of course, the problems have to be previously unseen.

The competition tends to take place on the second day of the event and, according to the current rules, it lasts four hours. Teams are physically separated from one another (bear in mind, this will require a lot of rooms) and may confer amongst themselves as much as they wish to solve the problems, but have no contact with other teams or the outside during the competition. They can of course ask your crew members for clarification or rectification of errors in the problems.

It is worth mentioning observers here; these are participants in PLANCKS who are not part of a team and don't compete. These are usually students who attend for other reasons: members of the Executive Committee, members of the next year's PLANCKS OC, other members of your NC, and so on. While the competition is taking place, the observers workshop is held across the four hours on a number of IAPS-adjacent topics, centering around PLANCKS - this includes you as organisers, who have little else to do but wait for fires to put out. At every other time the observers join all other participants.

A solution is provided with every problem; the correctors mark every problem of every team to find the three teams with the highest total scores. A good strategy is to have a corrector mark one problem and do that for all teams, rather than have them mark all problems for one team, however if you want the marking to be done in reasonable time it's advisable to have at least one marker for every problem and preferably many more. With upwards of 30 teams, there will be over 300 problems to correct before the closing ceremony! It is also good practice to have the problems re-marked by a second corrector afterwards to minimise errors. While your correctors are working frantically, the teams will be off enjoying a relaxing social evening!

As well as setting problems that cover a range of topics and of varying difficulty, you can expose a variety of problem-solving methods as well. For example, understanding and problem-solving exercises versus long and difficult calculations, or lengthy multi-part problems versus a series of separate exercises sub-problems. An example problem and links to past problems are given as [an appendix](#).

## Preliminaries?

'Preliminaries' are mini-PLANCKS competitions organised as national qualifiers for the full competition: in this context, your competition is the international final of PLANCKS! Any member committee of IAPS can organise a preliminary; National Committees do so for their country, while Local Committees for their institution. An increasing number of them do so each year, with ten at PLANCKS 2019 and fifteen at PLANCKS 2020. Preliminaries are usually held in February or March, to give the winners time to register for your finals in May or June.

The reason for this is that PLANCKS itself has grown in recent years and the finals typically cannot accommodate more than about 30 teams. But many more than 30 teams may register, including several from the same country. The clear solution is to organise preliminaries as qualifiers, to filter the teams and allow the best to move on to the final. As an alternative, the country or institution can select teams by some other method (first-come-first-served or something); if they don't do this, you will have to make a selection among the entrants yourself by some means. Clearly, preliminaries are a neat and fair way to avoid this.

Traditionally, two places are allocated to each country, so that the top two teams from each preliminary are selected by your OC to compete. This is totally up to what you can accommodate. Past OCs have admitted three teams from, for example, last year's winning country and the current host country, or from countries with particularly large preliminaries. Additionally, it's up to you to accept preliminaries. If you don't want to, you can select the participating teams without regard for their qualifying status. If there's more than one in a country, you can choose which one is official, and so on. Preliminaries are intimately linked to the finals organisation-wise.

Of course, encouraging preliminaries is a great way to boost participation for your event: each one means guaranteed entrants! As organisers of the final you can coordinate preliminaries so that many of them take place on the same day; this way, they can share a problem set (which may conserve problems for future preliminaries, or for you). You can also organise a preliminary competition yourself, in your own country, or get another university to do it. Some preliminaries are large competitions in their own right, with Germany's and the UK/Ireland's attracted upwards of 30 teams on their own!

Of course, for help with coordinating and attracting preliminaries from IAPS members, don't hesitate to contact the IAPS EC. We can assist with handling registrations for you as well, but this is less usual with PLANCKS than it is for ICPS.

## The programme

The remainder of the PLANCKS programme is a bit free-form, and it is in these parts that PLANCKS most resembles ICPS. The first day of the event may be preceded by an optional arrival day; the fourth day is usually optional as well. A range of social, cultural and scientific activities will fill the rest of your programme: at the end of the symposium, following the competition, and during the last day before the closing ceremony, as well as on your optional day.

Unlike ICPS, there is little mandatory beyond the competition itself. You don't have to accommodate a General Meeting of IAPS nor Delegate Day. As aforementioned you'll host the observers workshop, but this is natural since they need something to do during the competition. You should give space for a "What is IAPS?" talk; you can expect at least one EC member to attend as an observer who will give this talk for you.

Despite this, the activities are much like what is suggested for ICPS' schedule. You can organise laboratory tours, at your university and beyond, and excursions to sites around your country to show attendees the breath of physics done there! You can arrange extra presentations on your university or city, and explainers on the problems by their creators (after the competition!). A dinner after the opening symposium is a good idea; a barbeque party has for reasons unknown become a staple of PLANCKS too. And of course, cultural excursions like a city tour or museum visit are a must.

Arrangement-wise it's a good idea to put longer excursions, like a trip to a neighbouring city, on the optional extra day if you have it. And since PLANCKS has less participants than ICPS tends to, you can probably afford more choice to participants in which excursion or lab tours they will attend (because the numbers probably don't have to be split equally). Long events like excursions are often organised simultaneously, so participants choose one to go on. Again this is due to the compactness of your programme.

Naturally the closing ceremony of the event is essential as well; taking place on the last day, whether morning or evening, it ends the event and announces the anxiously-awaited winning teams! When exactly you place it probably depends on how you want to balance giving time to your correctors for marking versus keeping the teams waiting for their results. Like the opening ceremony, you'll likely use it to give important practical information to participants, like the check-out procedure and departing the event.

Once the event is closed and everyone has gone home, you can congratulate yourself on a job well done... and then get to preparing your event report and final accounts! It's a good idea also to put the problems and solutions online afterwards, as well as update your website. There's an AGM one or two months after your competition, and all the better for you if you can have everything complete by then. If that sounds like a good place to be - well, start preparing your bid now!

## Appendix: Sample problem

This mechanics problem is one of the ones used in the inaugural PLANCKS 2014, as featured in their event report. You shouldn't use this problem, but it may give an idea of the level you are pitching at.

More past problems are available: 2014 ([problems, solutions](#)), 2015 ([problems, solutions](#)), 2016 ([problems, solutions](#)), 2017 ([problems](#)).

## Newton's Cradle

*Jan van Ruitenbeek, Leiden University*

Newton's cradle is a well-known gadget and physics demonstration. It is usually described as demonstrating the laws of conservation of energy and conservation of momentum.

For simplicity we take the motion to be one-dimensional and the collisions to be elastic.

[1] *5 points* We launch a single ball onto the other balls that are at rest, and consider the situation just after the collision. For any number  $N$  of balls (including the launched ball) in the cradle how many solutions do the laws of conservation of energy and momentum permit? For  $N = 2$  and  $N = 3$  describe the set of allowed solutions in  $N$ -dimensional velocity space.

[2] *5 points* When we perform the experiment for  $N = 3$  we find that only one solution is realised. Which solution is this, and explain why.



Figure 1: Newton's Cradle

## Appendix: The Charter and Regulations

IAPS is governed by its Charter and Regulations, which are agreed by its members at the AGM. The Charter is changed only seldomly, as under French association law it must be translated into French and transmitted to the *tribunal d'instance* in the region where IAPS is headquartered each time this is done. The Regulations have no such restrictions, and are much longer.

In the Charter and Regulations, there are articles that govern the organisation of IAPS major events, of which PLANCKS is one. From the September 2019 versions of both documents, they are reproduced here for your reference.

### Charter

#### **17.1.10**

[The AGM should] Elect the National or Local Committees that will host IAPS major events, as specified in Article 19.

#### **17.7.11**

Elected organising committees of IAPS major events are required to briefly update the AGM on their progress at the GM following their election.

#### **18.11**

The election of the Executive Committee, Auditors and IAPS major event hosts must be by secret ballot.

#### **18.12**

In elections for the specific posts of President, Treasurer, Secretary and major event hosts, if there are more than two candidates the voting shall proceed in stages, with the candidate having the least votes eliminated at each stage until a majority of votes for one candidate is reached.

#### **19.3**

All major events of IAPS are in locations that are chosen by the AGM through an annual bidding process. All IAPS major events have a rotating-host system.

#### **19.9**

A GM may pass a vote of no confidence in the organisers of a major event at any time before the event takes place. If such vote of no confidence is passed (see Article 18.14), an alternative host may be rapidly selected or the event may be cancelled for the current year.

*Other clauses in Article 19 referring to IAPS events also apply to major events.*

### Regulations

#### **3.1.1**

[It is recommended to allow the OC of an IAPS major event to use a different currency for their internal financial affairs if useful.](#)

#### **4.2.6**

Organising committee (OC) candidates of IAPS major events, defined in Article 19 of the Charter, should send their bids to the EC, preferably a month before the AGM, which must be made available to all members.

#### **10.1.2**

Only individuals who are members of IAPS or of any of its member committees may take part in IAPS major events, as defined in Article 19 of the Charter. IAPS membership may be required for other IAPS events, as agreed by the OC and the IAPS EC.

#### **10.4.1**

IAPS major events occur annually and aim at reaching a wider audience within the IAPS community. They constitute opportunities for IAPS members and individuals from IAPS member committees to experience a wealth of scientific and social activities, as well as to take part in the life of the Association through assemblies and workshops.

#### **10.4.2**

The OC of any IAPS major event must consist solely of IAPS members or individuals who are part of an IAPS member committee.

[The committee may include non-students as consultants, but they must have no right to vote within the committee, if an internal vote is called by any member of the OC.](#)

#### **10.4.3**

Prospective organisers of IAPS major events must usually submit a bid to the IAPS AGM two years ahead of the event taking place.

#### **10.4.4**

Bids to host IAPS major events must include the expected duration of the event, the expected number of participants and a preliminary timetable. They must give details on the location, activities and accommodation. Furthermore, a provisional budget, including the estimated participation fee and a list of potential sponsors must be presented.

#### **10.4.5**

Following the selection of the OC of an IAPS major event, a representative of the latter is required to sign an agreement with the IAPS EC. Such agreement, to be originally drafted by the IAPS EC, must ensure complete observance of the IAPS Charter and Regulations over the course of the event organisation, as well as support effective communication between the OC and the IAPS EC. It must also include the amount of the financial guarantee granted by IAPS, see article 10.4.13.

[This agreement exists so that some details of the event and its regulations are agreed upon to start with. The agreement may contain upper/lower limits on budget and participation fees.](#)

#### **10.4.6**

OCs of IAPS major events must update the IAPS EC on a time basis and through appropriate means that must be agreed between the two committees.

If the OC is understood to be unacceptably behind on preparation for their event, the EC may convene a GM to call for a vote of no confidence on the OC and thus obtain a replacement from any country that may wish to undertake the required organising tasks.

#### **10.4.7**

OCs of any IAPS major event must present an update on their work to the IAPS AGM one year before the event is planned to take place. Such update must provide details on the OC composition, location, activities and accommodation. It must include a presentation of the event website, a list of potential guest speakers, a list of sponsors and a detailed budget, including participation fees. Contracts for accommodation and venues should also be presented.

#### **10.4.8**

The website and all publicity materials of any IAPS major event must contain links and explicit references to IAPS, including all materials that the EC wishes to be included.

#### **10.4.9**

The OC of an IAPS major event must produce a report within six months of concluding the event, incorporating final accounts together with any information that may be useful to subsequent OCs. Such report must be sent to the IAPS EC, filed in the IAPS archive and be presented by a representative of the OC at the following AGM.

In case no one from the past OC is able to attend the following AGM, the report may, under exceptional circumstances, be presented by the IAPS EC, although this should not be encouraged.

#### **10.4.10**

The IAPS EC may accept sponsorship on behalf of the OC of an IAPS major event. This funding should be included into the OC budget when confirmed by the IAPS EC.

Additional sponsorship for an IAPS major event through IAPS is possible upon an agreement between the organisers and the IAPS EC.

#### **10.4.11**

IAPS additionally maintains a separate fund for each IAPS major event in order to compensate for possible financial losses of an OC.

#### **10.4.12**

The amount in each major event fund is limited. If this maximum amount is exceeded, the surplus will go into IAPS' regular budget.

These funds correspond each to a reserved amount of money on the IAPS bank account. Of course, in the case that the maximum amount in the fund for a particular major IAPS event is exceeded, the IAPS EC may decide to use the surplus to fill the fund of another IAPS major event.

#### **10.4.13**

The IAPS EC must give a financial guarantee of one third of the maximum amount of the

corresponding fund to the OC of a particular IAPS major event, conditional on the availability of this amount in the corresponding fund. Whenever this amount cannot be guaranteed immediately after the selection of the OC of an IAPS major event, this must be done as soon as the corresponding fund contains enough resources to do so.

This article relates the amount of financial guarantee to the maximum amount that the fund of the corresponding event is allowed to contain. Moreover, when granting the financial guarantee, the IAPS EC has to consider all IAPS major events of a particular kind, which have already been accepted by a GM.

#### **10.4.14**

In the case of a loss from organising an IAPS major event, the OC will automatically obtain a compensation from the respective IAPS fund in order to break even, unless the OC has violated its agreement with the IAPS EC, see article 10.4.5, when a compensation requires the approval of the IAPS EC. However, any compensation paid by IAPS is limited by the amount of the financial guarantee, see article 10.4.13.

In case of financial loss from organising an IAPS major event, the organiser should automatically receive the promised compensation unless they did not abide the agreement with IAPS.

#### **10.4.15**

The OC of any IAPS major event should not plan on making a substantial profit under any circumstances. In case of a profit, this must be divided between IAPS and the OC as follows. First, all sponsorship received through IAPS according to article 10.4.10 must be transferred back to IAPS. Second, the remaining profit should be split equally between IAPS and the OC. IAPS must deposit its share in the fund of the corresponding IAPS major event.

This is to prevent excessive profit from IAPS support. However, IAPS will not demand the full amount of money. Note that an organising NC/ LC will typically receive less sponsorship in the year after collecting a large sum for an IAPS major event.

#### **10.4.16**

Any payment into the IAPS bank account must be made no later than three months after all contracts have been fulfilled. An extension may be granted by the IAPS EC.

This is to account for extended times that may be taken by sponsors to fulfil agreements.

#### **10.4.17**

Whenever a particular fund does not contain sufficient resources, the IAPS EC may choose to transfer money to the fund, but is not obliged to do so.

#### **12.1.1**

The Physics League Across Numerous Countries for Kick-Ass Students (PLANCKS) is an IAPS major event organised annually in May or June and constitutes the primary scientific competition in IAPS. It lasts at least three days.

#### **12.1.2**

There may exist national preliminary competitions of PLANCKS organised by IAPS members whose organising role is accepted by the PLANCKS OC. Any team from this country may only participate in PLANCKS by qualifying via the preliminary competition.

#### **12.1.3**

If no national preliminary competition is organised in a particular country, any team from this country may register directly for the PLANCKS competition.

[The organisation of a national preliminary competition is encouraged in countries where multiple teams register in any one year.](#)

#### **12.2.1**

The organisers of PLANCKS must inform all IAPS members of the essential details of the competition (including dates, locations, costs and all other information available for early dissemination) at least six months in advance. Furthermore, the PLANCKS OC should distribute the information of all available preliminary competitions to all IAPS members.

#### **12.2.2**

Organisers of PLANCKS preliminaries should inform the PLANCKS OC of national preliminary competition winners.

#### **12.2.3**

Team registration for PLANCKS must open at least five months in advance.

#### **12.2.4**

The program of PLANCKS must be presented to the IAPS EC at least three months in advance of the competition. This program should be presented alongside a detailed budget.

#### **12.3.1**

PLANCKS participants may apply for financial support for the registration fee and/ or travel costs.

They must apply to the IAPS EC at least three months prior to the event. The EC decides on the award of such support and informs applicants of its decision at least two months prior to the event.

#### **12.3.2**

The PLANCKS-fund of IAPS is limited to 6000 €.

#### **12.4.1**

The competition must involve teams of three to four individuals who are members of IAPS or of its member committees studying for bachelor's or master's degrees in Physics or a related discipline.

#### **12.4.2**

All IAPS members are encouraged to organise a national preliminary competition to choose their teams for the wider PLANCKS competition. The PLANCKS OC should be informed of any preliminary events.

The PLANCKS OC may offer resources to run such national competitions, but is not obliged to.

### 12.4.3

The rules of the PLANCKS competition are regulated in the document named “PLANCKS General Rules”.

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International Association of Physics Students  
August 2020