

Introduction to and activity overview of the International Association of Physics Students

Dear Members of the IUPAP Executive Council and IUPAP Committee Chairs,

as we, the International Association of Physics Students (IAPS), are not a section of IUPAP, but rather a hopefully upcoming and potentially highly productive collaboration partner of IUPAP, we would like to use this report not only to give you an overview of our latest activities, but also to introduce ourselves to you in greater detail. Currently our unique network consists of over 60,000 members worldwide, which are organised in National Committees (NCs), Local Committees (LCs) as well as Individual Members (IMs). This document will give you some impressions of what IAPS is about. More importantly, it should give you an idea where your committee or working group potentially can work together with IAPS on a common goal or for a joint event.

IAPS is a non-profit, non-governmental organisation run entirely for physics students, by physics students from around the world. With a spirit of mutual understanding and equality, our goal is to achieve global collaboration among physics students. As an umbrella organisation, we support both local chapters at universities and national physics student societies in promoting transnational cooperation in a scientific, social and cultural context.

Outline

- A. IAPS in a nutshell
 - I. International Excursions and Exchanges
 - 2. Networking and Opportunities
 - 3. IAPS School Day
 - 4. Support for Member Ideas
 - 5. ICPS and PLANCKS
- B. Who is IAPS the IAPS member structure
 - I. Individual Membership
 - 2. Local Committee
 - 3. National Committee
- C. Local Sample Events
- D. Recent and upcoming international IAPS Events

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A. IAPS in a nutshell

I. International Excursions and Exchanges

What is more fun than doing physics? Exactly, experiencing physics together with other physicists from different countries! This is why a core concept of IAPS is to organise physics related activities and to support members to realise their own event ideas. How we achieve the second part exactly is depicted in A.4. While we would like to mention some of our regular international events as examples, for the beginning. Overall, we quite consistently follow the simple idea of "physics + social activity = physics network" with our events.

iaps4FUSION

International excursion in the UK on plasma physics and nuclear fusion. Starting with lectures at the University of Oxford, the Joint European Torus (JET) experiment in Culham is visited, followed by a trip to laboratories of Imperial College, London.

• iaps2CERN

International excursion in Geneva, Switzerland on nuclear research, including a visit to CERN and some of its experiments.

• Lights of Tuscany

International event on photonics in Pisa and Florence, Italy, including a visit at the gravitational wave observatory VIRGO as well as the National Enterprise for Nanoscience and Nanotechnology.

• German Italian Physics Exchange

Recently established exchange programme between NC Italy and NC Germany with lectures, lab tours and excursions to facilities such as DESY, launched in November 2017.





2. Networking and Opportunities

In the past years IAPS has been monotonously growing. Growing mostly also in areas where there has not been a high density of IAPS members before. This also means that an increasing number of our members will not be able to join all our events so easily – mostly due to pecuniary reasons, long travel distances, but also due to the natural limitation of attendance.

Therefore, programmes and activities that do not have any natural limitation and do not need a high effort neither to organise nor to attend them. In that context the IAPS School Day which will be depicted in the next section was developed. Further, we worked and are still working hard to provide our members with a better digital involvement into IAPS. Quite recently, we started to actively discuss video recordings at events/for keynote speakers and on providing/developing appropriate IT to make it available for our members.

The main parts of our current IT strategy are described in the following paragraphs.

i. IAPS Members Network/Contact Network

The Members Network is going to be the heart of our digital infrastructure. It is not only designed as a database for the IAPS network, but as an interactive one where our members can update their personal information, find each other and register for our events.

For example, if they met a student working in the same field or at a university they would like to apply to, but they missed to exchange contact details, they can reconnect via the event both of them attended. On top of that, this kind of contact does not necessarily require a physical meeting. Furthermore, if someone is interested in organising a certain type of event, but has no experience in doing that yet, contacting a person who has run a similar event before via the Members Network might solve the issue. Needless to say, data protection is implemented appropriately and data is handled confidentially. The Members Network development is still ongoing with more features to come.

The IAPS Contact Network depicts the predecessor of the members network that is currently being developed. It consists of direct contact persons at about 100 universities and has been initiated years ago to link IAPS members better between each other. Its primary goal is to provide members with reliable information about potential degree programs at other universities.



ii. IAPS Wiki

Our Wiki serves as a central place for interactive documentations. NCs and LCs can document their activities there and provide valuable feedback. Get inspired by best practise examples of other committees: How to secure funding for a local event effectively? What is the best way to invite guest speakers? Which legal details do I have to consider when conducting an event? The answers to these and more questions can be found in the Wiki. With this thorough documentation provided by IAPS, knowledge is being passed from one generation of physics student to the next one.

For the future an implementation of IAPS real world events as webinars where students who were unable to attend a given event can see recordings of the keynote speakers, is planned.

iii. FERMI Internship Database

The FERMI project was initiated by an IAPS member, NC Italy, in December 2014. It has the twofold goal of collecting information on high-level internships for physics students available both in Italy and abroad as well as promoting the creation of new internship opportunities in Italian universities, laboratories and research centres.

This webpage contains the FERMI Project database of internships and summer schools for physics students. They are classified according to many parameters (field of research, country, region, paid/unpaid, period of the year, etc.) for your convenience.

3. IAPS School Day – a Local, International Event

Usually one might think of an international event to be located at some place one has to travel to – which can be a huge effort not everyone is able to take. Therefore, we are particularly proud of the IAPS School Day concept which was established in 2015 during the UN International Year of Light and Light based technologies. It's both local and international!

On the 10th November, the World Science Day for Peace and Development, all our members are encouraged to perform locally at their universities or in schools outreach activities for high school students under a common topic with the goal of raising interest in science. This year's topic is particle physics. While each outreach event is held locally, it remains an international endeavour by connecting the students to others around the world who are simultaneously doing the same thing. This can be done via video calls across time zones. Help with organising and activity ideas are provided through the IAPS network.



For small equipment IAPS is even able to provide funding in addition to conceptual help. Further, the newly declared International Day of Light inspired us to introduce a permanently light-based School Day in May of each year in addition as its first version related to the International Year of Light has been very successful.

4. Support and Amplification of Member activities

During the more than three decades of existence it turned out for IAPS that a funding scheme which specifically encourages member committees to offer nationally organised events to the international community of physics students works well. As it is an unbureaucratic, transparent and still flexible way to organise our distribution of small event funding. Therefore all our grants which are summarised below do follow that general idea.

On top of that we do encourage in particular younger IAPS committees to apply for certain grants as well; where we actively link experienced members with motivated new event organisers. From our currently available grants some of them could also be used for joint events together with IUPAP; while in practice our manpower and our pool of active volunteers might be more appreciated.

IAPS offers several grants for a wide range of subjects, such as: individual travel grants, funding for science outreach events, the IAPS School Day, member exchanges and international excursions.

Our currently available grants are:

• New Members Support Grant

- To support the coverage of legal fees in connection to the official registration of a new committee
- To support first events by a committee
- o More information: <u>http://www.iaps.info/grants/support-for-new-members</u>
- Example: NC Spain, LC Kharkiv

• IAPS Member Action Programme (IMAP) Grant

- For encouraging interactions between all IAPS members
- Requires 40% international participants
- Usually results in formats with at least 10 different countries represented in events with on average 40 participants
- More information: <u>http://www.iaps.info/grants/imap</u>
- Example: PAPAP, iaps4FUSION, Lights of Tuscany

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• IAPS Light Grant

- To support the organisation of International Day of Light activities, that happen simultaneously around the world in the week of the 16th May 2018
- More information: <u>https://www.iaps.info/grants/iaps-light-grant/</u>

• IAPS Exchange Grant

- To facilitate exchanges between IAPS members
- Application by 2 LCs/NCs
- o More information: <u>http://www.iaps.info/grants/iaps-exchange-grant</u>
- Example: German Italian Physics Exchange, Hungarian-German exchange

• IAPS Outreach Grant

- To support the initiation and development of science outreach projects, workshops and forums
- More information: <u>http://www.iaps.info/grants/outreach-grant</u>

• ICPS Worldwide Grant

- To enable physics students from around the world to attend the International Conference of Physics Students (ICPS)
- More information: <u>http://www.iaps.info/grants/icps-grant</u>

• IAPS School Day Grant

- To support the organisation of IAPS School Day activities which happen yearly on the 10th November
- o More information: <u>https://www.iaps.info/grants/school-day-grant-2017/</u>

5. ICPS and PLANCKS

The International Conference of Physics Students (ICPS) is a truly international event and the highlight of every academic year! Dating back to 1986, it has brought physics students from all over the globe together for more than 30 years. The next ICPS will take place in Helsinki, Finland in August 2018 and will have over 300 participants from more than 50 different countries. Seven days full of student talks, poster sessions, excursions and of course lots of social activities such as the Nations Party make this event simply legendary. Most noteworthy from the IAPS organisation perspective is the meeting of all IAPS committee delegates together with our Annual General Meeting, where the next Executive Committee, ICPS and PLANCKS host are elected.

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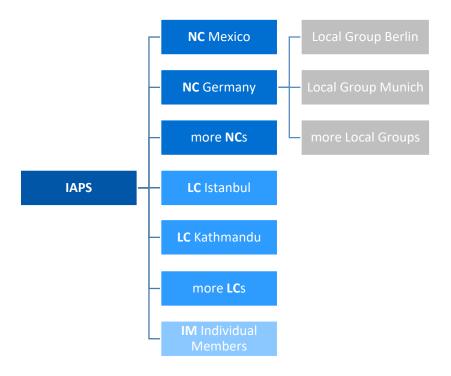


PLANCKS, the Physics League Across Numerous Countries for Kick-ass Students, is the second major international IAPS event. Designed for teams of three to four physics students to tackle challenging problems within a four-hour time limit. Many member countries host their own preliminaries to select the best team to send to the international final, this year taking place in Zagreb, Croatia. Guest lecturers have included Neil deGrasse Tyson and Stephen Hawking. The final is a four-day event consisting of lectures, cultural excursions and of course the PLANCKS competition itself!



B. Who is IAPS – the IAPS member structure

There are three different membership types in IAPS, referring to the degree of existing organisational structures in the respective country. The following section provides an overview over the various types as well as IAPS' structure.



I. Individual Member

- For students at universities without an existing Local Committee (LC) or National Committee (NC)
- Full access to all IAPS events and the Membership Network
- Limited voting rights (all individual members of a country without existing NC or LC have only have one vote in total per country at the Annual General Meeting (AGM))

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2. Local Committee

- Already existing local physics or science societies in a city or at a university!
- Organisation of LC partnerships to get new LCs get started faster within IAPS
- LCs receive all previous perks plus:
 - Full access to IAPS grants to help finance events and eligibility to host major IAPS events (ICPS, PLANCKS)
 - $\circ~$ Extended voting rights at the AGM (2 votes per LC, to a maximum of 6 votes per country)

3. National Committee

- Designed for multiple active local groups at different universities across a country.
- Encouraged to have a link with a national physics student network (such as the IOP in the UK, the APS in the U.S. or the DPG in Germany) if applicable.
- Organise national events, including an own AGM
- NCs receive all previous perks plus:
 - Maximum voting rights at the AGM (7 votes per NC)

To sum up, becoming an IM is easy and has lots of benefits, starting an LC is good for motivated members, whilst joining as an NC is the most advanced option. Thus, the membership types scale with the size of the organization involved.

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The following table compares the three available membership types and fees:

Member Type	Individual	Local	National
Membership Fee	10€	I/3 * Fee Formula	Fee Formula
Access to all IAPS Events	\checkmark	\checkmark	\checkmark
Access to the Members Network and IAPS Wiki	\checkmark	\checkmark	\checkmark
Access to individual IAPS Grants (e.g. travel grant)	\checkmark	\checkmark	\checkmark
Access to non- individual IAPS Grants (e.g. exchange grant)		\checkmark	\checkmark
Eligibility to host PLANCKS & IAPS		\checkmark	\checkmark
Voting Rights in the AGM	in total for all IMs per non-LC/non-NC country	2	7

Fee Formula:

 $\min\left(discount \cdot \left(75 + 2 \cdot \sqrt[3]{\text{GNI}[\text{in } 10^6 \,\$]}\right) [\text{in } \textbf{\in}], 400 \,\textbf{\in}\right)$

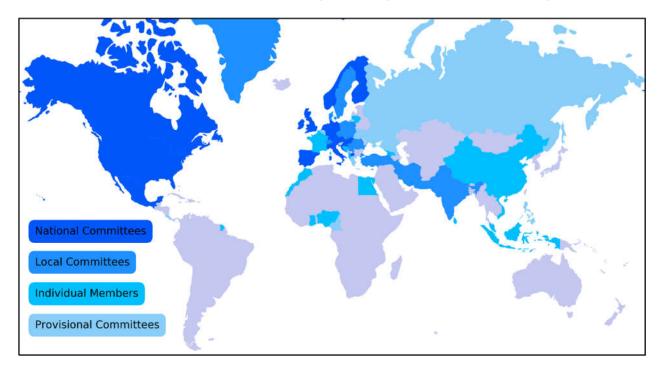
Our fee formula is rather unconventional and depends strongly on the Gross National Income of each country, we are happy to assist you applying it. Further, we can also support you with concepts and experienced advisers in case you are interested in creating an IAPS committee.

Available discounts for newly joined NC/LC's:

- Freshers' discount
 - -50% in the first year
 - -25% in the second year
- Members outside Europe have a 50% discount.

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The following map shows our members around the globe. All of our current members are listed here: <u>http://www.iaps.info/members/list-of-iaps-members</u>



As mentioned before, IAPS has an existing grant for administrative costs to facilitate the foundation of a local or national committee.

Find more information here: <u>http://www.iaps.info/grants/support-for-new-members</u>

In the following sections we will provide some more information about our events and infrastructures. There will also be suggestions of best practise examples to organise local events.



C. Local Sample Events

As an IAPS committee – both local and national – the most regular events usually happen on a local basis in order to keep members interested and thus active within our community. Some examples which have worked quite well are given below; they usually consist of an official part and an intended less official, more social part. More concepts and examples are available upon request.

• Local Excursion or Lab Tour

For example, organising an excursion to a local science related company or asking a professor for a lab tour as a starting point in order to find more members. In addition, you can also inform other students about IAPS and our activities. We would happily support you with informational material!



• Meet your Prof

A breakfast or a dinner with one of your professors or teaching staff where they explain in about 30 minutes their current research. This works especially well due to the fact that mostly teaching staff are usually barely talking about research in their lectures. Subsequently to the talk, people dine together and start discussing about the content informally.

Science Slam

An evening event where older students as well as teaching staff present their research in 10 to 15 minutes talks as funny as possible. Usually this takes place in a lecture hall ending up with a vote for the best talk which then gets a little award. This is quite popular in some countries. For instance, NC UK and Ireland have transformed this idea into a 3 minute wonder (3MW) which has local heats across the country and a national final, for PhD students to present their research in a fun and understandable way without any lecture slides.



• Physicists in their Professions

Within these events professional physicists are invited to the universities of the corresponding local chapters to give a lecture. The content of the lectures usually include a brief presentation of the company, an overview of the workplace/professional field and daily schedule. It should also include personal experiences and tips, e.g. in the application process. After the lecture there is a short discussion.

• Physics meets!

Two speakers. One topic. No borders. "Physics meets!" is perfect for intensifying the interdisciplinary dialog among students and for cooperating with similar organisations such as a Chemistry society, etc. It encourages to "think outside the box" of physics and presents unusual areas of work and research for physicists. Two speakers are invited, a physicist and a non-physicist, e.g. a mathematician, chemist, musician, philosopher, economist, to speak about their own research and their involvement in other disciplines.

• Boat/tower challenge

All participants for small teams of three to six people per team. Each team receives a previously defined amount of resources (e.g. 4 sheets of paper, I balloon, I meter of tap, etc.). Then the team that is able to build the highest tower/the best boat wins. However, the main focus is on networking and team building, which usually works out really well as the teams discuss about their project and thus naturally interact with each other. Overall, it is a great recruitment event.



Last but not least we would like to briefly outline our most recent international events.

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D. Recent and upcoming international IAPS Events

• Particle and Astroparticle Physics Autumn Programme

In October 2017 NC Italy organised already in its third edition the international excursion PAPAP to Rome, Frascati National Laboratories and the Gran Sasso Science Institute.

On first day the around 40 participants visited the University of Rome. Followed by the Frascati National Laboratories where cutting-edge research in the field of acceleration physics and laser physics is conducted on the second day. While the consecutive days has been spent at the Gran Sasso underground laboratories and ultra-low background experiments including a student talk and poster session.

Where & When:Rom & L'Aquila, Germany, 9th - 13th October 2017More Information:http://ai-sf.it/papap17/index.html

• German Italian Physics Exchange

The Italian Association of Physics Students (AISF) and the junge Deutsche Physikalische Gesellschaft (jDPG) met for the first edition of the German Italian Physics Exchange (GIPE) in Hamburg in November 2017.

During the Programme, 40 students will be able to visit some cutting-edge facilities such as the labs of the Max-Planck-Institute for the Structure and Dynamics of Matter, the Center for Free-Electron Laser Science and the Institute of Laser physics. Moreover, the participants will be given talks by local professors and researchers.

Where & When:Hamburg, Germany, Ist - 5th November 2017More Information:http://ai-sf.it/gipe/

• IAPS SchoolDay – Acoustics

During the last IAPS School Day on the 10th November being the UN World Science Day, IAPS members engaged in activities and project days in schools around the globe related with acoustics.

Supported activities by IAPS have been for instance a project in Nepal reaching 200 students who have built their own syringe hydraulic devices or a sound-experimental show session in Mexico for 100 students featuring standing waves in flames and visualizing sound waves by a non-Newtonian fluid to name a few. Besides that, there have been several supported activities in Europe (Italy, German, Croatia among others).

Where & When: around the world, 10th November 2017

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IAPS2CERN



IAPS organises a trip to CERN, the European Center of Nuclear Research, on a yearly basis since about a decade. The visit this year included LHCb, ISOLDE, DELPHI, RD51 as well as the European headquarter of the United Nations, but also a brief swing-by the birthplace of the WorldWideWeb. Further scientific highlights have been a guest lecture at the university of Geneva as well as a hands-on session by PhD students at CERN on their work and student opportunities at the European Organization for Nuclear Research.

At the same time, there intentionally has been left enough time for networking between the 40 participants from 14

different countries at the evenings – supported by a nations food night where students cook dishes from their own country and a Swiss host night with chess and checkers.

Where & When:Geneva, Switzerland, 6th – 9th March 2018More Information:cern.iaps.info

• PLANCKS 2018

PLANCKS is an annual international physics contest for bachelor and master students. Due to its large success last year, also this year's edition will be organised in a four-day event from Friday to Monday and will include, in addition to the competition itself, social events like a symposium, excursions, social activities and the award ceremony. Participants of PLANCKS compete in teams



consisting of three to four physics student and having to solve challenging theoretical physics exercises over the four-hour time limit. This year we are expecting a similar-sized event as already last year with 36 teams from around 20 countries.

Nevertheless, for us as an international organisation it is as least as interesting to explore how we can involve members that cannot afford to travel to PLANCKS. As last year traveling scholarships, are an option; while remote participation as we test it this year for the first time might open up PLANCKS to an even broader audience. Another highlight this year will be a parallel workshop with past and future preliminary organisers to ensure a high standard already at that level and to transfer knowledge from one generation of organisers to the next one.

Where & When:Zagreb, Croatia, 11th to 13th May 2018More Information:http://www.iaps.info/event/plancks-2018

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International Day of Light



The International Year of Light in 2015 has been a success with 13,168 events in 147 countries, 23.000 mentions in the media and more than 100 million people directly reached. The UNESCO Executive Board has now decided to establish a permanent legacy in the form of an International Day of Light (IDL).

International Day of Light

16 May

IAPS has been already involved in the IYL in 2015 where the IAPS School Day has been born, and will take part during the IDL in a similar manner; locally with light based experiments performed in schools or in public and internationally with 25 IAPS volunteers at the official ceremony in Paris on the 16th May 2018, the 60th anniversary of the first laser operation.

Where & When:	Around the world, 14 th – 18 th May 2018
More Information:	http://www.iaps.info/grants/iaps-light-grant

• IAPS4Fusion

laps4fusion is the annual excursion for all IAPS members to come to the UK and have an exciting weekend learning about fusion and particle physics. The programme will include visits to the University of Oxford, the Culham Centre for



Fusion Energy (for the JET fusion reactor) and Imperial College London. The participating students will also be welcomed to the Institute of Physics (IOP) by the IOP particle physics group and have time to see the sights in London and Oxford.

For this excursion, there are in total 40 places available; 20 for UK students and 20 for international students, from 7 countries featuring Iran and the United States among them. The later circumstances that IAPS is able to bring together students from countries that are rather opponents than friends is actually not uncommon within our events. And it is a circumstance of which we are particularly proud of.

On top of that travel grants are available via European Fusion Education Network (FUSENET).

Where & When:Oxford & London, 24th -27 June 2018More Information:http://www.iaps.info/activities/trips/iaps4fusion

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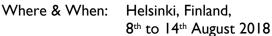
• ICPS 2018

After a long gap of 19 years, the International Conference of Physics Students returns to the northernmost location in its history, Helsinki, Finland.

The event is held from 8th to 14th August 2018 and it is organized by Resonanssi and Fyysikkokilta, the physics student associations at the University of Helsinki and Aalto University, respectively. There are many highlights worth mentioning. Meanwhile the well-known nations food night, hundreds of participants from around the globe and first-class key note speakers have become standard. Nevertheless, this year we will be able to for the first time to reach the magic number of 50 different participating countries.

From an IAPS organisation perspective, it is also our most important event of the year as our Annual General Meeting will take place during the ICPS as well as the meeting of our committee chairs called delegate day to which IUPAP has been invited to.





More Information: http://icps.helsinki.fi/icps-2018/





With this letter, we hope that you have got a comprehensive overview of IAPS: Its benefits, such as the Members Network or its membership types, larger international events and typical local events.

We sincerely hope to have raised your interest in IAPS and are looking forward to a future collaboration with IUPAP. Initial fields of collaboration could be on outreach events such as our School Day concept as this is not barely limited to physics students, but might also be well-suited to be conducted by physicists in general.

On top of that, IUPAP members would fit well as mother societies of IAPS National Committees. While IAPS would be able to contribute to the collaboration with its experience and concepts on how to run a national student chapter efficiently and smoothly.

Yours faithfully,

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