ICPS 2017

Torino

Programme Booklet

Sunset view of Torino from the Monte dei Cappuccini.

A l'alta fantasia qui mancò possa;
ma già volgeva il mio disio e 'l velle,
sì come rota ch'igualmente è mossa,
l'amor che move il sole e l'altre stelle.

Dante Alighieri, *Divina Commedia - Paradiso, canto XXXIII*, 14th century.

ICPS 2017 TORINO

AISF associazione italiana studenti di fisica

{iaps}

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1. Benvenuti a Torino!

1.1 Welcome Address of the Organizing Committee

Ciao everybody and welcome to Torino!

It's an honor and a pleasure for us to welcome you to the XXXII International Conference of Physics Students. A great week awaits us and we are very excited to start this adventure with you all.

In the coming days you will hear from world-renowned scientists, you will experience amazing excursions, and the finest Italian cuisine will excite your tastebuds beyond your best expectations. Some of you will also take on the challenge of telling your fellow physics students about your research work.

By sharing knowledge, getting to know each other and exploring Torino, you'll make this conference an unforgettable experience. All of you have different backgrounds and identities; it couldn't be otherwise since you come from almost every corner of the Earth! Nonetheless, we all share one passion: physics, of course.

Learning, sharing and creating bonds have always been cornerstones of what constitutes the perfect ICPS. The mix of excellent physics and amazing social events has proved to be quite explosive and after this week we are sure you will come to love the IAPS way.

As members of AISF (Italian Association of Physics Students), we did our very best to match the high standards required for this event and we hope you'll enjoy everything the city of Torino has to offer. All organizers and volunteers will be at your service to make this a memorable experience. We wish you a lovely stay and a great ICPS!

The XXXII ICPS Organizing Committee

On the *poems* throughout this booklet

You will notice that some Italian poems are scattered throughout the booklet. Italians are very proud of their language and of its rich literary tradition. Indeed, some literary works, from Dante's *Divina Commedia* to Salvatore Quasimodo's *Ed è subito sera*, are a core part of the culture of our *Bel Paese*. Do ask the Italian friend sitting next to you for a translation!

Taci. Su le soglie
del bosco non odo
parole che dici
umane; ma odo
parole più nuove
che parlano gocciole e foglie
lontane.
Ascolta. Piove
dalle nuvole sparse.
Piove su le tamerici
salmastre ed arse,
piove su i pini
scagliosi ed irti,
piove su i mirti
divini,
su le ginestre fulgenti
di fiori accolti,
su i ginepri folti
di coccole aulenti,
piove su i nostri vólti
silvani,
piove su le nostre mani
ignude,
su i nostri vestimenti
leggieri,
su i freschi pensieri
che l'anima schiude
novella,
su la favola bella
che ieri
t'illuse, che oggi m'illude,
o Ermione.

Gabriele D'Annunzio,
Alcyone - La pioggia nel pineto, *first strophe*,
1903.

1.2 Welcome Address of the President of IAPS

Dear member of IAPS,

Welcome!

We are overjoyed that you have chosen to join us at the biggest event of the year in the physics student community. The organisers from our Italian National Committee have worked very hard with great dedication and they deserve a big thank you for their efforts.

By having come here, you have also chosen to be part of the International Association of Physics Students. Our organisation is run by physics students and for physics students in an effort to increase peaceful worldwide collaboration. As such, we offer numerous events and we seek to connect you to great opportunities in term of internships, research, and education. Should you wish to know more about IAPS and the community, we encourage you to attend the IAPS workshops and maybe the Annual General Meeting. Both are described later in this booklet.

I guess all there is left to say is: get out there, learn, connect, and have fun!

On behalf of IAPS,

Henrik Siboni, President of IAPS

2. Important Information

Members of the the Organizing Committee (OC in what follows) will have black shirts and the volunteers will have blue shirts. An info desk will always be found at the residences and at the Campus Luigi Einaudi for the full duration of the Conference. Volunteers will be present at all events. In case you encounter problems or have any questions, do not hesitate to contact the volunteers or the OC. In addition to the useful phone numbers provided below, for **emergency situations**, you can also call the number +39 391 31 67 710, (**only available during the Conference**), which will be managed by a member of the OC. The Italian country code is **39**.

During the Conference maximum temperatures of around 30 °C (°F = °C × 1.8 + 32) with a humidity of 70% are expected. We recommend bringing with you a bottle of water and possibly sunscreen as well as a swimsuit if you are going to any water-fun activity. We also recommend saving on your phone or laptop a copy of the *Practical Information* and bringing with you this Booklet. Make sure to always bring your personal Conference badge with you.

2.1 Useful Phone Numbers

For all emergency situations: 112 (no country code needed)

State Police: 113

Fire Department: 115

Medical emergency: 118

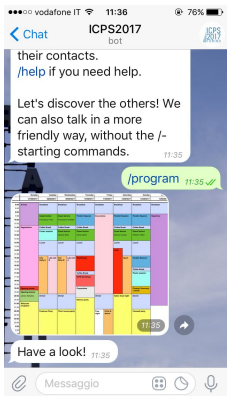
Environmental emergency: 1515

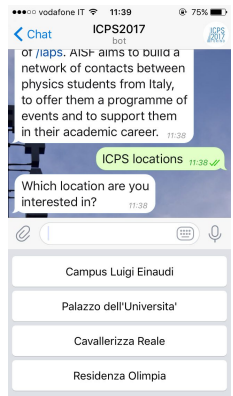
Rescue at sea: 1530

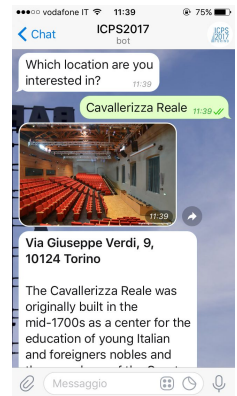
2.2 Official XXXII ICPS Telegram bot and channel

Want to always be up to date? If you haven't done it yet, download the live-chat app *Telegram* and look for **@icps2017_bot**, the groundbreaking official bot of the Conference! The aim of the bot is to give you all information you may need during the Conference, like the program or the address of the accommodation. At */basic* you can find a list of basic commands in order to begin using the bot. Anyway, it is more than that list! Explore it and you will find a lot of interesting stuff.

You can also chat with the bot without the /-starting command paradigma to obtain a more friendly conversation. For instance, asking *What will be the program of August 9?* the bot will recognize the words *program*, *August* and *9* ad it will reply you the requested program. Furthermore there are several Easter Eggs! ;)







Unexpected classroom change? Free beer somewhere? Join the official Telegram channel **telegram.me/icps2017** and do not miss the most important communications.

2.3 Useful Addresses

Conference venues

CAMPUS LUIGI EINAUDI

The Campus Luigi Einaudi (CLE) is the main location of the Conference. It was built in 2012 and today houses the law, politics, economics and social sciences departments of the Università degli Studi di Torino. It was included by CNN International among the the most beautiful University buildings in the world. All the guest lectures as well as the parallel and poster sessions, the workshops, the coffee breaks and the IAPS Delegate Day activities will take place here. The IAPS Annual General Meeting will take place in the adjacent Palazzina Einaudi. ***The exact locations will be specified in the detailed timetable on the back cover.***

Address: lungo Dora Siena, 100 A, 10153 Torino
Telephone: +39 011 670 9409
The Campus is located near the bus stops (line number - stop name):
68 - Campus Einaudi
19 - Verona, Pisa

LECTURE HALL OF CAVALLERIZZA REALE

The Cavallerizza Reale was originally built in the mid-1700s as a center for the education of young Italian and foreign nobles and of the page boys of the Court. Today the Cavallerizza houses a new Lecture Hall of the Università degli Studi di Torino. The Opening Ceremony will take place here.

Address: via Giuseppe Verdi, 9, 10124 Torino.

COURTYARD OF PALAZZO DELL'UNIVERSITA'

The University's head office is located in this eighteenth century building designed and built as part of a university reform. It is close to the Cavallerizza Reale and possesses a strong official and symbolic meaning. The most spectacular element of the building is the courtyard with a double loggia. The celebrations following the Opening Ceremony will take place here.

Address: via Giuseppe Verdi, 8, 10124 Torino.

The Lecture Hall and the Courtyard are a 15-minute walk away from the Campus, near the bus stops: 68, 18 - Po/Verdi.

Accommodation

RESIDENZA OLIMPIA

The Residenza Olimpia is just opposite the Campus Luigi Einaudi: all lunches and most of the social activities in the evening will take place here.

Address: lungo Dora Siena, 104, 10153 Torino
Telephone: +39 011 0829 2500
The Residenza Olimpia is near the following bus stops:
68 - Campus Einaudi
Verona 19 - Verona, Pisa

RESIDENZA VERDI

The Residenza Verdi is on the same street as the Lecture Hall and the Courtyard, 15-minute walk from the Campus.

Address: via Giuseppe Verdi, 15, 10124 Torino
Telephone: +39 011 653 1300
The Residenza Verdi is near the bus stops of line:
68, 18 - Po/Verdi

Duration of Journey from/to

Min.	A	D	PS	PN	C/O	V
A		20-25	30-40	30-45	40-60	40-50
D	20-25		15-20	20-25	20-25	30-35
PS	30-40	15-20		5-10	25-30	15-20
PN	30-45	20-25	5-10		15-20	10-15
C/O	40-60	20-25	25-30	15-20		10-15
V	40-50	30-35	15-20	10-15	10-15	

A = Torino-Caselle airport

D = Dora GTT railway station

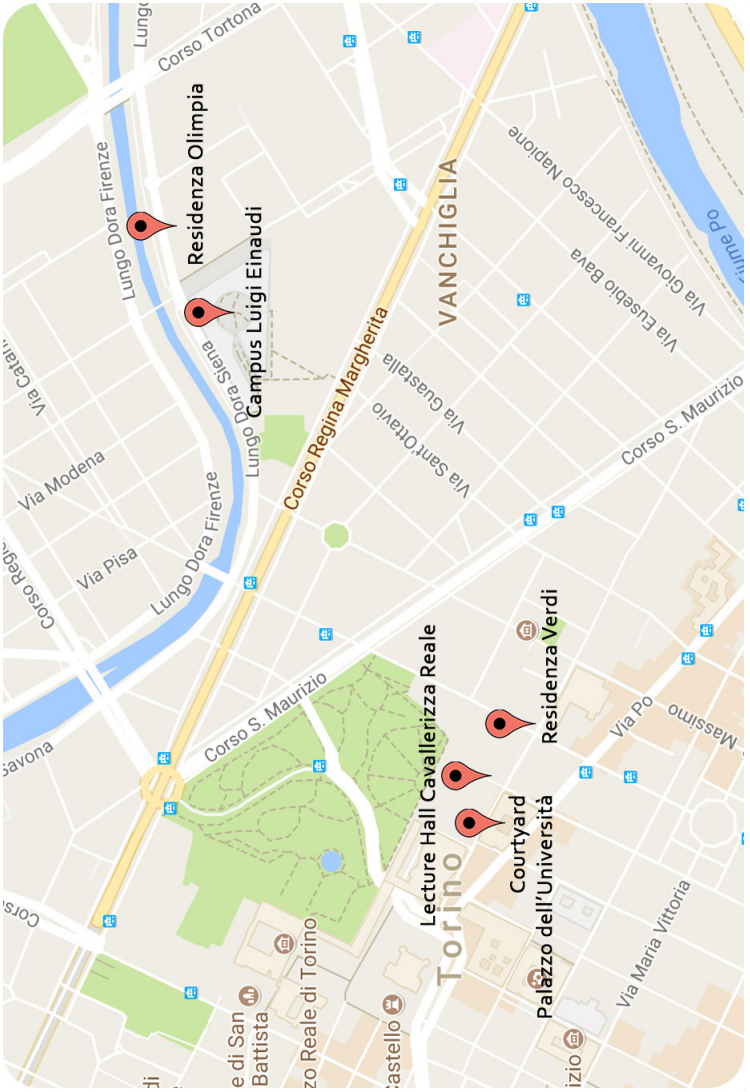
PS = Porta Susa railway station

PN = Porta Nuova railway station

C/O = Campus/Olimpia

V = Verdi

Map of the Conference venues:



2.4 Conference Badges Explained

Regular participant
H = excursion, 7 = magic group, 2 = city rally/lab [1,2], 654 = ID

+1 and **volunteer**

Speaker and **organizer**

Video crew and **guest**

3. About Torino

Come una stampa antica bavarese
vedo al tramonto il cielo subalpino...
Da Palazzo Madama al Valentino
ardono l'Alpi tra le nubi accese...
È questa l'ora antica torinese,
è questa l'ora vera di Torino.

Guido Gozzano, *I colloqui*, 1911

Torino (Italian [toˈriːno], Piedmont dialect [tyˈriɲ]) is an important business and cultural centre in northern Italy, capital of the Piedmont region. The city is located mainly on the western bank of the Po river, in front of the Susa Valley and surrounded by the western Alpine arch and by the Superga Hill. The population of the urban area is estimated to be 1.7 million inhabitants and the metropolitan area is estimated to have a population of 2.2 million.

The earliest findings in Torino date back to the 3rd century BC when the Taurini, a Celtic-Ligurian people, settled in the Po river valley. In the same area, the ancient Romans created a military garrison station in 58 BC which they then turned into a *castrum*, i.e. a fortified military camp, during the Gallic Wars. In 28 BC the castrum became a Roman colony under the name of Julia Augusta Taurinorum. Some buildings dating back to this period are still visible in the city center. After the fall of Western Roman Empire, Torino was conquered by several peoples: the Heruli, the Ostrogoths, the Byzantines, the Lombards and the Franks of Charlemagne. After the foundation of the Marquisate of Torino, the Counts of Savoy

gained control of the town. The University of Torino - Università degli Studi di Torino - was founded in 1404, under the initiative of Prince Ludovico of Savoy. With the Traitès du Cateau-Cambrèsis (1559) Torino became the capital of the Duchy of Savoy. A tribute to the Traitès is represented in bas-relief at the base of the Caval ëd Bronz, in San Carlo square. In the same period a pentagonal fortification (*sitadela 'd Turin*) was built. The Mastio, the building entrance of the fortress, still exists today.

After a period of significant expansion, in 1706 Torino was besieged by the Franco-Spanish troops as part of the War of Spanish Succession. The city resisted for one hundred and seventeen days and staved off the French conquest. The city's strength and the heroic deeds of the miner Pietro Micca, who sacrificed his life to prevent the French assault, are narrated in the Pietro Micca Museum. The Basilica of Superga was built by King Vittorio Amedeo II as a thanksgiving to the Virgin Mary, at the end of the siege. The town was annexed by the French Empire in 1802. During the Congress of Vienna, the European leaders decided to assign to Piedmont the territories of the former Maritime Republics of Genova and Noli, creating the seeds of the process that will bring in fifty years to the unification of Italy.

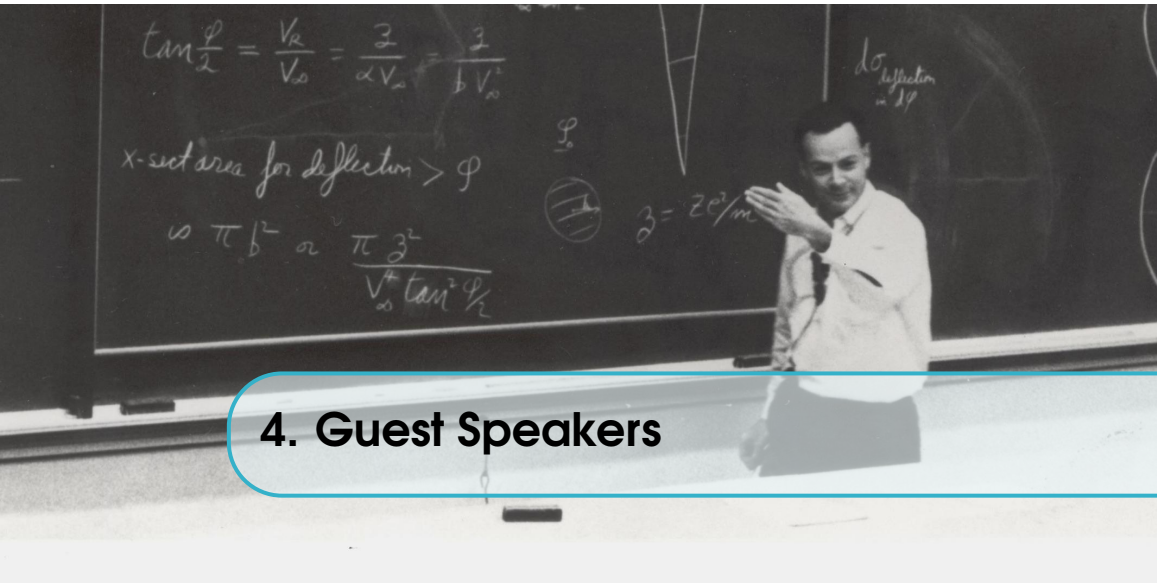
In 1847 Torino became the capital of the Kingdom of Sardinia under the leadership of Carlo Alberto of Savoy and after several insurrections and three independence wars in 1861 Torino became the capital of the Kingdom of Italy. The capital was later moved to Firenze and then to Roma. At the beginning of the twentieth century Torino experienced significant industrial development and therefore was a target of Allied strategic bombing during WWII. In the postwar years the city's automotive industry played a pivotal role in the Italian economic growth, attracting hundreds of thousands of citizens.

Today Torino is a dynamic and vibrant city. Its millenary history has allowed the creation of an original and unique cultural identity. Despite possessing a strong industrial inclination, the city houses several natural areas such as the Valentino park and the Po river park and hill, where it is possible to enjoy an amazing view over the city, especially at sunset. The Valentino park hosts the village and medieval castle and the Valentino Castle, which is of the Residences of the Royal House of Savoy included in the list of UNESCO World Heritage Sites, together with Palazzo Madama, Palazzo Carignano and the Royal Palace. The Po river and hill have been recognized as a biosphere reserve by UNESCO. Torino also hosts world class museums, such as the Egyptian Museum (the second richest in the world after the one in Cairo), the National Automobile Museum and the

National Cinema Museum, located in the Mole Antonelliana, one of the landmark buildings of the city.

Many artists, writers, scientists and Nobel Laureates were born or lived in Torino. Among others, we remember Giuseppe Lodovico Lagrangia (who turned his name in Joseph Louis Lagrange after moving to France), Amedeo Avogadro, Rita Levi-Montalcini, Desiderius Erasmus Roterodamus, Jean-Jacques Rousseau, Friedrich Wilhelm Nietzsche, Torquato Tasso, Cesare Pavese, Primo Levi and Italo Calvino. The city has recently developed a particular attention to sport by hosting the XX Olympic Winter Games and being the 2015 European Capital of Sport. Torino is also the home of the Juventus Football Club and the Torino Football Club. The most popular nightlife neighborhoods are the Quadrilatero, San Salvario, Vanchiglia (*Vanchiglia is the new San Salvario!*) and the city center where you can find young people and students chilling out and enjoying the night.

The coat of arms of the City of Torino consists of a swiss-blue shield superimposed to a rampant gold bull with silver horns; everything is stamped with a wrenches-crown in order to highlight the city's industrial identity.



4. Guest Speakers

James Kakalios, Mon 07/08/2017, 19.30 - 20.30

James Kakalios is a physics professor at the University of Minnesota in the USA. Prof. Kakalios gained popularity through his book *The Physics of Superheroes*, which analyzes the actions and contexts of comics superheroes from the point of view of fundamental physics. His research in Minnesota is concerned with amorphous semiconductors, granular materials and 1/f noise.

Francesco Prino, Tue 08/08/2017, 09.30 - 10.30

Francesco Prino is a researcher at the Italian Institute for Nuclear Physics in Torino. Since 2004 he has been working on the preparation, commissioning and the data analysis of the ALICE experiment at the LHC. He worked on the construction, test and performance studies of the silicon drift detectors of the Inner Tracking System as well as on the analysis of the Quark Gluon Plasma data. He is presently serving as deputy coordinator of the Data Preparation Group of the ALICE experiment.

Francesco Tombesi, Wed 09/08/2017, 09.30 - 10.30

Francesco Tombesi is an astrophysicist at NASA's Goddard Space Flight Center and a research scientist at the Department of Astronomy of the University of Maryland, College Park. His research focuses on supermassive black holes in Active Galactic Nuclei through X-ray observations collected from orbiting satellites. In particular, he investigates the origin of black-hole-driven winds, such as the powerful ultra-fast outflows and their feedback on the AGN host galaxies. Tombesi is a member of the science teams of the upcoming large X-ray observatories ASTRO-H and Athena (launching in 2028). He was awarded several prizes, including the 2014 *Early Career Research Scientist Prize for Excellence* of the Department of Astronomy at the University of Maryland, College Park and the *NASA Astrophysics Science Division Peer Award*.

Agnese Bissi, Wed 09/08/2017, 11.30 - 12.30

Agnese Bissi is a young prominent researcher in Theoretical Physics, currently member of the *Center for Fundamental Laws of Nature* at Harvard University. She obtained her PhD in 2013 at the Niels Bohr Institute in Copenaghen with a thesis on holographic correlation functions. She then moved to a postdoctoral position at Oxford, where she spent two years before moving to Harvard. At the beginning of 2017 she won the *Wallenberg Academy Fellowship* which will allow her to create her own research group in Uppsala next fall. Her current research activity is focused on theoretical high energy physics. In recent years, she made outstanding contributions to the application of conformal bootstrap to correlation functions in higher-dimensional conformal field theories.

Elena Aprile, Thu 10/08/2017, 11.30 - 12.30

Elena Aprile is the founder and spokesperson of the XENON Dark Matter Experiment at the Gran Sasso National Laboratory. She began working on liquid-argon detectors as a graduate student at CERN, and later as postdoctoral researcher at Harvard University. At Columbia University, she worked on the first application of a liquid-xenon time-projection chamber (LXeTPC) as a Compton telescope for MeV gamma rays. Since 2001, Aprile's research has been focusing on the direct detection of dark matter with liquid xenon. She received several scientific awards, including the National Science Foundation Career Award in 1991, and she was elected a Fellow of the American Physical Society in 2000.

Steven Cowley, Sat 12/08/2017, 11.30 - 12.30

Steven Cowley is a leading plasma physicist and controlled fusion scientist. He served as Director of the Culham Centre for Fusion Energy and Chief Executive Officer of the United Kingdom Atomic Energy Authority between 2008 and 2016. From 2001 to 2003 he led the plasma physics group at Imperial College London, where he remained as a part-time professor until 2016, when he became President of Corpus Christi College, Oxford. He became a member of the UK Prime Minister's Council of Science and Technology in 2011 and in 2012 he was awarded the Glazebrook Medal of the Institute of Physics.

Roberto Vittori, Sun 13/08/2017, 11.30 - 12.30

Roberto Vittori graduated from the Italian Accademia Aeronautica in 1989 and then trained as a pilot in the United States. In 1998, Vittori was selected by the ESA to join the European Astronaut Corps. He participated in several spaceflights with the Russian Soyuz and took part in the penultimate mission of the American Space Shuttle Program. He was the first European astronaut to visit the International Space Station (ISS) twice. He carried out numerous experiments in astrobiology and space physiology and was the last non-American to fly aboard the Space Shuttle. Vittori was decorated by Italy and Russia and he is a high-ranking officer of the Italian Air Force.

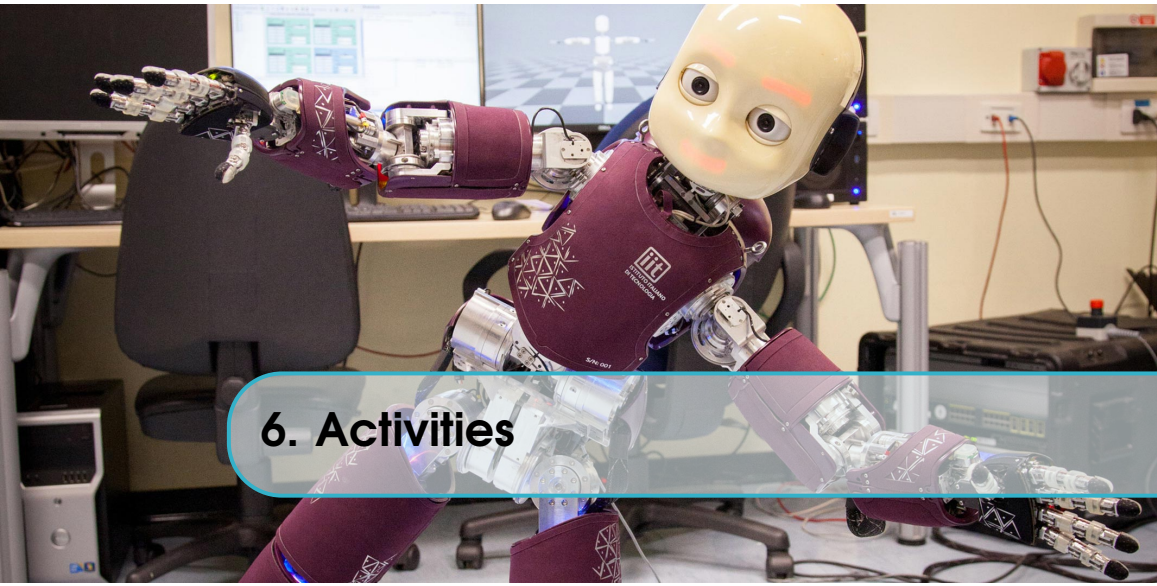
5. The AGM

During the Annual General Meeting (AGM), delegates representing National Committees (NCs) and Local Committees (LCs) as well as individual members discuss and deliberate on a number of topics ranging from memberships to regulations and grants. While only delegates and *individual* members can cast a vote, any member of IAPS is welcome to attend the meeting.

The **agenda** for the 2017 Meeting is as follows:

1. Election of chair, secretary and tellers
2. Membership
   - 2.1. Voting rights
   - 2.2. New members
   - 2.3. Expulsions
   - 2.4. Quorum
3. Approval of the minutes of the previous Extraordinary GM
4. Auditors report and accounts of the previous Executive Committee
5. Election of auditors
6. Report on the work of the outgoing Executive Committee
7. Internship proposal
8. IAPS IMAP grant 2017/2018
9. IAPS Member exchange grant
10. New member support grant
11. Educational grant

12. IAPS School Day 2018
13. Regulation changes
14. IAPS reimbursement guideline
15. IAPS Terms and conditions
16. IAPS Code of Conduct
17. EC members in IAPS competitions
18. IAPS Design Competition: Coat of Arms and Shirt Design
19. EC structure for 2018/2019, Wiki-person, Alumni-person
20. Election of IAPS archivist
21. Membership fees 2017/2018
22. Provisional budget for 2017/2018
23. Final report of the ICPS 2016 Organizing Committee
24. Election of the host of ICPS 2019
25. Progress report of the ICPS 2018 Organizing Committee
26. Final report of the PLANCKS 2017 Organizing Committee
27. Election of the host of PLANCKS 2019
28. Progress report of the PLANCKS 2018 Organizing Committee
29. Election of Executive Committee members
30. Other points of interest



6. Activities

6.1 Excursions

A letter is assigned to each excursion: the designated excursion letter is specified on the Conference badge.

6.1.1 A : Centre of Oncological Hadrontherapy - Wine tasting

The National Centre of Oncological Hadrontherapy (CNAO) in Pavia is one of the four medical centres in the world specifically dedicated to the treatment of cancer through hadrontherapy. Here, protons and carbon ions are accelerated by a 25 m diameter synchrotron to several hundredths of MeV and then shot at tumors up to 27 cm deep in the body. We will have a chance to visit a cutting-edge facility and get to know some of the most challenging issues facing medical physicists.

During the journey, we will stop in Canelli, in the Langhe area, and visit one of its historical wine cellars, part of the so-called *underground cathedrals*. This geographical area has been declared as UNESCO World Heritage Site and it is home of some of the most celebrated Italian wines. We will have the chance to get to know the secrets of the art of wine-making, as well as taste these exceptional products of the Italian tradition.

6.1.2 B : Energy Research Centre - Monza park and race track

Ricerca sul Sistema Energetico (RSE) is a research centre focused on the field of electrical energy. It promotes technological innovation of the electricity system, the improvement of its safety, environmental compatibility and efficiency. The main goal, i.e. an energetically sustainable future, is pursued through several innovative projects, such as LED-based lighting,

hydrogen accumulation systems, concentration photovoltaic systems and offshore wind generation.

RSE is close to the Royal Park of Monza, the fourth largest walled park in Europe. We will have the chance to explore this unique landmark that also includes the Royal Villa of Monza and the Monza race track, where the Formula1 Grand Prix of Italy is held every year.

6.1.3 C : Italian Institute of Technology - Relax on the beach

The Italian Institute of Technology (IIT) is a national center for scientific and technological research. IIT has several bases throughout the country; we will visit its headquarters in Genova. Here, different departments and labs carry out research in fields such as nanophysics, nanostructures, advanced robotics, pattern analysis, computer vision, neuroscience and brain technologies.

In the afternoon, we will relax on one of the most picturesque beaches of Genova and northern Italy: Boccadasse. This is a small fishermen village with colorful houses, where we will have a chance to lay on the pebbly beach, swim and grab a tasty gelato in one of the typical narrow streets.

6.1.4 D : Istituto Mario Boella - Water fun

The Istituto Superiore Mario Boella (ISMB) is a research centre of excellence on Information Technologies and Communication Devices. The main interest areas are advanced computing and electromagnetics, applied photonics, mobile technology and multi-layer wireless solutions. During the last years the Institute has also developed specific projects in business models and energy sustainability.

After the visit to the laboratories we will move to the swimming pool, where it is possible to sunbathe and have fun with water slides and diving boards. Do not forget your swimsuite!

6.1.5 E : Astrophysical Observatory and the hills of Torino

The Planetarium of Torino is a recently built centre for teaching and outreach in the fields of astronomy and astrophysics. We will visit the permanent exhibition and enjoy the projection of breath-taking movies in the spherical planetarium cinema. We will also visit the Astrophysical Observatory, which is a central node of the ESA GAIA mission, and enter the telescope domes whilst in operation.

The Observatory is located on the hills that surround Torino. We will move to the nearby Superga hill, from which it is possible to enjoy an amazing view of the city and the Alps. We will dive into history by visiting the monumental baroque basilica built on top of the hill in the 18th century by the Duke of Savoy, in fulfillment of a vow made during the Siege of Torino.

6.1.6 F : Conservation and Restoration Centre - Venaria Reale

The Conservation and Restoration Centre (CCR) is a rather unique institution in the world, where art and science meet in fascinating ways. Here, artists, restorers, chemists and physicists work together to preserve and save masterpieces coming from all over the world. We will visit all the different labs where applied physics makes it possible to carry out non-invasive diagnostics on the works of art, with the help of sophisticated technologies.

The center is located in the magnificent complex La Venaria Reale, a royal residence included in the UNESCO World Heritage Site list. We will visit the baroque palace and its stunning interiors, as well as the large gardens that gave it the name of *The small Italian Versailles*.

6.1.7 G : Modane Underground Laboratory - Mountain trekking

The Modane Underground Laboratory (LSM) is the deepest European particle physics laboratory, located within the Fréjus tunnel linking Italy and France. We will first visit the main building and the control rooms in the city of Modane, before having an opportunity to enter the underground facility that hosts the Neutrino Ettore Majorana Observatory (NEMO), one of the most sensitive neutrino-less double-beta decay experiments in the world.

In the afternoon we will have a chance to relax on the Italian Alps, enjoying some trekking in centuries-old forests, fully immersed in nature and history. It is recommended to wear comfortable shoes, suitable clothes and waterproof garments.

6.1.8 H : TotemEnergy - Sacra di San Michele

TotemEnergy operates in the field of energy efficiency, focusing on renewable energies and new technologies aimed at energy saving. It has designed, produced and marketed the micro-cogenerator TOTEM, that can simultaneously generate power and heat, greatly reducing energetic waste and pollution. Since 1995, it is also a leader in the design, building and management of advanced plants generating energy from renewable sources.

In the afternoon we will climb on the top of the 962m-high monte Pirchiriano, where the medieval Sacra di San Michele awaits us. This is an abbey dedicated to Saint Michael that guards Torino and the Susa valley from the high, offering a tremendous view of the city below. We will have a tour in this ancient, gothic monument whose mysterious, evocative architecture inspired the book *The name of the rose*.

6.2 Parties!

Opening Ceremony - Mon 07/08/2017

After the guest lecture of James Kakalios we will move to the Courtyard of the Palazzo dell'Università, where the jazz group *20 strings* (in 3 dimensions) will provide the musical background to the opening buffet. Cascading staircase and suggestive colonnade surround the yard, where a severe Minerva statue will welcome you.

Costume Party - Tue 08/08/2017

The Costume Party will take place in a beautiful location, the club *The Beach*, on the bank of the Po river, with a breathtaking view on the Gran Madre church and on Vittorio Emanuele I bridge. The architecture of "The Beach" reflects the original structure of the buildings of the XIX century, when they were used as boathouse and stockroom. Nowadays the area next to the river is the core of Torino's nightlife. For a Costume Party you need a costume and for a theme party you need a theme, so the theme is... (drum roll)... no theme! Surprise us with the most original and fancy costume you can create!

That's Amore Party - Wed 09/08/2017

A one-of-a-kind chance to socialize! Do you want to chat with that guy about astrophysics? Are you interested in the culture of their country or you just want to say something nice to the physicist-next-door? The That's Amore Party is the perfect environment to realize such aspirations. All seasoned with some unique and fitting music surrounding.

Nations Party - Thu 10/08/2017

The Nations Party is your occasion to prepare a typical recipe of your country and get a taste of international cuisine from all over the world. Each National Committee has the possibility to use one of the kitchens in the residence and propose a *speciality of the house*. All dishes, combined with a glass of good music, will be shared among the participants in a festive spirits. We encourage National Committees to coordinate the preparation of their dishes in advance. It's great if you brought some special ingredients form your own country, but you can always get any extra ingredients at the local supermarket. Kitchenware will be provided by the Organizing Committee.

Games Night - Fri 11/08/2017

This evening begins with a startling and unexpected quiz team game. All participants will be divided into teams of five people and will compete in a science battle against each other. Review all your physics knowledge, history facts and trivia, and train your quick reflexes. Who will prevail in this challenge? Then a peculiar competition will be held: the most notorious Drink&Derive! The name says it all, participants will be required to drink and derive increasingly difficult expressions. Only one will achieve eternal glory and obtain the World title. Remember to register during one of the previous days at the info point as there is a limited number of spots. Will you dare?

Italian Food Night - Sat 12/08/2017

Good Italian food in a glamorous location, what else? Just immagine savouring the Italian delicacies walking around a Medieval village, in the fairy-tale glimpse of the Valentino Park. A really nice living postcard from the past. Live music will create the perfect atmosphere for our midsummer night's party. It isn't over! The party continues at *Club 84*, a modern club few steps away, just opposite the Valentino Castle.

Farewell Party - Sun 13/08/2017

It is time to go, but no tears! The Farewell Party is the perfect way to say *goodbye*. Don't miss it, the dj's will be memorable!

Some practical information. The address of "The Beach" is Via Murazzi Del Po, 22, 10124 Torino; it is 20-minute walk from the Residenza Olimpia and 10-minute walk from the Residenza Verdi. It is also near the stops of lines 15, 13 and 55. The address of "The Club 84" is Corso Massimo d'Azeglio, 9, 10126 Torino; it is 25-minute walk from the Residenza Verdi and 35-minute away from the Residenza Olimpia. It is also near the stops of lines 16 CS and 18.

6.3 Sport

On Saturday August 12, participants will have the opportunity to join one of the following planned sport activities. Please remember to register at the info point for one of the options by August 10!

Football tournament

A football tournament (5 - 7 players) with 12 teams, with a round-robin qualification phase and a single-elimination final phase: round of 8, round of 4 and the finals.

Beach volley tournament

A beach volley tournament with 14 teams (2 men and 2 women per team) and a single-elimination structure.

Chess tournament

Yes, at ICPS chess can *definitely* be considered as a sport!

Swimming pool Colletta

Free access to a swimming pool for up to 125 participants.

The exact number of teams (and players per team in the case of football teams) for the football and beach volley tournaments will be adjusted depending on the number of participants that request to take part in the different activities. Near the football pitch and the swimming pool you can find the "Parco della Colletta", a huge public park along the Po river. You are encouraged to explore the park and relax.

6.4 City Rally

On August 8, half of the participants will visit the laboratories of the "Politecnico" (the Polytechnic University in Torino), while others will take part in the city rally, a tricky team-based race all about physics and history. The theme of the competition is *Euler vs Lagrange*, so half of you will play the role of Lagrange and half will step into Euler's shoes. Six stations are set all over the city centre, in the most beautiful and characteristic places. Follow Euler's and Lagrange's steps along their close-knit scientific relationship. We managed to unveil exclusive parts of their letters, where they have supposedly been hiding a secret code to stop humanity from accessing dangerous knowledge. Solve the mysteries, explore the city and discover the unexpected and stunning revelations that two of the most famous scientist of the XVIII century hid from the world!

The day after, the lab visit group switches with the city-rally group. This time we created for you a fantasy story in which black arts and white magic fight to rule the world. Gloomy atmospheres, incantations, good and evil dichotomy are the main ingredients of our magic potion. Are there any side effects? Well, only excessive fun!

7. Student Contributions

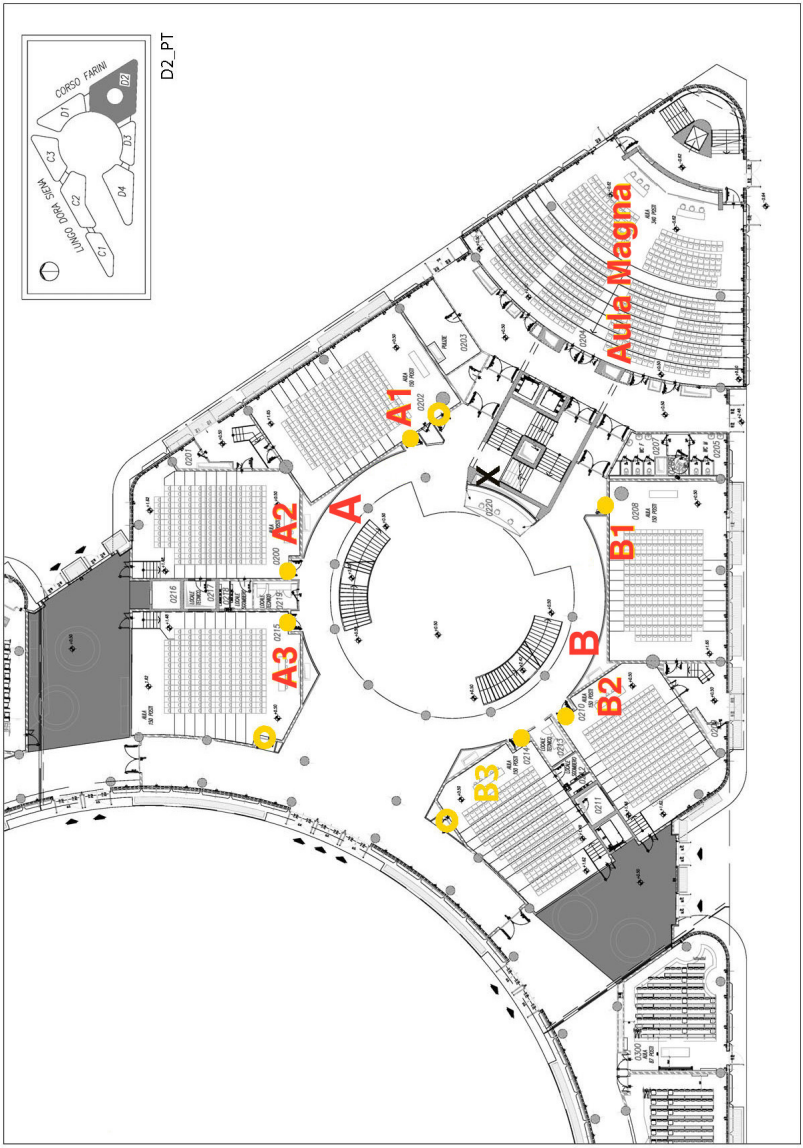
7.1 Talks

Parallel sessions dedicated to oral presentations will take place in the morning (9:30-11:00) of August 10, 12 and 13 as well as in the afternoon (15:00-16:30) of August 13. During each time slot, five different parallel sessions will take place. Each presentation will last 12 minutes, with 3 extra minutes allocated for questions. You can find more information about the location of the presentations in the Abstracts Booklet together with a complete timetable and author index.

7.2 Poster Presentations

Two formal poster sessions will take place on August 8 (11:30- 13:00) and on August 13 (17:00-19:00). Every student presenting a poster should illustrate their work during both sessions. This is to ensure that your work has the highest possible visibility and at the same time to allow other participants to explore different concepts and ideas in depth. In fact, posters will be hanging in the Main Hall and adjacent corridors throughout the entire week, thus allowing multiple iterations of observation and analysis.

Map of the Campus Luigi Einaudi (CLE) classrooms:



8. Workshops

8.1 General Workshops

A number of workshops will take place in the afternoon of Thursday, August 10. The topics of the workshops have been chosen to stimulate and involve as large an audience as possible. We do hope you'll find them interesting and instructive!

Important Information: you can find links to register to the COMSOL Multiphysics®workshop, to download Arduino software and to get the Linux Mint operating system at `http://www.icps2017.it/workshops`.

8.1.1 COMSOL MultiPhysics Web Workshop

COMSOL MultiPhysics ®is a finite element analysis package which allows to study physical processes where coupled, nonlinear phenomena are of particular interest. During ICPS 2017, we will host two interactive web workshops on multiphysics simulation. During the first session, you will see the capabilities and workflow of the COMSOL Multiphysics®software. The second session will be focused on High-Frequency Electromagnetics modeling, as an example of more advanced applications. You will leave the tutorial with new skills to work on your own applications using a free two-week COMSOL Multiphysics®trial that will be made available to you once you arrive in Torino. We recommend that you to install your free two-week trial license of the COMSOL Multiphysics®software as soon as it is made available to you and bring your laptop to the event in order to get the most out of it. Are you unable to bring a laptop to the workshop? No worries; you can still follow along with the demonstrations.

During this web workshop, we will discuss:

Intro to COMSOL Multiphysics®

- Get an introduction to the capabilities and the fundamental modeling workflow of COMSOL Multiphysics®.
- Watch a live presentation of the entire analysis process via a practical example.
- See how quick and easy it is to turn your sophisticated model into a specialized application that any engineer can use.

Modeling High-Frequency Electromagnetics:

- modeling techniques applicable to antennas, waveguides, cavities, and filters;
- microwave and laser heating;
- photonics, plasmonics, and metamaterials;
- ray tracing through optical systems.

8.1.2 Arduino Microcontrollers Workshop

This session will offer an opportunity to learn about Arduino microcontrollers, which originated in the town of Ivrea - not far from Torino! Arduino is an open-source company that produces both hardware and software allowing the construction of digital devices with interactive (sensing) capabilities. Arduino boards are internationally applauded as ideal means to learn about microcontrollers and general programming in electronic applications. During this workshop at ICPS 2017, we will have a number of Arduino kits for groups of participants to practice with. Download of the Arduino software is free. ICPS participants who wish to take part in this workshop are encouraged to explore the basics of the software above prior to the event; however, the workshop will also provide an opportunity to learn about Arduino from scratch for those who prefer!

8.1.3 Getting to Grips with Unix and the Linux Family

Linux operating systems are dominant in scientific research and their differences with more user-friendly commercial operating systems can be discouraging for newcomers. In this workshop we will try to bridge the gap between common personal computing and basics of Unix-like systems.

At the end of this session, you can expect:

- to have an overview of the history of computer science;
- to understand the general functioning and similarities of Unix-like systems;
- to be able to distinguish the features of different Linux distributions;
- to be able to use basic Linux commands;
- to produce the worst software bug EVER;
- to know how to build your own operating system (*advanced*).

For the purposes of this workshop, installation of a Linux distribution on a personal laptop is recommended but not necessary. Participants will be able to simply follow the workshop activities if they wish, even though hands-on participation is strongly encouraged. Guides to install a Linux operating system on a personal laptop can be found all over the internet; for complete beginners we would recommend Linux Mint (Cinnamon Edition). ICPS organizers will not be able to help with installations, as they are not qualified to take any risk on someone else's computer. However, most likely you will not have any trouble going through the available tutorials.

8.1.4 A Glimpse of Data Science Applications with AizoOn

Why should a physicist be interested in data science? On the one hand, physics and data science are longtime partners: statistics, data visualization and sometimes also machine learning are used to understand the results of every scientific experiment, from laboratory classes during undergraduate education to experiments at CERN. The more complex and bigger the experiment, the more challenging and intriguing it becomes to mine the results and discover patterns. On the other hand, physicists have the mathematical knowledge and scientific mindset that allow to find solutions to the complex problems that industries face in order to advance their business. During this workshop, the AizoOn data science team will present several practical cases they worked on and you will be able to get a taste of the process that translates a business problem into a Data Science one.

8.1.5 Scientific Publishing from an Editor's Point of View

Sharing scientific results is an important and challenging part of a physicist's work. In this session, we will host Andrea Taroni - Chief Editor of Nature Physics - who will share his experience in scientific publishing as part of one of the largest scientific publishing companies in our field.

What are the elements that a high-quality journal looks for in submitted articles? Quality is certainly the main criterion, but it is also important to explain the results clearly, keeping in mind what is the expected audience.

Andrea Taroni will illustrate good practices for the submission of scientific articles, also sharing his personal views on the editorial process. The talk will be followed by a Q&A session open to ICPS participants and researchers from the Università degli Studi di Torino and the Politecnico of Torino.

8.2 IAPS Workshops

The workshops organized by IAPS constitute a unique occasion to gain first-hand exposure to the activities and initiatives organized by the International Association of Physics Students and its members. By attending the workshops and contributing to the discussion, you also get a chance to shape the future of IAPS!

8.2.1 IAPS members' ideas worth spreading

Most of you know about IAPS projects such as ICPS or PLANCKS. But IAPS is what you, members, make of it, with your hard work and passion for knowledge and adventure. That is why the list of awesome international projects you know about goes beyond ICPS and PLANCKS... Have you wondered how a new project gets started or better yet, if there are any new member projects just waiting to be discovered by you? We have found two such projects.

First we will explore a project from LC Prague - an online team competition (Online Physics Brawl) which is opened to anyone interested in solving challenging physics problems. You will also have the opportunity to try their problems - in a showcase of the Online Physics Brawl (evaluated by the end of the workshop). If you think you can win, try to claim the prize! If not, you can still have fun and spread the information about its existence. Maybe you will even be inspired to organize a similar competition.

From NC Germany we will hear about their conferences for high school students where they can experience scientific practice, discuss with peers and present their own work. Communicating the results of their research is indeed an essential skill for physicists. By offering further scientific education for youth you can also train organizational skills, connect with young people and foster your creativity. Besides learning more about the education programme of NC Germany, you will also be encouraged to present your project ideas. We will discuss how to communicate knowledge and how to contribute to the IAPS education programme.

8.2.2 How to Volunteer in IAPS and How to Create a National Committee

The first half of this workshop will be on volunteering in IAPS. An EC member will present current volunteering opportunities for IAPS members after which participants will be able to discuss how they can get involved and which ideas they have for IAPS. Anyone from the casually curious to EC candidates are encouraged to attend.

The second part of the workshop will be about why and how to create a national committee. Both IAPS EC members and officers of young National Committees will offer useful information, advice and tips on how to make the foundation of a new IAPS committee as smooth, fun and successful as possible. Funding opportunities for new committees will also be presented.

8.2.3 Finding Sponsors: what IAPS can Offer and Who Else You Could Address

If you plan to organize an event or are already organizing one, you are always thinking of where you can get some money to finance it. Decreasing the expenses that have to be covered by the participants is a main goal to make the event affordable for more interested students, especially due to the additional travel costs. In this workshop it will be discussed whether IAPS could offer more or different grants to its members. A main focus will also be on the creation of a list of possible sponsors besides IAPS. Considering that many committees have to stick to different regulations, common grounds will be looked for. Examples will be given and draft letters will be worked out.

8.2.4 Introduction to the IAPS Members Network and Wiki

It's all about connecting us better with each other. For this very reason, we have launched our new IAPS members network and integrated wiki. In this workshop, we will introduce you to it and show its most important benefits. For instance, it provides a platform for recovering forgotten details about other IAPS members and event participants as well as broadening your network with new contacts which might be very important in later studies and job hunting. The platform also contains information about IAPS committees, how to organize events and much more. After the workshop, you will be able to tell the fellow IAPS members about the overall idea of having an IAPS "intranet" as well as how to register yourself. Join in to see how the platform works and, as a possible future IAPS subcommittee member, help to make it even better!

9. Sponsors

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Consiglio Nazionale delle Ricerche

Fisica Torino

edizioni Dedalo

ENEA

EPS

IOP Institute of Physics

Fondazione CRT

NEUTRONS FOR SOCIETY

INRiM ISTITUTO NAZIONALE DI RICERCA METROLOGICA

INFN Istituto Nazionale di Fisica Nucleare

The Booklets were printed with the support of

Società Italiana di Fisica

10. The Organizing Committee

10.1 The Organizers

Andrea Celon - *Chief Executive Officer*

Andrea is the CEO of the Organizing Committee and a former Chair of the Italian Association of Physics Students. He (very) recently completed his Master's Degree in Theoretical Physics at the Università degli Studi di Torino, with a thesis on astroparticle physics and stochastic approach to cosmic rays diffusion. He has been taking part in ICPS since 2012.

Riccardo Longo - *Deputy CEO and Local Coordinator*

Riccardo obtained his BSc at the Università degli Studi del Piemonte Orientale in 2012. He then moved to the Università degli Studi di Torino, where he received his MSc in 2014 and he is now working towards his PhD. Since 2012 he has been a member of the COMPASS Collaboration at CERN. He is a co-founder of AISF and has previously been the Chair of the AISF Torino Local Committee.

Michele Re Fiorentin - *Chief Financial Officer*

Michele graduated in Physics at the Università degli Studi di Torino and then moved to the University of Southampton, UK, where he obtained his PhD in Theoretical Physics. He now holds a postdoctoral position at the Centre for Sustainable Future technologies of the Italian Institute of Technology in Torino, working on nanoscale modelling applied to devising new energy sources.

Francesco Sciortino - *Chief Operative Coordinator*
Francesco studied Physics at Imperial College London before moving to the USA for a PhD at MIT. He specializes in plasma physics, with a particular interest in microturbulence, nuclear fusion and magnetic reconnection. He has previously been a member of the Executive Committee of the International Association of Physics Students (IAPS) and is a co-founder of AISF.

Lucio Maria Milanese - *Editorial Board*
Lucio completed his MSci at Imperial College London in June 2016 and is now pursuing a PhD at MIT, undertaking research in the area of plasma physics. His interests outside physics encompass history, politics and economics. He is currently a member of both the IAPS and the AISF Executive Committees.

Lorenzo Bianchi - *Scientific Coordinator*
Lorenzo received his BSc and MSc degrees in Physics at the Università degli Studi di Torino in 2010 and 2012, respectively. He then moved to the Humboldt Universität zu Berlin, where he got his PhD in Theoretical Physics in 2015. His research activity is mostly focused on exactly solvable aspects of the AdS/CFT correspondence. He currently holds a three-year postdoctoral position in Hamburg. During his studies he attended ICPS 5 times, from 2011 to 2015.

Chiara Signorile Signorile - *Volunteers' Coordinator*

Chiara graduated in Physics at the Università degli Studi di Torino and is now completing her Master's. She specializes in infrared divergences in QCD, a topic that she will continue to research in the upcoming year as she begins her PhD in Torino. She is the former Deputy-Chair of the Torino Local Committee of AISF and she was recently elected AISF Financial Coordinator.

Mattia Ivaldi - *PR and Social Media Manager*

Mattia is completing his Bachelor's Degree in Physics at the Università degli Studi di Torino, with an experimental thesis on the measurement of visible cross sections and luminosity with the van der Meer scan in the ALICE experiment at CERN. He is the former Chair of the Torino Local Committee of AISF and he was recently elected AISF PR Manager.

Eugenio Valdano - *Graphic and Design*

Eugenio got his BSc and MSc in Torino in Theoretical Physics. He then moved to Université Pierre et Marie Curie in Paris where he recently obtained his PhD in computational epidemiology. He is currently a postdoctoral researcher at the Universitat Rovira i Virgili in Terragona, Spain. His research focuses on Complex Systems, particularly on epidemic-like models in networks of human and animal interactions.

Martina Cornagliotto - *Sponsorship*
Martina got her BSc and MSc degrees in Physics at the Università degli Studi di Torino in 2012 and 2014, respectively. She is currently pursuing a PhD at the DESY research center in Hamburg. Her research activity is focused on integrable theories, in particular non-perturbative approaches to quantum field theory and conformal field theory in any dimensions.

Giulio Pasqualetti - *IT Manager*
Giulio received his Bachelor's degree in Physics at the University of Pisa, and he is now studying for his Master's at the Ludwig-Maximilians-Universität of Munich. He is particularly interested in research involving aspects of both Physics and advanced computing. He is a co-founder of AISF and served as its IT Manager.

Marta Crisanti - *IAPS Relations*
Marta studied Physics at the University of Perugia, where she both her Bachelor's and Master's degrees with theses focusing on energy harvesting and neutronics. She spent extended periods of time at the Institut Laue-Langevin, where she contributed to the development of new methods for neutron counting with CMOS-like detectors. She is currently a PhD student at the University of Warwick where she studies skyrmionic systems and their properties by means of neutron and muon scattering. She is a co-founder of AISF and has been AISF Vice-President.

10.2 The Volunteers

We would like to thank our amazing team of volunteers:

Ammazzalorso Simone
Amosso Alessandra
Barresi Andrea
Biasi Lorenzo
Bordin Matteo
Chiappini David
Collavini Ruggero
Di Ubaldo Gabriele
D'Amato Marianna
Erba Vittorio
Galante Maria Gabriella
Garabello Elisa
Insogna Valeria
Morrone Marco
Nada Alessandro
Nasini Giacomo
Nurisso Matteo
Oriani Daniele
Orusa Luca
Peri Valerio
Pezzotti Lorenzo
Politanò Stefano
Polla Stefano
Scudeler Martina
Siragusa Sara
Tornago Marta
Tulli Manuela
Wetzl Paolo
Zanchettin Maria Vittoria

11. Communication Manual

Perchè del resto nessuna lingua viva ha, nè può avere un vocabolario che la contenga tutta, massime quanto ai modi, che son sempre (finch'ella vive) all'arbitrio dello scrittore. E ciò tanto più nell'italiana (per indole sua). La quale molto meno può esser compresa in un vocabolario, quanto ch'ella è più vasta di tutte le viventi.

Giacomo Leopardi, *Zibaldone di pensieri*, 1817-1832

11.1 Common Italian expressions

Italian is a Romance language and is the third most widely spoken first-language in the European Union, with 65 million native speakers; it is spoken as a second language by 14 million EU citizens. Including Italian speakers in non-EU European countries and other continents, the total number of speakers is around 85 million. The base alphabet consists of 21 letters, the letters *j*, *k*, *w*, *x* and *y* are not part of the proper alphabet and are used only for loanwords and foreign names. The alphabet has five vowels (*a*, *e*, *i*, *o*, *u*) and 16 consonants and grave, acute and circumflex accents are added to them in some words.

The letter *H* is not pronounced at the beginning of words and *R* is rolled with a trill in the front of the mouth. *C* before *e* or *i* sounds like the English *ch* but the Italian *ch* sounds like *k*. *G* before *e* or *i* has a soft *gee* sound and *gh* sounds like a hard *g*. *S* is pronounced as in *s* as *yes* when it is at the beginning or end of a word, but as in *rise* when it is between two vowels. Other sounds include *gl* which is roughly pronounced as the *li* in *million*, or *gn*, roughly pronounced as the *ni* in *onion*. A double consonant is pronounced more strongly than a single one.

Common and useful sentences in Italian

ITA *(IPA pronunciation)*	EN
Sì - No *(/ˈsi/ - /ˈnɔ/)*	Yes - No
Buongiorno - Buonanotte *(/ˌbwɔnˈdʒorno/ - /ˌbwɔnaˈnɔtte/)*	Good morning - Good night
Ciao! *(/ˈtʃaːo/)*	Hello!
Arrivederci! *(/arriveˈderʃi/)*	Good bye!
Per favore - Grazie! *(/per faˈvoːre/ - /ˈgrattsje/)*	Please - Thank you!
Mi dispiace *(/mi diˈspjaːtʃe/)*	I'm sorry
Come ti chiami? Mi chiamo... *(/ˌkomettiˈkjaːmi/, /mi ˈkjaːmo/)*	What's you name? My name is...
Che ora è? *(/ke ˌora ˈɛ/)*	What time is it?
Dov'è il bagno? *(/doˌvɛ il ˈbaɲɲo/)*	Where is the bathroom?
Quanto costa? *(/ˌkwanto ˈkɔsta/)*	How much does it cost?
Non capisco l'italiano *(/noɲkaˌpisko litaˈljaːno/)*	I don't understand Italian
Una birra! *(/una ˈbirra/)*	A beer!
Ti amo! *(/ti ˈaːmo/)*	I love you!

11.2 Piedmont culture, element of

Many Italian regions already had different substrata before the conquest of Italian peninsula by the Romans. Today an Italian dialect is any regional variety of the Italian language and they began as a diversification between the ways of speaking Latin, the official language of the Roman Empire. The dialect of Piedmont (piemontèis) is spoken by over one million people and it has several differences compared to Italian. Well, we are sll physicists and we love units of measurement, so...

Wine, length and speed measurements

Mzura da vin (Wine measurement)		Value [l]
Picé		0.171
Quartin	2 picé	0.342
Bocal	2 quartin	0.684
Pinta	2 bocaj	1.369
Brinda	36 pinte	49.284
Cara	10 brinde	492.84

Mzure d'antéisa (Length measurement)	Value [cm]	
Mes dil	1	
Un dil	2	
Un pugn	12	
Un gucion	15	
Na branca	23	
Na bela branca	27	
Na pércia	2.5 m	
Un tir dë s-ciop	50 m	
Truch e branca	Apropré, mzura nen definia	Not defined

Mzure ed lestéssa (Speed measurement)	Value [km/h]
'N gamber	-1
Na lumascia	1
'N can sensa bale	35
Na bala dë s-ciop	600

Notes

Some free space for taking notes, drawing sketches or noting down your favorite Italian expressions.

Tu m'ami? oh gioja! i tuoi raggianti sguardi
Gira dunque ver me pietosi un poco;
Tua parte prendi del mio immenso foco,
O in me saetta men pungenti dardi.

Deh come dolce amorosetta sguardi!
Oh qual ne'tuoi begli occhi Amor fa gioco!
L'alma già già non trova in me più loco
Or via, se m'ami, a m'aitar che tardi?

Tremule spesso e languidette io vidi
Le tue negre pupille umide farsi;
Nè par che sola in lor pietà si annidi.

Dicon tue luci - È poco amor giurarsi
Dicalo il labro alfine; ond'io poi gridi
Felice il dì ch'io venni, e vidi, ed arsi.

Vittorio Amedeo Alfieri,
Rime - Tu m'ami? oh gioja! i tuoi raggianti sguardi,
1789

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STAZIONE DI PORTA SUSA
CORSO BOLZANO
CORSO S. MARTINO
CORSO BECCARIA
CORSO PRINCIPE
P.ZZA XVIII DICEMBRE
MUSEO CIV. PIETRO MICCA
VIA FRANCESCO MOROSINI
VIA MAGENTA
VIA COLLI
CORSO G. MATTEOTTI
VIA SAN ANTONIO DA PADOVA
VIA P. PETROCCHI
VIA T. DORE'
VIA GUICCIARDINI
VIA GRATTONI
VIA GOZZI
VIA PASSALACQUA
VIA ALLIONI
VIA JUVARRA
VIA BOUCHERON
PIAZZA STATUTO
VIA DEL CARMINE
VIA SAN DOMENICO
VIA SANTA CHIARA
VIA CARLO BOTTA
VIA ALBERTO NOTA
VIA MANZONI
VIA BERTOLA
VIA CERNAIA
CORSO VINZAGLIO
CORSO DEGLI ABRUZZI
CORSO VITTORIO EMANUELE II
VIA VITTORIO AMEDEO II
VIA DONATI
VIA SAN QUINTINO
CORSO PALESTRO
CORSO VALDOCCO
VIA DEI QUARTIERI
VIA PERRONE
VIA BERTRANDI
VIA GARIBALDI
VIA DELLA CONSOLATA
VIA BRICHERASIO
GALL. CIVICA D'ARTE MODERNA E CONTEMPORANEA
VIA VELA
VIA FANTI
VIA SAGLIANO MICCA
VIA SAVIO
VIA AMEDEO AVOGADRO
VIA AMEDEO AVOGADRO
VIA OTTAVIO REVEL
VIA ETTORE DE SONNAZ
VIA MONTECUCCOLI
VIA SEBASTIANO VALFRE'
VIA ASSAROTTI
VIA PIAVE
VIA PAPACINO
VIA FABRO
VIA BLIGNY
GIARDINO CITTADELLA
PIAZZA ARBARELLO
MUSEO DELLA SINDONE
CORSO GALILEO FERRARIS
CORSO GALILEO FERRARIS
VIA ... PROMIS
MASTIO DELLA CITTADELLA
CORSO SICCARDI
VIA DELLA
VITTORIO EMANUELE II
VIA MISERICORDIA
PIAZZA SAVOIA
VIA PRESTINARI
VIA DAVIDE BERTOLOTTI
VIA MEUCCI
VIA MERCANTINI
VIA GIANNONE
GIARDINO LAMARMORA
VIA S. DALMAZZO
VIA DELLE ORFANE
VIA CORTE D'APPELLO
GASTALDI
VIA BELLINI
VIA CONFIENZA
VIA CONFIENZA
VIA D. STAMPATORI
VIA SANTA MARIA
VIA BARBAROUX
VIA SAN AGOSTINO
VIA PONZA
VIA BROFFERIO
VIA GIANNONE
CORSO RE UMBERTO
PIAZZA SOLFERINO
TEATRO ALFIERI
VIA BOTERO
BOTERO
PIAZZA EMANUELE FILIBERTO
VIA BELLEZIA
VIA MASSENA
VIA PARINI
VIA DON MINZONI
VIA SAN FRANCESCO D'ASSISI
VIA PIETRO MICCA
VIA MILANO
VIA GIOBERTI
VIA MELCHIORRE GIOIA
VIA BIANCAMANO
V. DELLALA
VIA ALFIERI
VIA DEI MERCANTI
VIA BERCHET
VIA CONTE VERDE
VIA TASSO
VIA XX MARZO
VIA DELLA BASILICA
VIA EGIDI
VIA SECONDO
VIA ARSENALE
VIA DELL'ARSENALE
VIA SANTA TERESA
VIA SAN TOMMASO
VIA PALATINA
VIA IV MARZO
VIA PORTA
VIA CAMERANA
VIA VOLTA
VIA SACCHI
VIA XX SETTEMBRE
VIA XX SETTEMBRE
VIA CAPPEL VERDE
P.ZZA SAN GIOVANNI
object To Official Torino Souvenir
PIAZZA PALEOCAPA
PIAZZA CARLO FELICE
PIAZZA LAGRANGE
VIA G. AMENDOLA
VIA S. FROLA
VIA GRAMSCI
VIA ROMA
VIA BUOZZI
VIA GOBETTI
P.ZZA CLN
P.ZZA SAN CARLO
T. ROSSI
MUSEO EGIZIO
TEATRO CARIGNANO
VIA VIOTTI
VIA ROMA
PALAZZO MADAMA
P.ZZA CASTELLO
PIAZZA REALE
P.ZZETTA REALE
PALAZZO REALE
GIARDINI REALI
VIA NIZZA
VIA LAGRANGE
VIA LAGRANGE
VIA ACCADEMIA DELLE SCIENZE
P.ZZA CARIGNANO
P.ZZA CARLO ALBERTO
VIA SALUZZO
VIA U. RATTAZZI
VIA CAVOUR
VIA GIOVANNI GIOLITTI
VIA SAN GOITO
VIA CARLO ALBERTO
VIA MARIA VITTORIA
VIA PRINCIPE AMEDEO
VIA PO
TEATRO REGIO
VIA BERNARDINO GALLIARI
VIA PIO V
VIA BODONI
P.ZZA BODONI
VIA GIUSEPPE POMBA
VIA BOGINO
VIA BOGINO
VIALE MAGGIO
VIALE PARTIGIANI
VIA SANT'ANSELMO
VIA ANDREA DORIA
VIA DEI MILLE
VIA MAZZINI
AUDITORIUM RAI
VIA PRINCIPE TOMMASO
VIA SAN FRANCESCO DA PAOLA
VIA SAN FRANCESCO DA PAOLA
PIAZZA VALDO FUSI
VIA CARLO EMANUELE II
P.ZZA CARLO EMANUELE II
VIA DES AMBROIS
VIA VERDI
VIA GAUDENZIO FERRARI
VIA ROSSINI
VIA VASCO
VIA CAVALLERIZZA
P.ZZA ROSSARO
VIA MADAMA CRISTINA
VIA DELL'ACCADEMIA ALBERTINA
PINACOTECA DELL'ACCADEMIA ALBERTINA
AIUOLA C. BALBO
MUSEO REGIONALE DI SCIENZE NATURALI
VIA S. CROCE
VIA ORMEA
VIA SAN MASSIMO
VIA SAN MASSIMO
VIA MONTEBELLO
VIA SAN MAURIZIO
VIA MONTEBELLO
VIA A. PROVANA
PIAZZA CAVOUR
MOLE ANTONELLIANA
VIA FRATELLI CALANDRA
VIA DELLE ROSINE
VIA DEGLI ARTISTI
VIA SANT'OTTAVIO
VIA VANCHIGLIA
VIA M. TERESA
VIA ROLANDO
PIAZZA MARIA TERESA
VIA PIANA
VIA R. DI CORTANZE
P.LE ALDO MORO
VIA SANTA
MASSIMO D'AZEGLIO
PARCO DEL VALENTINO
VIA DELLA ROCCA
VIA DELLA