



PRESENTATION

Today, all of the world's countries are engaged in an unprecedented race for the construction of impressive astronomical facilities, as well as for the development of increasingly-ambitious space missions to explore the Universe. It is becoming clearer that modern astronomy has a strategic role for the future of humanity: it not only pushes our knowledge to the edges of the Universe, but also creates assets that are crucial for innovation and our planet's safety.

In modern astronomy, ground and space observations are two inseparable, complementary aspects of the study of the Universe. The National Institute for Astrophysics (INAF), founded in 1999 and composed today of about 1,400 staff members spread out over twelve cities, possesses all of the intellectual and instrumental power needed for the exploration of the Universe; it operates at all wavelengths, from the ground and from space.

INAF is a "young" institution: it will be 20 years old in 2019. It is therefore a next-generation institution: it drives innovation and produces great industrial returns for our country. It has a significant presence on the national territory, with a strong impact in terms of training, higher education, public outreach, technology transfer, and historical heritage preservation.

INAF has been ranked second in the world for international collaborations by the authoritative, international scientific journal Nature

(see *Il Sole 24 Ore*, 16 November 2016, "Technology" section)

Modern astronomy: a strategic engine for socio-economic development

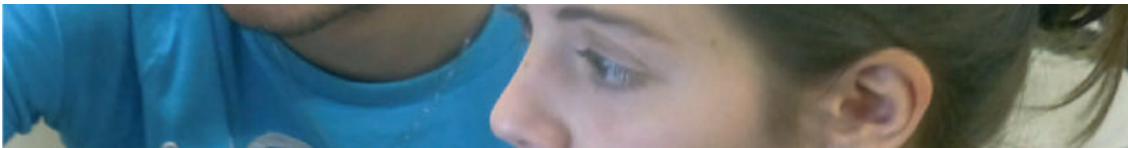
"Astronomy has the power to bring about development where it is needed. Establishing groups of professional astronomers, technicians, engineers and other highly trained staff can provide ongoing economic and educational stimulus to a region. Moreover, the construction of new observing facilities injects much-needed money, employment and infrastructure".

Nature Publishing Group (Focus of *Nature Astronomy*, 3 July 2018)





INAF and society: education and public outreach



INAF FOR SCHOOLS

At each of its locations, INAF proposes a wide range of training opportunities for local schools of all levels. At many locations, there are visitor centers, science museums, planetariums, equipped classrooms, and laboratories. INAF also stipulates agreements with institutions such as Turin's Planetarium and Astronomy Museum, the Astronomical Observatory of the Autonomous Region of Valle d'Aosta, and the International Center for Astronomical Sciences at the Madonie Park. A group of INAF researchers focuses on the development of inclusive activities, taking into account the most widespread Specific Learning Disorders, in collaboration with the International Astronomical Union (IAU).



A group of students from Saronno's Liceo Banfi contributed to a scientific discovery that was published in the international journal *Astronomy & Astrophysics*. This was covered by *Nature*.

Through INAF's Alternating School-Work (ASL) activities, students get work experience in a public research institution. INAF offers five projects:

Research: acquisition and analysis of astronomical data and production of a scientific report. Often chosen by Scientific High Schools.

Communication & Outreach: production of multimedia material, brochures, websites. Often chosen by Classical High Schools.

Technology: production of an object and functional test (with 3D printers, analogue electronics, app development). Often chosen by Technical Institutes.

History of science: at historical libraries or INAF museums.

Administration: in INAF administrative departments.

50 ASL projects ∞ 1000 students ∞ 100 affiliated schools



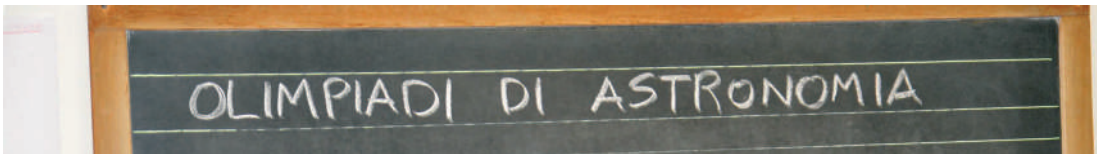
EDU INAF

Risorse e iniziative per la scuola e la società
dell'Istituto Nazionale di Astrofisica



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INAF AND THE ASTRONOMY OLYMPIAD

The Astronomy Olympiad is promoted, funded and advertised by the MIUR General Directorate for School Regulations and for the Evaluation of the National Education System, and implemented by the Italian Astronomical Society (SAIt) in collaboration with INAF. It is organized into three different categories: *junior 1*, which is reserved for junior high schools; *junior 2* and *senior*, which are reserved for high schools.

The Olympiad is held in three phases: pre-selection at the participating schools, interregional competitions at INAF and SAIt locations, and the national final competition. National winners then participate in the International Astronomy Olympiad of the Euro-Asian Astronomical Society, which is organized annually.

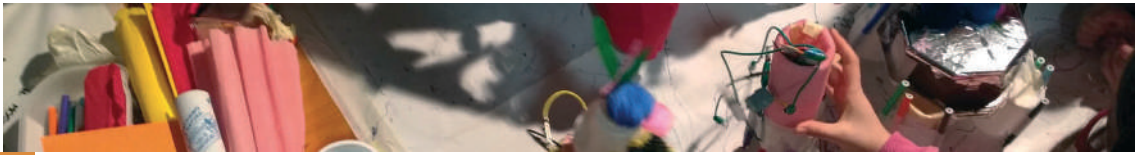


INAF offers 1 IRNET network of remote telescopes to the schools; 7 inflatable planetariums; 4 fixed planetariums; 7 science or visitor centers; 10 professional telescopes that are also used for educational purposes.

The list of winners of the Astronomy Olympiad is included in the National List of Excellence. INAF and SAIt offer student internships at the INAF locations of Asiago, Loiano, Medicina, Teramo and Stilo; the latter is organized by the Provincial Planetarium "Pythagoras" of Reggio Calabria (SAIt).

In recent years at the International Olympiad, the Italian team has won 1 gold, 1 silver, and 6 bronze medals, as well as 3 certificates for the best-ever test results (theoretical, practical or observational), winning over the competition of well-trained Korean and Chinese students.





INAF AND TRAINING COURSES FOR TEACHERS

INAF organizes numerous training courses for primary and secondary school teachers. These courses provide scientific insights and operational tools that help connect astronomical phenomena to children's daily lives.

INAF's training courses offer new ways of interpreting scientific knowledge, by providing cultural, technical and material tools. This allows teachers and students to do it in a fun and creative way, thus stimulating comparisons.

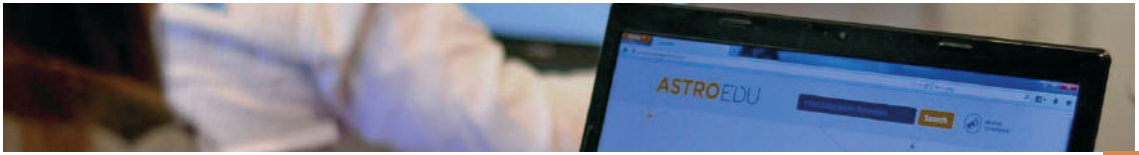


INAF organizes training courses that are published on the SOFIA platform. It also participates, with members of its staff, in courses organized by SAlt, Universities and other Associations recognized by the MIUR.

Tinkering, for example, is a new educational methodology with a strong potential for the development of innovation, inclusion and motivation. It is a very effective way of involving people with different levels of experience and interest in the exploration of concepts, practices and phenomena related to science and technology.

Coding, on the other hand, aims to provide teachers with the tools to develop their students' *problem solving* skills, thereby developing their computational thinking.





INAF AND THE EDUCATIONAL METHOD

INAF values school planning through the *Inquiry-based learning* approach (IBL), an internationally-recognized method. The IBL is based on a learning modality that closely reflects the nature of scientific research. It starts with a series of questions and, by leveraging its own competences and disciplinary knowledge, the answers are sought through hypotheses, real and mental experiments, in a process that corrects itself all along.

INAF, through the *Inquiry-based learning* approach, promotes the development of critical thinking.



INAF supports the recognition of the professionalism of Italian teachers through publications in an internationally-certified journal: astroEDU (<http://astroedu.iau.org/it/>).

INAF, in collaboration with SAIt, is in charge of the Italian edition of astroEDU: the free-access online magazine of the International Astronomical Union (IAU).

astroEDU publishes certified (peer-reviewed) educational resources: educational proposals are evaluated by a scientist in that field and a professional teacher. The published activities are identified by a DOI, which indicates their authors in a unique way.

Teacher-authors may indicate their own publication(s) in their curriculum vitae.





INAF AND THE NATIONAL CIVIL SERVICE

Since 2015, INAF has been accredited as a 3rd class institution at the National Office for Civil Service for the enrollment of volunteers in the Civil Service. Currently, the accredited locations are in Bologna, Turin, Palermo, Rome, Padua and Florence.

In 2017, the INAF Civil Service project *“Young people and new technologies: astronomy outreach for personal and cultural growth”* welcomed 22 volunteers, of which 50% were men and 50% were women. The project's intervention sector is *Education and cultural promotion*, while its intervention area is *Cultural animation for young people*.



In 2017, 5 accredited locations, 22 young volunteers from the National Civil Service including 11 men and 11 women, who each performed an average of 31 hours of weekly service.

Thanks to the support of these young volunteers, it has been possible to offer greater contributions to our country, such as for: school activities, support for the opening of INAF facilities to the public, number and quality of local events.

Volunteers are valued with tasks that meet their interests and skills, in order to increase their autonomy and awareness.

Most of the volunteers who work at INAF are over 26 and are mostly university graduates. They perform an average of 31 hours of weekly service.

This INAF project was evaluated by ARCI Servizio Civile, and obtained excellent marks, with an overall score of 8.1 out of 10.





INAF AND LOCAL OUTREACH

INAF participates in the main cultural festivals of each local area, presenting itself as an authoritative interlocutor and dialogue facilitator at: Genoa's *Science Festival*, Rome's *National Geographic Science Festival*, Naples' *Futuro Remoto*, the *Science Festival of Valle dei Templi* in Agrigento, *Bergamoscienza*, Foligno's *Philosophy Festival*, Macerata's *Astronomy festival*, or Rome's *Earth Day*. We shall not ignore smaller but interesting events, such as *Fosforo* in Senigallia or *Carpinscienza* in Carpi, as well as a great number of adhesions to initiatives such as the *week of astronomy and the week of scientific and technological knowledge*, organized by the MIUR.



Every year, in the second or third week of November, INAF organizes the *Light in astronomy* event, an extraordinary opening of its locations.

Every year in each of the cities in which it has locations, INAF adheres to the European Researchers' Night, in parallel with universities, research institutes and non-profit associations.

50 conferences ∞ 10 round tables ∞ 15 workshops
20 theater performances ∞ 8 exhibits
1 million visitors

INAF AND RESEARCH IN COMMUNICATION AT THE INTERNATIONAL LEVEL

With 4 talks, 2 workshops and 1 poster at the international conference *Communicating Astronomy with the public* (Fukuoka, Japan, 2018) and 5 presentations and 1 exhibit at the *General Assembly of the International Astronomical Union* (Vienna, 2018), INAF is the main Italian actor in the communication of astronomy and space at the international level.





INAF FOR THE YOUNGEST ONES

Water on Mars, gravitational waves, black holes, extrasolar planets: children's curiosity does not stop at any difficulty. To satisfy this curiosity, more than 500 meetings, workshops, games and discussions have been organized by INAF in about 10 years. They involved not only children, but also their parents!

The astrokids format started in Palermo in 2009. Since 2011, it is carried out by INAF institutes throughout the national territory.



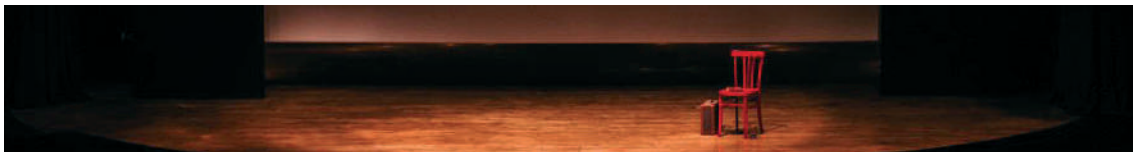
Astrokids is an INAF astronomy outreach project aimed at children, made to satisfy their curiosity and bring them closer to the scientific method (astrokids.inaf.it).

The astrokids have given life to the game book *Adventures and discoveries in space*, which was published by ScienzaExpress. The protagonist is a little girl named Martina Tremenda, who guides the readers in the discovery of the universe.

To maintain contact with children, INAF translates the European Spacescop project (coordinated by the University of Leiden) into Italian. This project discusses the most recent astronomical discoveries on a weekly basis.

10 years of activity ∞ 500 meetings ∞ 1 book ∞ 1 theater performance





INAF AND SCIENTIFIC THEATER

INAF, in collaboration with Realtà Debora Mancini and the professional theater company Zeldà, has produced the children's theater show *Martina Tremenda in space - have you ever seen the universe?*, which also includes the famous writer Roberto Piumini.

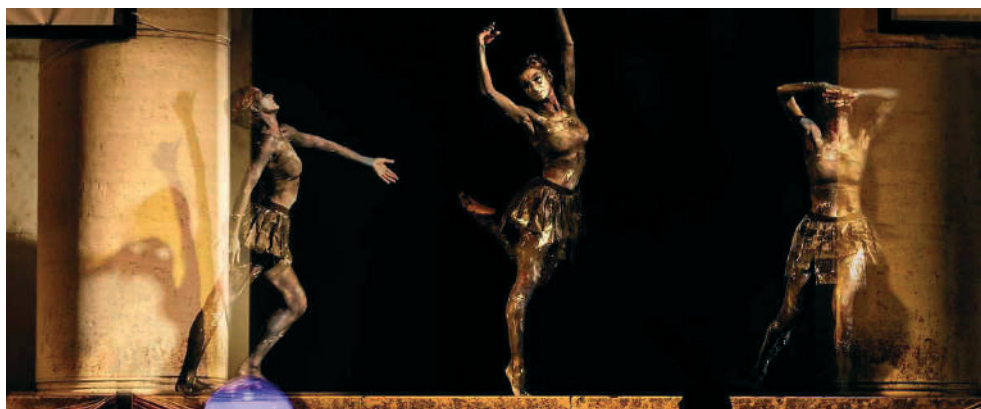
Martina Tremenda, a 12-year-old girl who already is the protagonist of the book *Adventures and discoveries in space*, guides viewers in the discovery of the cosmos, with curiosity, irony and honesty. Martina Tremenda continues the tradition of young explorers, such as Pippi Longstocking by Astrid Lindgren and Giovannino Perdigiorno by Gianni Rodari. The show is itinerant and can be easily set up in theaters and schools.



Three post-graduate master theses have already been written on the role that Martina Tremenda can have in bringing girls closer to the world of science, thanks to her proposal for a model of a "girl scientist".

Theater is an internationally accredited form of narration for communicating science, its results and its methods.

INAF is involved in various capacities in about 20 theatrical productions: cosmic ballets, music and science, comedies and dramas, inter-cultural dialogues, recovery of tradition. These are just some of the many themes that INAF researchers connect with the theater world, in collaboration with professionals in the field.





INAF FOR READERS: MEDIA INAF

Whenever astronomy, space, physics and related technologies make headlines, there is an online newspaper that keeps you up to date. With articles, interviews, editorials and insights. From Italy or from the world. On your smartphone, on your tablet, on your computer. Every day, all year round, always on the news, often first. With a long-established production: one video a day, twenty articles a week. Media INAF is the newspaper of the National Institute for Astrophysics.

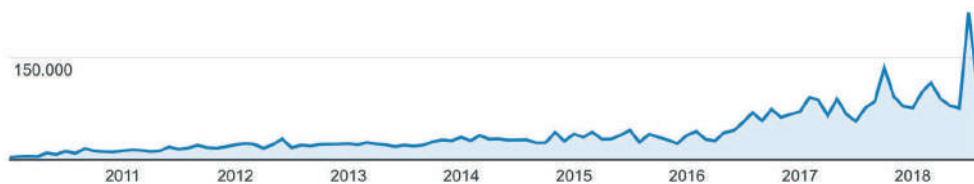
8,000 news articles ∞ 2,000 videos ∞ hundreds of audio and written interviews
2 newsletters a week ∞ 100,000 readers each month

Utenti

300.000

Andamento dei lettori unici mensili dal 2010 all'agosto 2018

150.000



News, videos, interviews and other contents are updated continuously each day about the world of research. You can visit Media INAF, the INAF news organization, at the link www.media.inaf.it

Despite being the INAF newspaper, Media INAF is a full-fledged online newspaper. The choice of news is wide-ranging: those in which INAF is involved are on average less than one in five.

The cut is journalistic: you will not only find the discoveries and successes, but also the things that are not going well. All of it is written in clear language, is accessible to anyone, from a small - but tireless and passionate - editorial staff of journalists. You are the only contacts we have: our readers.





IL CANALE DELL'ISTITUTO NAZIONALE DI ASTROFISICA

MEDIA INAF ON YOUTUBE AND SOCIAL NETWORKS

On Facebook, Twitter, or Instagram: we are there. We have been there for many years. And not because we have to be there: we are there because we are intrinsically social, because it comes naturally to us, because we like to share with you what astronomers think, discover, build and explore. We are there because we are motivated. And your participation, in terms of followers and engagement, tells us that we are on the right path.



Astronauts leaving for the Space Station, children and parents we met at festivals and telescopes, government officials, scientists, students, teachers, designers, communicators ... Wherever astrophysics is being done, with science and technology, Media-inaf Tv is there. With its microphones and video cameras.

Telescopes in spectacular and inaccessible places. Fascinating discoveries about extreme objects and phenomena at the edge of space and time. Scientists who are always on the go, armed with passion and guided by curiosity. A world of images, animations, faces, voices. A world we invite you to enter every day - thanks to the immediacy of video - through the services and in-depth analysis of Media-inaf TV, our YouTube channel.

8,000 followers on Twitter ∞ 4,000 on Instagram

44,000 "likes" on Facebook

11,000 subscribers and 5 million views on our YouTube channel





INAF AND HISTORICAL HERITAGE: COLLECTIONS

The historical and scientific heritage of the National Institute for Astrophysics consists of books, archive cards and instruments that testify to the development of astronomy in Italy from pre-Galilean observations to the present.

All of these objects represent one of the most precious collections in the field of the history of science. They are in fact the testimony of the astronomical research activity that took place in Italy in the past centuries, of the achieved scientific results, and of the contribution given by Italian astronomers to the development and progress of astronomy.



Polvere di stelle is the INAF portal dedicated to libraries, historical archives and Italian astronomical museums, through which it is possible to learn about one of the richest astronomical collections in the world: www.beniculturali.inaf.it

The historical and instrumental heritage of INAF, preserved at its oldest Astronomical Observatories, includes over a thousand pieces. It is composed of quadrants, spyglasses, theodolites, clocks, globes, telescopes, mathematical and meteorological instruments, which range from the 11th century to the first half of the 20th century. The oldest owned instrument is an Arab astrolabe dated around 1090.

Some of these collections are open to the public and can be visited in the museum spaces set up within their Observatory of origin.





INAF AND HISTORICAL HERITAGE: HISTORICAL ARCHIVES AND LIBRARIES

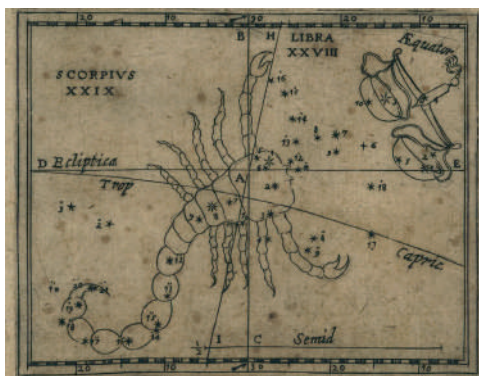
The historical archives of astronomical observatories preserve the written evidence of the activities at some of Italy's oldest scientific institutions. In the archives, we do not find books but documents: observational diaries; drawings of nebulae, comets, planets and other sky inhabitants made during the long hours spent in the dome; letters that reveal the mind's path towards extraordinary scientific discoveries; travel reports; meteorological observations that have continued uninterrupted for centuries. A historical legacy consisting of over 3 million documents and contained in 122 archival series.



In the digital version of *Polvere di Stelle*, it is possible to browse INAF's oldest and most valuable volumes, including incunabula, 16th century volumes and stellar atlases of extraordinary scientific and iconographic value: www.beniculturali.inaf.it/teca-digitale/

The volumes, preserved at INAF's oldest Observatories, cover the fields of astronomy and physics, but there is no lack of texts from related disciplines, such as meteorology, mathematics, geography and philosophy.

A few books represent cultural milestones: the works of Galileo, Copernicus, Ptolemy, Kepler and Newton (often owned in their first editions) are considered to be the "flags" of the scientific revolution and have paved the path toward modern science.





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