

COMMUNICATION AND OUTREACH

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The Education and Public Outreach Service (EPOS) of LNF fosters the scientific literacy through a wide programme of initiatives addressed to students, teachers and general public to bridge science and society, either inside or outside the LNF site. The main mission is to engage the public with science, inform about the latest issues in research conducted by INFN-LNF and the collaborations, enhance the valorization of scientific heritage and building network with the society. The Service includes many activities: communications (web and social), press and media relations, multimedia, graphics and photos, public events and visits, student and teacher programmes. Due to the Covid-19 emergency, the activities have been carried out both online and in person during 2021.

1 Student programme

EPOS-LNF offers different types of activities to raise awareness, curiosity and passion towards science and its applications to society among young people. In some of these initiatives pupils work together with LNF researchers in laboratory-based activities, having the chance to experience life inside a research centre. These events represent a unique opportunity for High School students that could help in the choice of higher education or career. The activities can be recognized in terms of work-related learning project.

1.1 Primary and Middle School: INFN Kids

INFN Kids is a popularization of science project addressed to pupils attending Primary and Middle Schools. The project aims at engaging young people with science through different activities such as hands-on didactic labs, comics, videos, podcasts, animations and tales. During 2021, the LNF team was involved in the realization of 15 virtual lectures dedicated to hands-on experiments that were also included in the Science Festival's program held in Bergamo and in Genova.

Moreover during July 2021 the LNF team contributed in the realization of 2 summer camps. The first one "Summer Waves – Racconti di suoni, luci e particelle fantastiche!" was held online 12-15 July and broadcasted on the INFN Kids YouTube channel, while the second one "Rapsodie digitali" was held in person at the Archeological Park of Ostia Antica. Rapsodie digitali is an education project based on the fusion between history and science addressed to a group of 25 children (9 -12 years old). The project is promoted by Affabulazione cultural association, in collaboration with the Theatre of Ostia Lido (Rome, Italy), Archaeological Park of Ostia Antica and INFN LNF[1]. Finally during the Christmas time, the LNF team was involved in the design and the creation of the INFN Kids' Advent Calendar.

<https://web.infn.it/inf-n-kids/>
https://bit.ly/INFNKids_summercamp21

1.2 High School: Researchers @Home

From January to May 2021 a series of 7 webinars devoted to the latest issues of Modern Physics and presented by INFN researchers and professors has been broadcasted on the LNF YouTube channel.

V.Barone - La relatività ristretta

E.Coccia - La relatività generale

G.Isidori - I concetti chiave della meccanica quantistica

D.Domenici - Il Modello Standard delle particelle elementari

G.Lanfranchi - La materia oscura

G.Galati - La fisica dei neutrini

T.Fornaro - La ricerca della vita su Marte

1200 total views during the live events.

The videos are available in the dedicated INFN LNF YouTube playlist while the slides are available on AccendiScienza e-learning platform.

<https://bit.ly/RHome21>

1.3 High School: International Day of Women and Girls in Science

For the International Day of Women and Girls in Science, 11th of February, established by the UN General Assembly to promote STEM careers (Science, Technology, Engineering and Mathematics), LNF organized an online event addressed to High School students in their last years. During this event female and male researchers shared with the students their experiences and talked about female scientists and their contributions.

More than 620 students participated at this event.

edu.lnf.infn.it/international-day-of-women-and-girls-in-science-2021/



Figure 1: *The banner of the International Day of Girls and Women in Science.*

1.4 High School: INSPYRE International School on modern PhYsics and REsearch

INSPYRE - International School on modern PhYsics and REsearch, Challenges in Quantum Physics and Technologies is a course dedicated to the latest issues of Modern Physics addressed

to students in their last two years of High School. The 2021 edition (12-16 April) was held online and broadcasted on the LNF INFN YouTube channel.

Number of registered students: 97.

edu.lnf.infn.it/inspyre-2021/

1.5 High School: IPPOG Masterclass

The International Particle Physics Outreach Group Masterclass is a school dedicated to the main issues related to particle accelerators and detectors and a focus on the LHCb experiment.

The 2021 edition (1-5 March) was held online and broadcasted on Zoom. Breakout rooms were used in order to maximize the interaction with students during the experimental sessions. All the lectures are available online on the AccendiScienza e-learning platform.

Number of registered students 82.

<https://edu.lnf.infn.it/ippog-international-masterclass-2021/>

1.6 High School: Summer School

The INFN LNF Summer School is open to students who attended their fourth year in High School. The 2021 online edition has been devoted to Particle Physics and to the communication of science.

It has been structured in lectures, experimental demonstrations, a virtual visit to the Dafne accelerator complex, and a laboratory featuring interactive sessions devoted to the communication of science in which students designed and produced the contents of a blog[2].

54 students participated to the 2021 edition.

edu.lnf.infn.it/summer-school-2021

1.7 High School: Art & Science across Italy

Art & Science across Italy is a European project on art and science addressed to students, attending the third and fourth year, with the aim of bringing them closer to the world of science and scientific research using art as the main language. The LNF team organized 2 webinars to illustrate the facilities and the main research activities.

1.8 High School: Online Events

During the year several online events were organized to present the main LNF activities to High School students. In particular in October 2021, 14 groups of students participated to a virtual tour to the Bruno Touschek Visitor Centre and to the Dafne accelerator for the Genova Science Festival.

2 Teacher programme

This programme consists in two courses addressed to Science Teachers who want to deepen their knowledge in the fields of Physics and Technology.

2.1 AggiornaMenti

AggiornaMenti is a course of General and Modern Physics addressed to Middle School teachers with a focus on the hands-on methodology. The 2021 edition (21-26 March) was held online and

consisted in lectures and experimental sessions in which researchers presented video tutorials on how to conduct Physics experiments with low tech materials. The research materials are accessible on AccendiScienza e-learning platform.

12 teachers participated to the 2021 edition.

<https://edu.lnf.infn.it/aggiornamenti-2021/>

2.2 Incontri di Fisica - Physics Meetings

Physics Meetings is a refresher course on Modern Physics. addressed to High School teachers. The 2021 edition was held online, free and in open access. It was structured in 6 lectio magistralis held by INFN researchers and professors.

510 teachers registered to the 2021 edition.

<http://www.lnf.infn.it/edu/incontri/2021/timetable.php>

3 General public

This programme consists of public seminars given by LNF researchers, guided tours addressed to people passionate about science and people who want to discover science and the places in which it is investigated.

3.1 Bruno Touschek Visitor Centre and Guided Tours

During the year we organized 4 virtual guided tours that have been broadcasted on the INFN LNF YouTube channel in private mode in order to maximize the interaction with the audience. People had the chance to write questions to the researchers using the live chat.

visitorcentre.lnf.infn.it

3.2 European Researchers' Night

The European Researchers' Night is an initiative created in 2005 by the European Union which aims at promoting valuable occasions of meeting between science and society in enjoyable and bracing contexts. In 2021 LNF was partner of the Science Together NET project (G.A. 101036127) [3] in collaboration with 10 research centres and universities of the territory. In this framework between June and September, the LNF team organized the initiatives listed below:

Science Trekking (in person), 5-26 June, 11 September, participants: 125

Science Café (in person): Pianeta Idrogeno, 10 September, participants: 35

Webinars for High Schools, 24 September, participants: 140

Webinars for Primary Schools, 22 September, participants: 90

Webinar for the general audience, 20-21-24 September

Main event in person at the Città dell'altra Economia, 24-25 September, participants: 3900

<http://www.lnf.infn.it/edu/notte-europea-dei-ricercatori/2021/>



Figure 2: *A Science Trekking on the Monte Tuscolo.*

3.3 Public seminars

In 2021 we organized 7 webinars (Pomeriggi di Scienza and Strong 2020 public lectures series) dedicated to modern Physics, addressed to the general public and broadcasted on the INFN LNF YouTube channel. 60 live views on average.

Moreover on the centenary of the birth of Bruno Touschek (December,3) LNF organized an event (in person, 50 participants) to entitle the LNF Visitor Centre to Bruno Touschek.

3.4 AccendiScienza - e-learning for science education

AccendiScienza is a tool for e-learning and scientific culture diffusion. The platform, financed by MIUR (Ministry of Education, Universities and Research) has been completed thanks to the collaboration with Consorzio GARR and University Marconi. Created to collect and freely make available lessons and seminars held at LNF, this web-portal contains four sections dedicated to its different targets: high school teachers, students, general public, young people. The main goal of the portal is to enhance and give more extensiveness to the activities organized every year by the Laboratory here in Frascati by enabling remote participation too. In addition, it will be a valuable support to traditional scientific teaching and education.

Videos : 295

Users : 2085

Views (March 2020-March 2021) : 39146

accendiscienza.lnf.infn.it

4 Communication

The Communication office aims to create and distribute informational contents concerning the ultimate issues related to LNF experiments and collaborations, moreover it enhances the valorization of LNF scientific heritage. The principal communication activities are on the website and on socials.

4.1 Web Editorial board

The LNF Web Editorial board role is to improve the development of web content in order to keep the website constantly up to date. The Editorial Board is made of representatives of all the LNF divisions, services and the Director and provides for the collection, editing and publication of the various news, dissemination articles and other texts and communications addressed both to the general public and the LNF personnel.

10 newsletters and 32 news were published in 2021.

`cdrweb.lnf.infn.it`

4.2 Social media

LNF fosters public engagement with science via social media and is currently active on Facebook, Twitter, Instagram and YouTube.

Facebook @lnf.infn.it

Twitter @infn_lnf

Instagram @lnf_infn

YouTube [youtube.com/user/INFNLNF](https://www.youtube.com/user/INFNLNF)

5 Acknowledgements

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6 References

- [1] https://bit.ly/artribune_dr21
- [2] <http://infnlnfsummerschool2021.altervista.org>
- [3] <https://www.scienzainsieme.it>