

ACTIVITY REPORT 2015

Communication and Outreach

R. Centioni (Resp.), D. Bifaretti, A. Cupellini, G. Di Giovanni, C. Federici, A. Mecozzi, S. Reda (Art. 15), M. Scudieri (Art. 15), E. Santinelli (Art. 15), B. Zuaro (Bors.)

SIDS - Scientific Information and Documentation Service



2015 has been proclaimed International Year of Light and Light-base Tecnologies (IYL 2015)

For this occasion, the Outreach program of LNF has been enriched of numerous activities of basic education in physics by means of a vast outreach program for the general public, teachers and students.

These activities are made possible by the enthusiastic involvement of the INFN-LNF personnel: graduate students, postdocs, researchers, engineers, technicians and administratives.

The events are organized both at the LNF (Visits, Open Day, Public Lectures, European Researchers Night and special appointments addressed to high school teachers and students such as Incontri di Fisica and Stages) and outside the Laboratories (Seminars at schools, local libraries, etc).

1) **Visits** edu.lnf.infn.it/guided-tours/?lang=en to LNF are a well-established tradition. They consist of a brief historical presentation of the Laboratories and their activities, on site and abroad, and of a guided tour of the experimental areas and the open air museum. Visits are organized for both students in their last high school year and pupils (age: 10-14) and they usually last about 3 hours.

In 2015 [edu]kids program hosted about 1185 kids.

Not just Italian schools but also schools from all over the world book visits. During 2015 about 10000 people visited the LNF.

2) The **OpenLabs 2015 In the Year of Light** www.lnf.infn.it/edu/openlabs/2015 consisted of a full day program of guided tours inside the LNF, conferences, public lectures, expositions,

scientific videos and a very rich program for kids. Most LNF employees were in action to present their research centre, answer questions and take care of their guests. About 2200 people visited the LNF on Saturday May 23rd, 2015.

101 Students of Roman high schools and surroundings helped out the LNF Staff in ensuring the success of the event



OpenLabs 2015 (INFN-LNF Photo)



OpenLabs 2015 - (INFN-LNF Photo)

4) **Seminars and Public Lectures “Lights on Modern Physics” in the Year of Light** edu.lnf.infn.it/programma-seminari-divulgativi-2015/ aimed to high school students and the general public were held every month by important personalities of the scientific field at the LNF’s Bruno Touschek Auditorium.

The 2015 saw the LNF host extremely appreciated seminars fascinating the public with arguments related to the theme of the Light:

Cavalcando la luce: dalla Relatività di Einstein ai viaggi interstellari (C. Curceanu INFN-LNF); Neutron Stars from birth to death – Seminar in english language (A. Drago, INFN Ferrara); Storia del fotone: da Planck al teletrasporto quantistico (M. Genovese INRIM Torino); Il fascino discreto della luce laser (M. Ferrario, INFN-LNF); E la luce fu: la radiazione cosmica di fondo a 50 anni dalla sua scoperta (N. Vittorio, Univ. Tor Vergata, Roma); Manipolare i quanti di luce: verso la tecnologia del futuro (F. Sciarrino, Univ. Sapienza, Roma); Alla ricerca della luce oscura (F. Bossi INFN-LNF); Visioni spaziali (R. Battiston, Presidente ASI).

Upon request, many LNF researches also held lessons in schools and libraries.

In 2015 the Seminars programs involved about 3900 people (schools and general public) from all over Italy.

BTML – Bruno Touschek Memorial Lectures held on December 10th, 2015.

The **Bruno Touschek Memorial Lectures (BTML)** were established in 1987 to honor the life and works of Bruno Touschek. The Lectures saw in the last few years the participation of distinguished scientists lecturing on important innovative research topics and historical perspectives. This year the Lectures were dedicated to Cosmology and Dark Matter with Joseph Silk talking about “Where next for the Cosmic Microwave Background: to B or not to B”; and Gianfranco Bertone talking about: “Identifying Dark Matter with Astroparticle Experiments and the LHC”.

In the afternoon, Roberto Battiston, President of the Italian Space Agency, gave a colloquium on Space Science, addressed to the general public.

6) **European Researchers’ Night** edu.lnf.infn.it/notte-dei-ricercatori-2015 organized in collaboration with Frascati Scienza.

Friday September 25th, from 3 to 11 pm the National Laboratory of Frascati took part in the 2015 European Researchers’ Night. Researchers, technicians and LNF staff collaborated at the realization of an all ages events, featuring: conferences, guided tours of the experiments, exhibitions, scientific theatre and experimental physics lessons.

The LNF hosted the photographic contest Photowalk, aimed at professionals and amateurs who took pictures of the LNF great experimental machinery. The initiative was promoted by the international network InterActions.

The final event of the evening was a projection of the documentary Particle Fever, set at CERN in Geneva between 2008 and 2012, the moment when the Large Hadron Collider started operating, giving the start to a great scientific adventure.

29 students of Roman high schools and surroundings helped out the LNF Staff in ensuring the success of the event.

The European Researchers’ Night took place on September 25th, 2015, and hosted about 1850 people.

7) High school teachers course - **Incontri di Fisica** <http://www.lnf.infn.it/edu/incontri/2015/> has been organized since 2001. The event is a three-days course for high school teachers and INFN people involved in scientific research dissemination. About 200 participants from all over Italy attend this event every year. The goal is to stimulate the teachers’ professional training and provide an occasion for interactive and hands-on participation in the latest developments in physics.

The program consists of plenary lessons, presentations of INFN-LNF activities, visits to LNF experimental area and discussions. The peculiarity of this course is represented by the group work (14 in 2015 edition) focused on a theoretical lesson followed by hands-on activity or data analysis of a real experiment. This way, teachers have a direct contact with researchers and get to use typical experimental instrumentation employed in contemporary physics.

Teachers, authorized by the Minister of Education, receive a certificate of participation.

All the programs are published on the LNF web site (lessons, videos, photos).

LNF October 7th -9th, 2015.

8) **Stages for students – School-work alternation** www.lnf.infn.it/edu/stageInf have been organized since 2000 for high school students in their last years. Students are selected by their teachers on the basis of their curriculum but, above all, on the basis of their interest and motivation. In direct contact with their tutors (1 tutor / 2 students), students are involved in theoretical lessons and practical operations. They acquire knowledge and understanding of INFN research activities in an interactive modality.

At the end of the stage they get a Certificate of Participation.

The LNF offers a number of different stages:

- **The Winter Stages** take place during the school year and they consist of 9 appointments, once a week. Students are divided into various experimental groups: Electronics, Informatics, Modern Physics, Mechanics and Administrative activities.

24 students – LNF February 16th – May 28th, 2015

- **The Stage Masterclass** is organized in partnership with the IPPOG Masterclasses International Project. It lasts 5 full days. 57 Students follow lessons on modern physics and analyze data from the CMS and ALICE experiment at CERN.

LNF March 16th – 20th, 2015.

- **INSPIRE 2016 International School on Modern PhYsics and Research** is open for 70 of the best students in their last year(s) of high school/college, from 8 European countries. It lasts 5 days and it involves lectures on Modern Physics and its applications in our society and activities to be performed in laboratories. The official language is english.

Participants have, as well, the opportunity to visit the main experiments and accelerating facilities of the LNF.

LNF February 16th – 20th, 2015.

- **The Summer Stages** are organized in June, at the end of the school year, and last 10 days.

Summer Stages – 129 students - LNF June 8th -26th, 2015. The students, divided in small groups, joined 11 different experimental activities (Quantum Mechanics, Superconductivity, Cosmic Rays, Electronics, Informatics, Mechanics, Data Analysis, Theoretical activities, Bio-Nanotechnology and Graphene, Scientific Communication, Administration).



INSPYRE 2015 students – International School on Modern Physics and Research (INFN-LNF Photo)

Participation in the stages program has increased over the last 15 years: since 2000, **2659** students attended the stages. As shown in Tab. 1, in the year 2000 LNF hosted only 12 students from one local school, while in the year 2015, **351** students from over 133 different schools all over Italy and from abroad came to Frascati.

Tab. 1

Year	Students	Females	Males	School	INFN Tutors
2000	12	1	11	1	7
2001	14	3	11	1	14
2002	57	15	42	8	50
2003	56	11	45	14	22
2004	114	34	80	21	25
2005	154	42	112	29	56
2006	161	48	113	46	58
2007	163	45	118	51	55
2008	161	47	114	51	63

2009	177	40	137	54	67
2010	166	36	130	60	60
2011	184	61	184	60	70
2012	206	59	147	72	59
2013	288	78	210	90	84
2014	395	144	251	93	86
2015	351	173	178	133	96

The LNF monitor the success of the various initiatives proposed, mostly through questionnaires (each one specific to the event) and keep track of the progresses using dedicated databases, thanks to whom it is possible to perform simple statistical analysis.

9) **Web page**

On the LNF web site are reported all the events organized: tutors' lessons, videos, photos, reports that, together with the educational material and the general information about the LNF research activities, introduce the general public and schools to modern physics and INFN-LNF research, so to bridge the gap between science and society.

Tab. 2 - Number of participants to LNF events during 2015

EVENTS (2015)	PARTICIPANTS
Visits	10000
OpenLabs	2200
Seminars and Public Lectures (at the LNF and outside)	3900
European Researchers' Night	1850
Incontri di Fisica for high school teachers	228
Stages for high school students	351

Acknowledgements

Many thanks to the LNF Director and the Heads of the Accelerator, Research and Technical Divisions. Special thanks to all LNF Tutors and Services LNF.