

Frascati National Laboratory

by P. Gianotti (Research Division Head)



1 Introduction

This activity report has been prepared thanks to the work of each coordinator who has provided the summary of the works done by the corresponding group. It represents a detailed description of all the activities carried out at the Frascati National Laboratory (LNF) during 2017. In this short introduction, it is also given a general description of the lab premises and of the available facilities, together with some statistical data.

The LNF is the largest (for number of employees) and the oldest of the INFN laboratories. Its main feature can be identified in the capability of building and operating particle accelerators.

The LNF site covers a surface of 131.178 m^2 , 56.000 of which are indoor and include offices, laboratories and workshops. The LNF hosts the following facilities:

- DAΦNE, an e^+e^- collider operating at the Φ energy (1020 MeV), able to deliver instantaneous luminosities $\sim 2 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$, a world record at this energy;

- a synchrotron radiation facility (DAFNE_Light) with lines in the X, UV and infrared regions, extracted in parasitic or dedicated mode, from the intense photon emission of DAFNE;
- a Beam Test Facility (BTF), providing electron/positron or photon beams mainly for detector calibration purposes;
- SPARC_LAB, a facility that combines a linear accelerator (SPARC) and a ~ 200 TW laser (FLAME). This is an infrastructure for R&D in the field of new technologies for particle acceleration like FEL, PWA and TeraHertz radiation;
- SCF_LAB, a laboratory equipped for Outer Space Simulation;
- DDG-Lab, the infrastructure of the Detector Development Group, that since 1985 has been performing R&D, design and manufacturing of classical and innovative gaseous detectors for large high energy physics experiments;
- LAMPS (Laboratory Magnetic high Pressure and Spectroscopy), the site where research is conducted on superconductors, magnetic materials and related systems using magnetic and electric transport tools with cryogenic equipments able to study the dynamic behaviour of these materials under conditions of extreme temperature and magnetic field;
- NEXT (Nanoscience EXperiments for Technologies), a laboratory that synthesises and studies nanostructured carbon materials;
- assembling halls, mechanical workshops, a Computer Center, and an Electronics Laboratory suited for complex and challenging enterprises in many fields of fundamental research;
- eight clean rooms (class ISO 6÷8), three connected to DAFNE_Light, SPARC_LAB and SCF_LAB, and the others equipped for the construction of different kind of particle detectors, for a total area of $\sim 400\text{m}^2$.

2 Organization

The LNF personnel, at the end of 2017, consists of 322 units, 60 of which have a fixed term contract, plus 206 associate members. Among these, there are university and PhD students, young post-Docs and employees from universities or other research institutions. Associate members work alongside staff members and likewise take part in the laboratory's activities. Tab. 1 shows the distribution of the LNF personnel among the different profiles.

	Staff	Temp.	Tot.
Researcher	67	6	73
Engineer	41	24	65
Administrative	28	10	38
Technician	126	20	146
Tot.	262	60	322

Table 1: Snapshot of the LNF personnel at Dec. 2017.

Fig. 1 shows the organization chart of the laboratory. The structure consists of services (green boxes in the picture), that respond directly to the Director, and three divisions (Research division, Accelerator division and Technical division) that also consist of different services. The

orange box, labeled “Scientific Committee”, represents a consulting body of the Director consisting of eminent international scientists. They meet twice a year and deliver recommendations regarding the scientific programs of the laboratory.

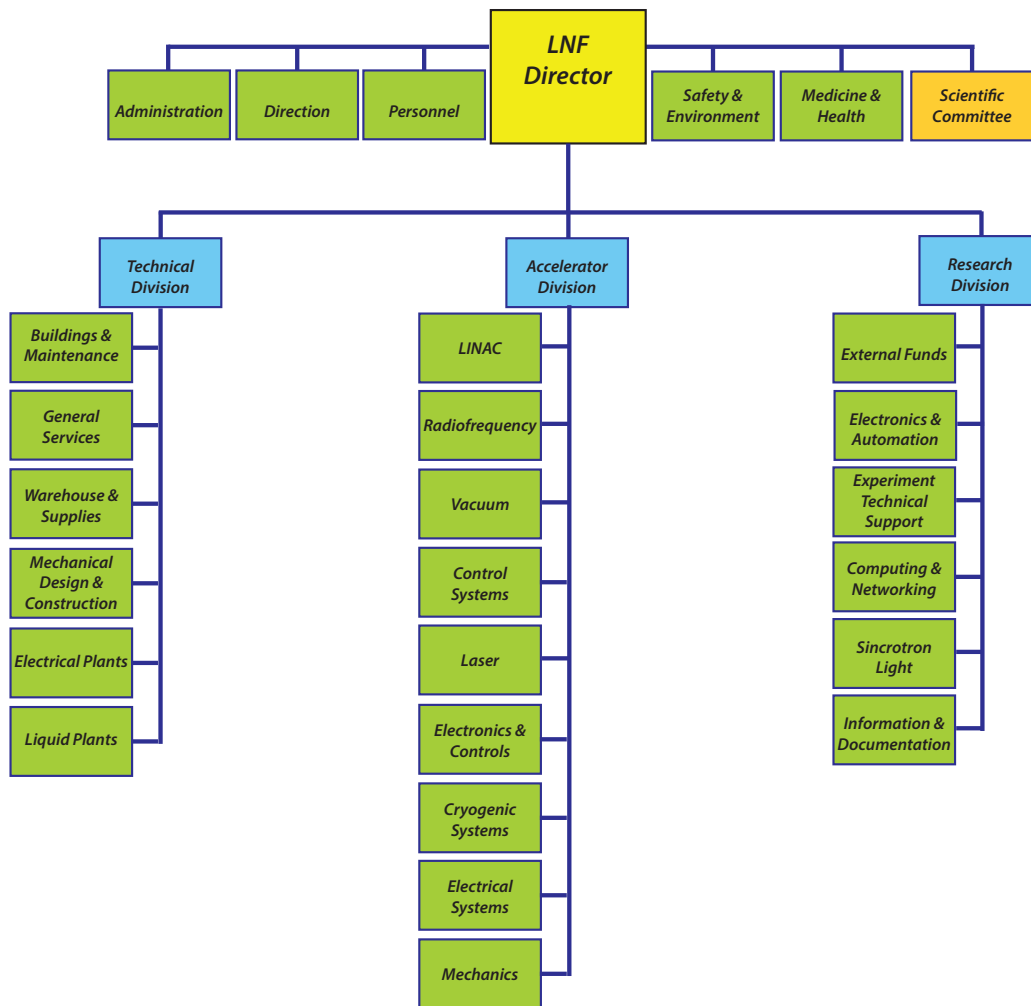


Figure 1: The LNF organization (see text for more details).

3 Activities

The LNF can rely on big spaces and peculiar infrastructures and, thanks to these, it often hosts ambitious and challenging projects.



Figure 2: The entrance of the new LNF Visitor Center, taken on a rare snowy day.

The local research activities are centered on the DAΦNE complex, and on the other on-site infrastructures. In parallel, the LNF researchers are also involved in many other scientific programs carried out at the major international laboratories all over the world.

The LNF is also engaged in an intense outreach activity. This includes Open Days, laboratory guided tours for students, general public events and seminars, training courses for high school students and teachers from all over Italy. In 2017 a visitor center (see fig. 2) has been realized in building 29. This is our first space completely dedicated to the external public. Here detector prototypes and other illustrative material of the research activities will be exposed for didactical purposes.