



Il Buco Nero

sito dei lavoratori precari dell'Istituto Nazionale di Fisica Nucleare (INFN)

INFN and CERN

5 March 2009

The Istituto Nazionale di Fisica Nucleare (INFN, the Italian National Institute of Nuclear Physics) was founded in 1951, and currently consists of 20 Sections operating out of the physics departments of major universities across the country, as well as four National Laboratories at Catania, Frascati, Legnaro (Padua), and Gran Sasso. The INFN has about 1800 employees, of which 570 researchers, 220 applied researchers, 710 technicians, and 300 administrative staff members. The INFN's annual budget is about 280 million euros. Among the various institutions in the Italian public sector, the INFN functions particularly well: expenditures for salaries are less than 60% of the total budget, leaving ample margins for investment in the experimental program, and the rate of absenteeism is remarkably low (for example, about three sick days are used per employee per year).

The INFN conducts research in particle and nuclear physics, a field of inquiry in which Italy has traditionally played an important role ever since the days of Enrico Fermi. It was at Frascati that in the late 1950s Bruno Touschek conceived of and constructed the first particle collider, the ancestor of the modern machines at Fermilab and CERN. Today, INFN researchers hold positions of great responsibility in international scientific collaborations. The INFN also promotes the transfer of knowledge created as a product of its core research program to applications in fields as diverse as medicine, historical preservation, and environmental protection. The INFN conducts these activities in close collaboration with the university sector.

Italy and the LHC

The most ambitious project on which the INFN has collaborated in recent years has been the construction of the Large Hadron Collider (LHC) at CERN, the European Laboratory for Particle Physics, in Geneva, Switzerland. The LHC, an underground high-energy particle collider with rings 27 kilometers in circumference, is the largest scientific instrument ever built, and is probably second only to the Apollo program as the largest scientific enterprise ever undertaken. It is expected to give definitive answers to questions about the nature of the interactions among the fundamental constituents of matter. The commissioning of the experiment, which was started in September 2008, will continue in fall 2009. On 21 October, the project was officially inaugurated in a ceremony at which were present various heads of state of the CERN member countries.

Italy contributed about 20% of the LHC construction costs, investing nearly 1 billion euros in 10 years (including CERN membership dues). A significant fraction of this outlay was recovered in the form of contracts with Italian industry. From the year 2000 to date, such investments have totaled 460 million euros – second place to France but ahead of Germany and Great Britain, which contribute more to the CERN budget. These investments have typically been in cutting-edge industries. They have contributed to the growth of Italian know-how and will continue to advance the competitiveness of the Italian industrial sector for years to come. Among the major Italian industrial enterprises, Ansaldo Superconduttori built about 1200 of the superconducting magnets for the LHC, Simic contributed in the area of cryogenics, CAEN in electronics, Renco in civil engineering, Cecom and Zanon in precision manufacturing, OCEM in electrical and electronic engineering, and Saes Getters in vacuum technology.

Italian researchers have made decisive contributions to the design and construction of the LHC accelerator and its various experiments, and currently hold positions of significant responsibility. Since January 2009, Sergio Bertolucci, a senior INFN physicist, has served as the Director of Research at CERN.

After years of great effort in the construction of the machine and the experiments, the present moment is critical for the maximization of the scientific yield. For this very reason, the participating countries are recruiting young research talent. The competitiveness of the Italian contingent at CERN is instead in danger, because hundreds of fixed-term and temporary researchers and technicians will soon be forced to abandon the field. Because of repeated hiring freezes since 2001, most have never had the chance to participate in a competitive public selection for permanent hire. The fact that so many young Italian researchers are looking for employment at foreign universities and laboratories is testimony to the difficulties that they face. Although the ease with which these researchers are finding foreign employment is a strong validation of their professional qualities, their loss comes with serious social and economic consequences for the country. The training of a researcher requires hundreds of thousands of euros of public investment.

INFN personnel: Current situation

The statutory number of INFN employees was reduced by 5% in 2005 to the current level of 1909 persons. Today, the INFN has 1800 permanent employees, to which must be added about 75 researchers, applied researchers, technicians, and administrators who have passed official selection procedures and have been waiting for many months to be hired (the authorization for their hire has already been approved by the Ministry for Public Administration and is waiting for approval by the Ministry of Finance). Once these workers are hired, the INFN will have about 1890 permanent employees. The problem concerning the temporary workforce is evinced by the presence of 275 fixed-term contract employees, the majority of whom have

served the INFN in various capacities for over 10 years, and who provide significant support to the international undertakings of the Institute.

There is no need for additional funding to overcome this impasse. The biggest obstacle can be removed by legislation, if the INFN is granted the independence to manage its own personnel expenses, up to a predetermined fraction of its total budget (for example, 60%). If this were the case, at constant funding levels, the INFN would be able to undertake a serious and selective recruitment campaign, aimed at retaining the best of its young researchers. The alternative is to allow Italy's position in the international research community to be compromised, putting to waste the country's scientific efforts and economic investment.

APPENDICES

INFN budget by year, in millions of euros

Year	2001	2002	2003	2004	2005	2006	2007	2008
Total budget	286.6	276.6	280.9	280.3	268.1	269.2	273.3	267.8
Experimental outlays*	81.3	78.7	98.3	84.9	87.2	69.2	62.2	

*Experimental outlays do not include structural funds for laboratory operations

The 2001 budget, adjusted for inflation, would now be equal to 330.2 million euros. In constant euros, the funding for the INFN has declined by 19% over the period shown.

In addition to the funding from the Italian government shown in the table, the INFN does receive a small amount of external funding, principally from the European Commission. In 2007, the INFN had 14 million euros in external funds.

Source: Presentation of INFN president to International Evaluation Committee, 2008.

Annual economic exchange Italy-CERN in millions of euros

Year	2001	2002	2003	2004	2005	2006	2007	2008
Payments to CERN*	70.2	76.0	77.8	79.9	78.9	75.5	76.0	76.4
Industrial returns	33.6	53.6	66.0	87.8	87.9	62.9	22.0	

*Payments from the Italian Ministry of Foreign Affairs

In 2007, the CERN spending profile changed dramatically, with the conclusion of contracts related to LHC construction and the start of the repayment phase for bank financing of the project.

Annual coefficient of return on Italian payments to CERN

Year	2000	2001	2002	2003	2004	2005	2006	2007
Coefficient	1.30	1.20	1.34	1.35	1.38	1.40	1.40	1.41

For a particular country, the coefficient of return is defined as the ratio between the fraction of the CERN budget spent in industrial contracts to that country, and the fraction of the CERN budget paid by that country. It is calculated annually by CERN for each member state.

For comparison, the average coefficients of return for the period 2003-2006 for some of the other major contributing countries were: France **1.60**, Germany **0.96**, Spain **0.63**, UK **0.32**.

Source: S. Centro, Liason Officer for Italian Industry at CERN

Composition of Italian research groups at CERN

Researchers and applied researchers affiliated with INFN groups may be INFN employees (permanent or temporary) or university employees (permanent or temporary) with an INFN appointment as an Associate.

The following numbers were obtained from the 2007 budget estimates for all INFN groups participating in the LHC experiments (ATLAS, CMS, LHCb, and ALICE):

Permanent personnel			Temporary personnel	
Rank	University	INFN		
Ordinario/Dirigente	95	52	Fixed-term employees (<i>INFN</i>)	55
Associato/Primo Ric.	73	94	Fellows (<i>Univ.+INFN</i>)	166
Ricercatore	67	139	PhD students (<i>Univ.</i>)	85

In summary, the Italian research contingent at the LHC breaks down as follows:

- Managerial/senior staff 18%
- Other permanent research staff 45%
- Temporary contracts and fellows 27%
- PhD students 10%

It should be noted additionally that permanent university staff members must dedicate a significant fraction of their time to teaching responsibilities.

Under the recent law, very few of the temporary researchers or PhD students will be able to be permanently hired by the research groups within the next three to four years; moreover, because of spending restrictions for temporary contracts, the majority of fixed-term researchers and fellows will not have their contracts renewed.

The situation is particularly critical at CNAF, the National Center for Research and Development in Information Technology. CNAF is an INFN research structure headquartered in Bologna, which handles the development and management of the INFN's principal information-technology and networking systems. In 2005, a national center for LHC data processing was inaugurated at CNAF. There are only 11 such centers in the world, of which 7 are in Europe. The center represents CNAF's most significant investment from both the economic and human-resources standpoints, and is one of the major Italian nodes for distributed computing. CNAF has been involved for years with the development, implementation, and management of the computing grid infrastructure in Italy (GRID.it), Europe (EGEE), and the world (LHC Computing Grid), and has taken a leading role in the design and development of middleware.

The CNAF personnel consists of 14 permanent employees, 35 fixed-term employees, 9 fellows, and 1 person working on a freelance contract. In summary, 76% of the personnel is on temporary contracts. Very few of the temporary CNAF personnel members will be eligible for permanent hire.

Source: INFN 2007 budget estimates for LHC experiments; CNAF data update October 2008.