

INFN: 70 years of science

Prof. Antonio Zoccoli, INFN President



rECFA – Rome 4 March 2022

ECFA

European Committee for Future Accelerators





INFN has a long and prestigious tradition that started in 1951 with **Enrico Fermi** and his school **I Ragazzi di Via Panisperna**



70 YEARS
OF RESEARCH
SHAPING
THE FUTURE

Origins and birth (1920 to 1951)



"The boys of via Panisperna" in Rome in the 1930s, the "fathers" of nuclear physics.
From left: Oscar D'Agostino, Emilio Segrè, Edoardo Amaldi, Franco Rasetti and Enrico Fermi.

Constitutive decree of the National Institute of Nuclear Physics

REPUBBLICA ITALIANA

N. 599
Consiglio Nazionale delle Ricerche

ISTITUZIONE DELL' ISTITUTO NAZIONALE DI FISICA NUCLEARE

IL PRESIDENTE

- Veduti i decreti legislativi 1° marzo 1945, n.82 e 7 maggio 1948, n.1167;
- Veduto il decreto presidenziale n.380 in data 22 febbraio 1947, relativo alla istituzione del Centro di studio degli joni veloci;
- Veduto il decreto presidenziale n.517 in data 21 dicembre 1949, concernente il Centro di studio per la fisica nucleare;
- Veduti i voti espressi dalla Commissione per gli studi e le ricerche di fisica nucleare;
- Considerata l'urgente necessità di assicurare un efficiente coordinamento fra gli organi di ricerca nel campo della fisica nucleare;

d e c r e t a:

Art. 1

E' istituito, ai sensi dell'art.1 del decreto legislativo 7 maggio 1948, n.1167, l'"ISTITUTO NAZIONALE DI FISICA NUCLEARE".

Art. 2

L'Istituto cura il coordinamento dell'attività scientifica del Centro di studio per la fisica nucleare, costituito in Roma, del Centro di studio degli joni veloci, costituito in Padova, del Centro sperimentale e teorico di fisica nucleare, costituito in Torino.

Oltre ai Centri sopraindicati, potranno essere aggregati all'Istituto nazionale di fisica nucleare, altri organi di studio e di ricerca da istituire con successivi provvedimenti e con convenzioni stipulate con gli enti, le amministrazioni ed i privati interessati.

REPUBBLICA ITALIANA

Consiglio Nazionale delle Ricerche

Foglio N° 2.

Art. 3.

L'Istituto opera in armonia con le deliberazioni della Commissione per gli studi e le ricerche di fisica nucleare.

Art. 4.

Con ordinanza del Presidente del C.N.R. sarà istituito un Consiglio direttivo composto dei direttori dei Centri di studio che costituiscono l'Istituto nazionale di fisica nucleare.

Il Consiglio direttivo assicura il coordinamento dei programmi di ricerca dei vari Centri e la collaborazione fra i ricercatori addetti ai Centri medesimi.

Roma, li 8 agosto 1951



IL PRESIDENTE

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IL SEGRETARIO GENERALE

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August 8, 1951

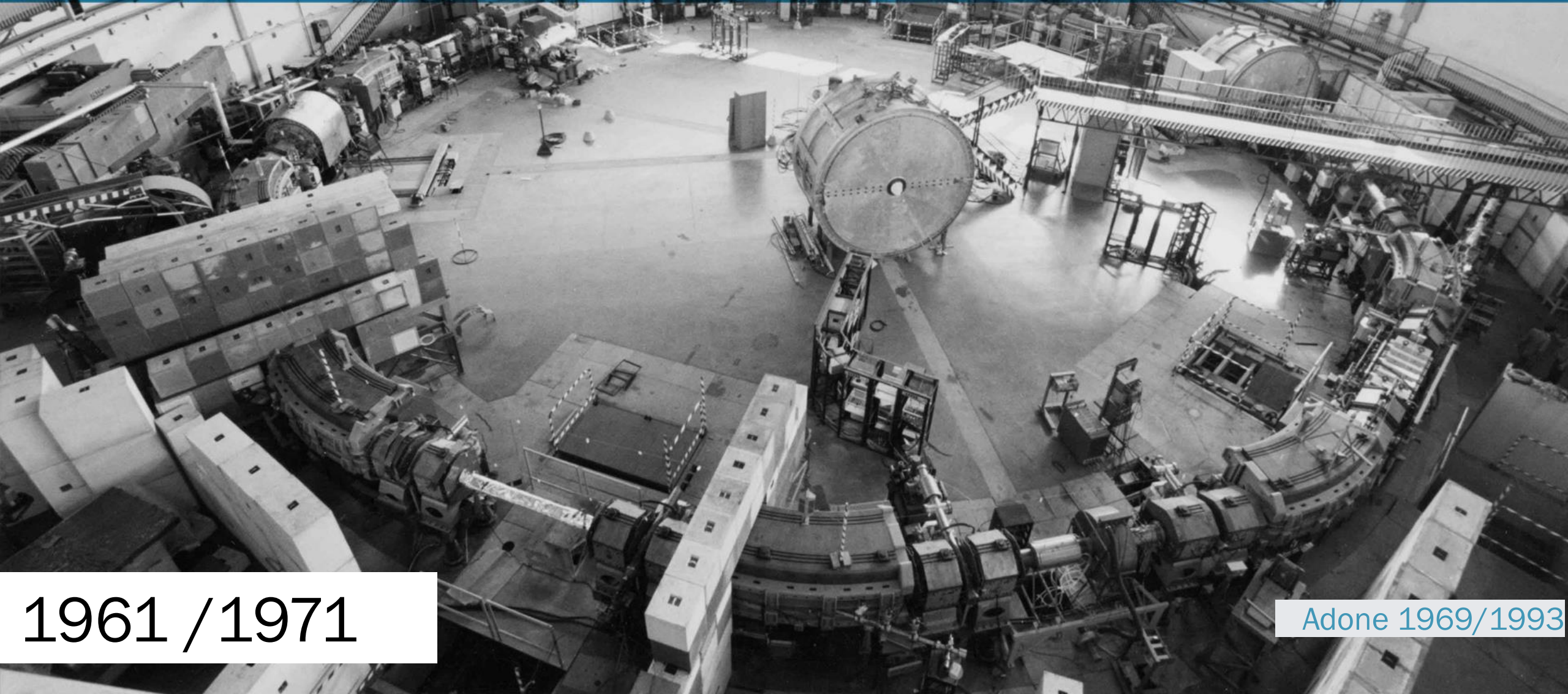
The early years



Launch of balloons
with nuclear emulsions
(Asti, 1955)

1951 / 1961

AdA and Adone, the Italian primacy in high-energy research



1961 / 1971

Adone 1969/1993

The reorganization of the INFN and international collaborations



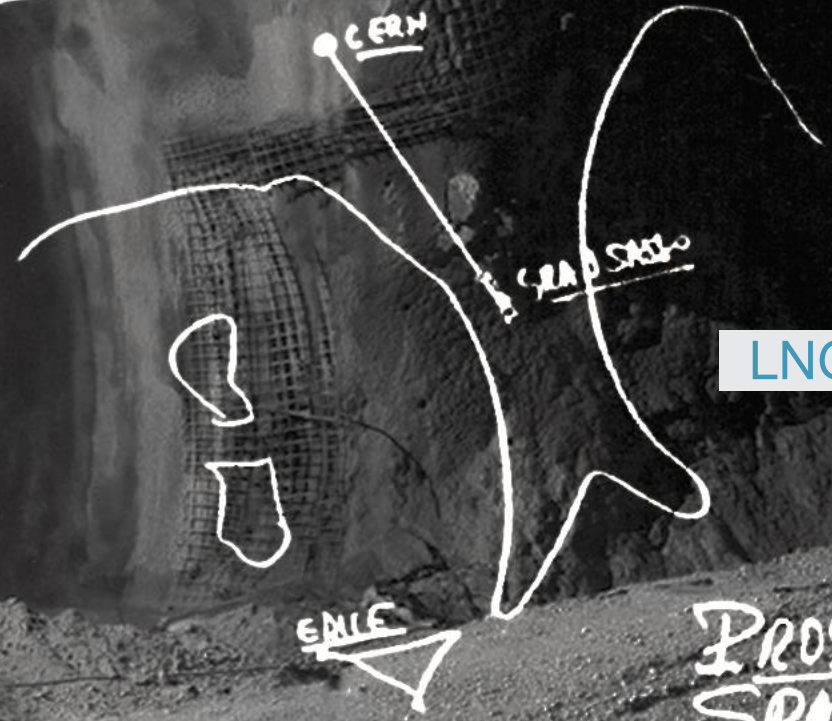
Super Proton Synchrotron
(SPS) 1981/1984

1971 / 1981

The W and Z bosons, the Italian supercomputing and the birth of the Gran Sasso National Laboratories



COMMISSIONE LAVORI PUBBLICI DEL SENATO



LNGS 1987

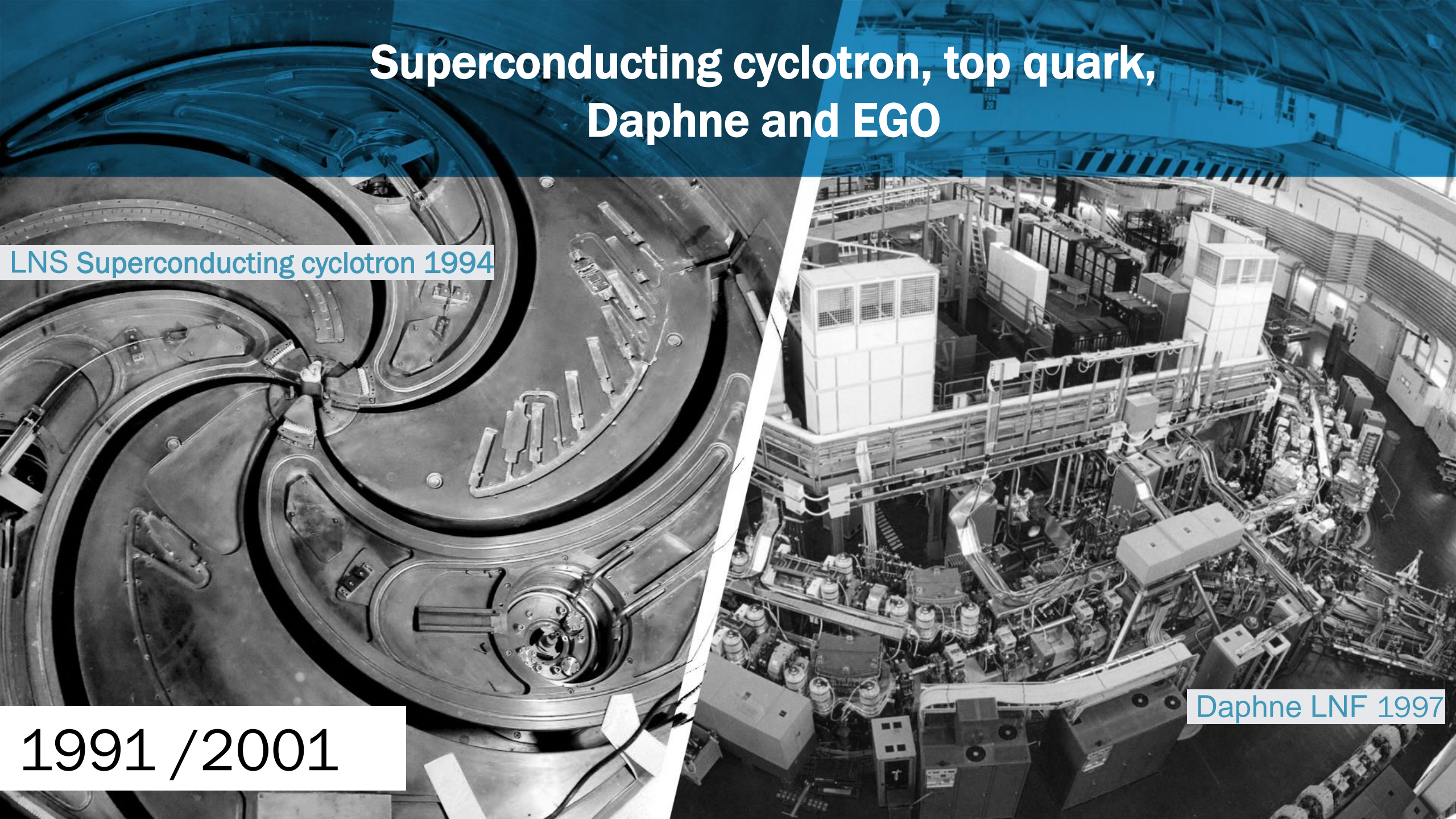
1981 / 1991

Superconducting cyclotron, top quark, Daphne and EGO

LNS Superconducting cyclotron 1994

1991 / 2001

Daphne LNF 1997



Labec, Babar e LHC



2001 / 2011

LHC 2008

**AMS, Higgs boson, neutrino oscillation,
gravitational and multi-message astronomy**

2011 / 2021

Virgo interferometer 2000

**Pushing the frontiers
of knowledge.**

The secrets of the Big Bang

The
mission

Train
the next generation
of scientists and engineers



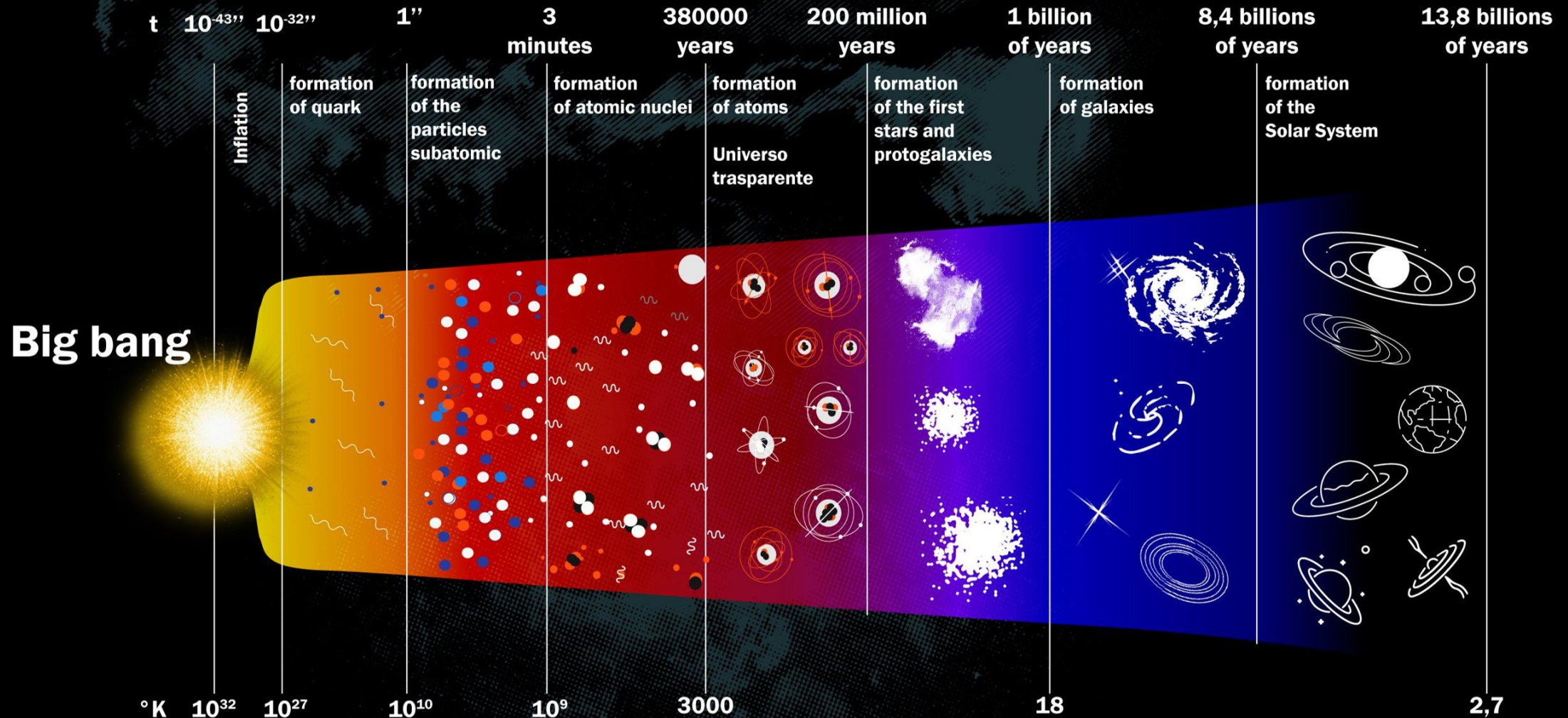
Developing
new frontier technologies



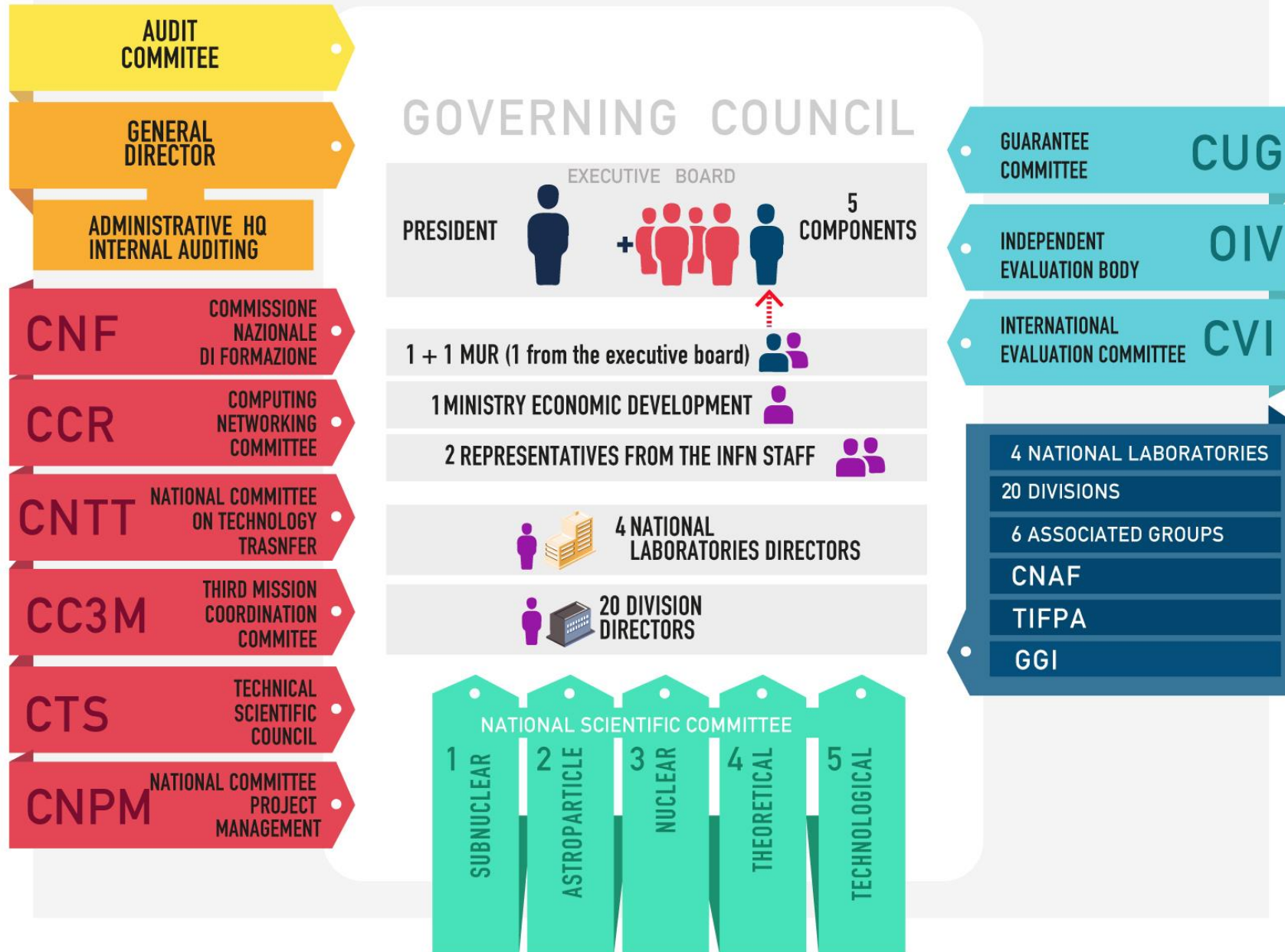
Working together
with young researchers
and with researchers coming
from all over the world

The challenge

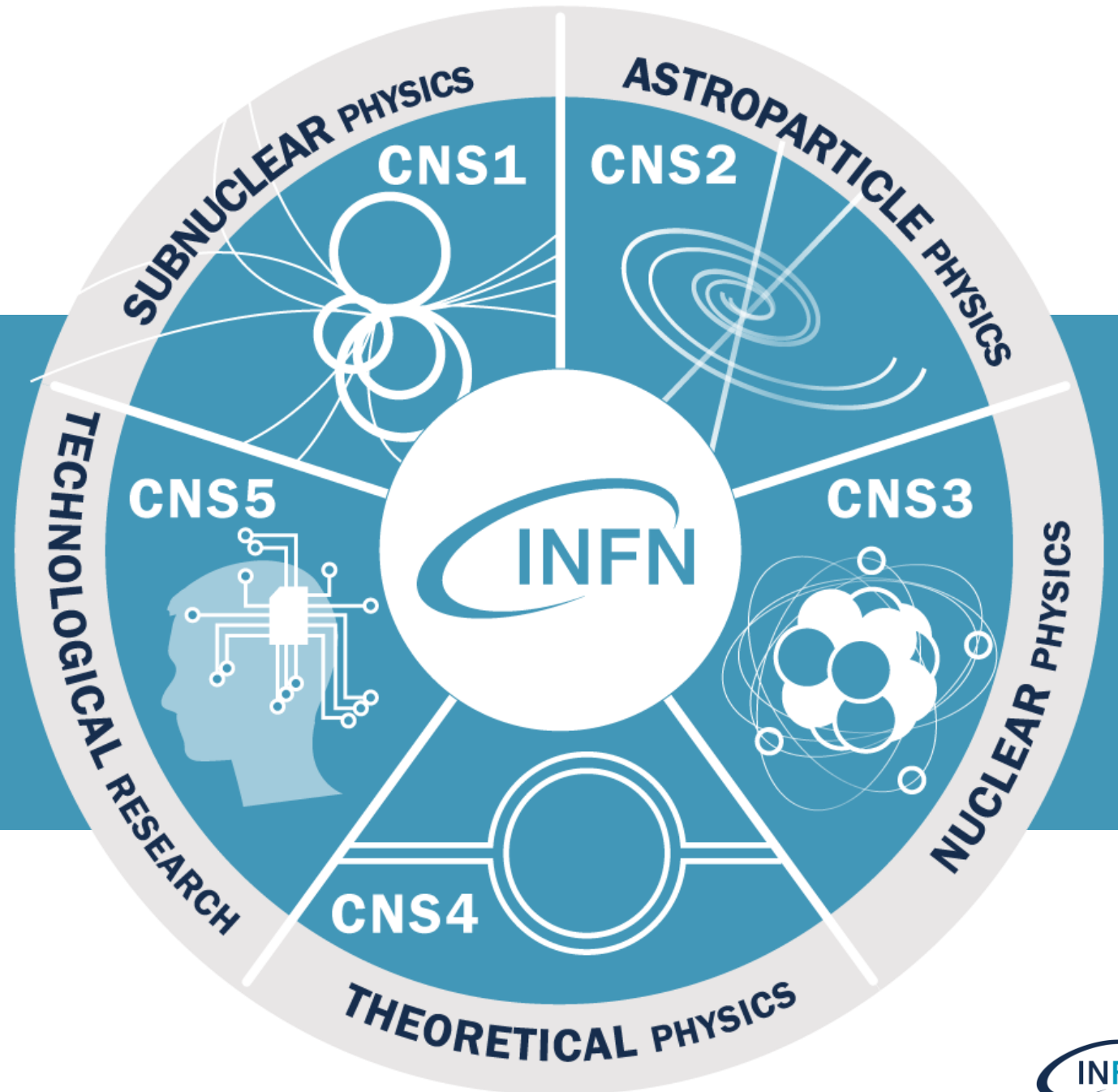
understand the Universe in the first moments after the Big Bang



INFN structure



The 5 research lines and the National Scientific Committees



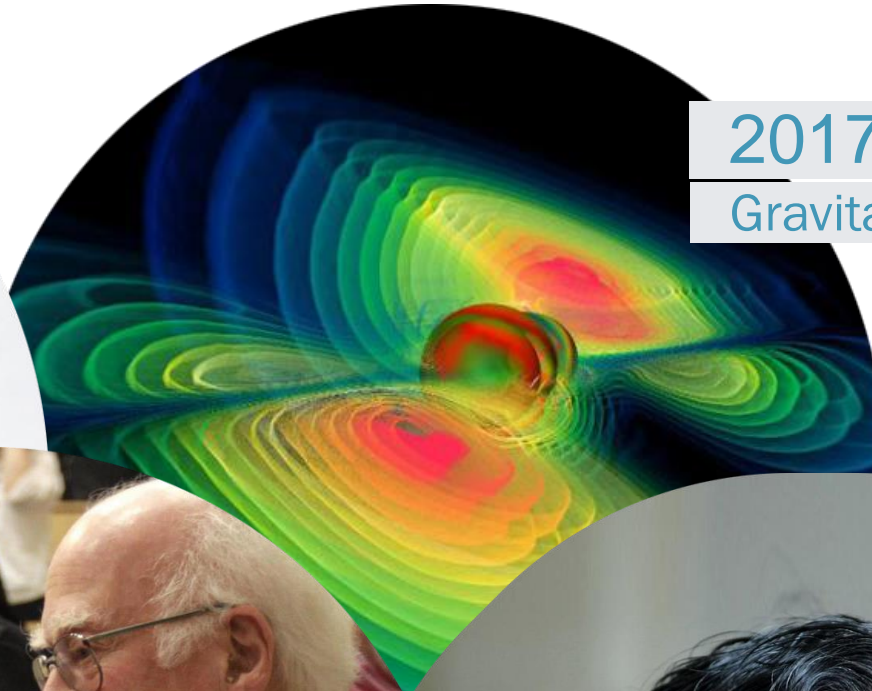
1985

Carlo Rubbia



2017

Gravitational Waves



2021

Giorgio Parisi



2013

Higgs Boson



INFN facilities

- 4 National Laboratories
- 20 Divisions
- 6 Associated groups
- 3 National Centres and Schools
- 1 International consortia





INFN facilities

4 National Laboratories





INFN facilities

3 National Centres





INFN facilities

1 International Consortium

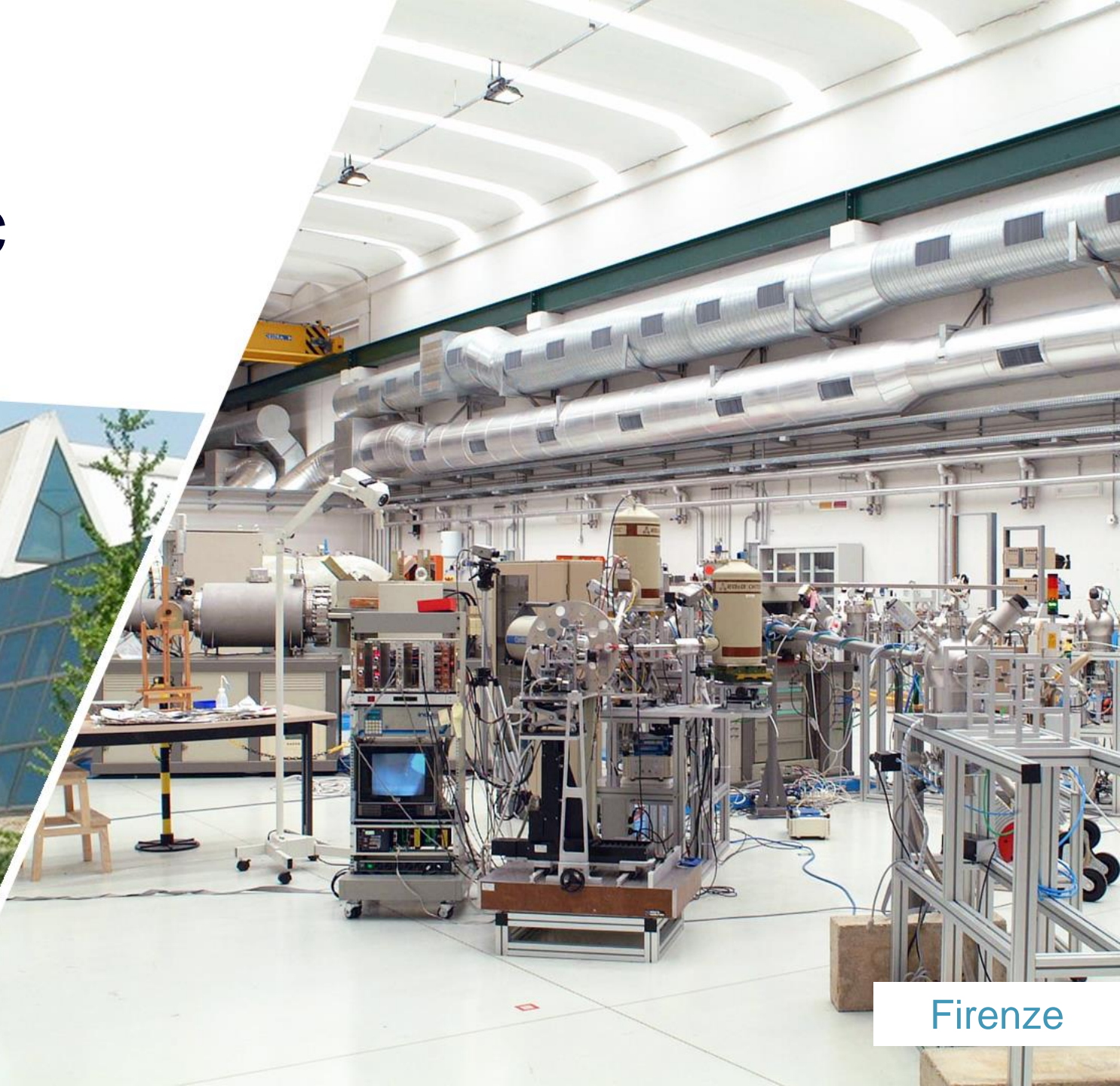
EGO-VIRGO
European Gravitational Observatory



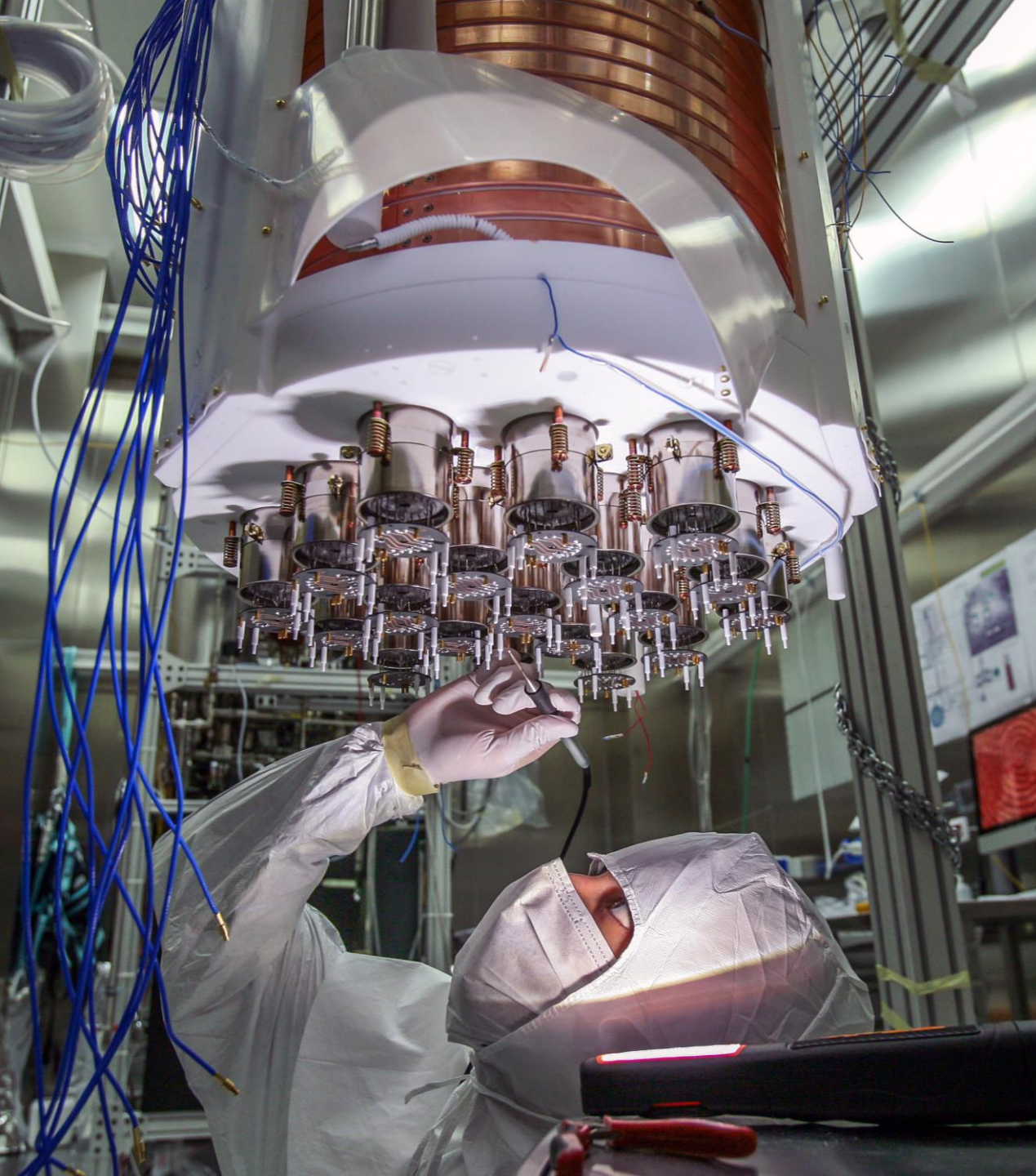
LASA and Labec



Milano



Firenze



The INFN is ...

**a community of over
6,000 people**

**~ 25% of them have PhD grants,
post-doc scholarships and research grants**

Number of employees with Permanent contract / Fixed-term contract



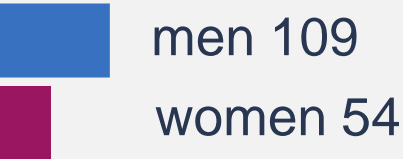
PERMANENT CONTRACT 2000



TI



FIXED-TERM CONTRACT 163



TD





Breakdown of Permanent staff

Researchers **661**



Technologists **392**



Technicians **619**



Administrative staff **326**



Administrative manager **2**

Total staff TI

2000



Breakdown of **Associates**

University researchers working only in INFN fields	806
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University researchers partly involved with INFN, teachers, other researchers	1796
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Technical associates	162
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Total Associates	2764
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Up to 31/12/2021



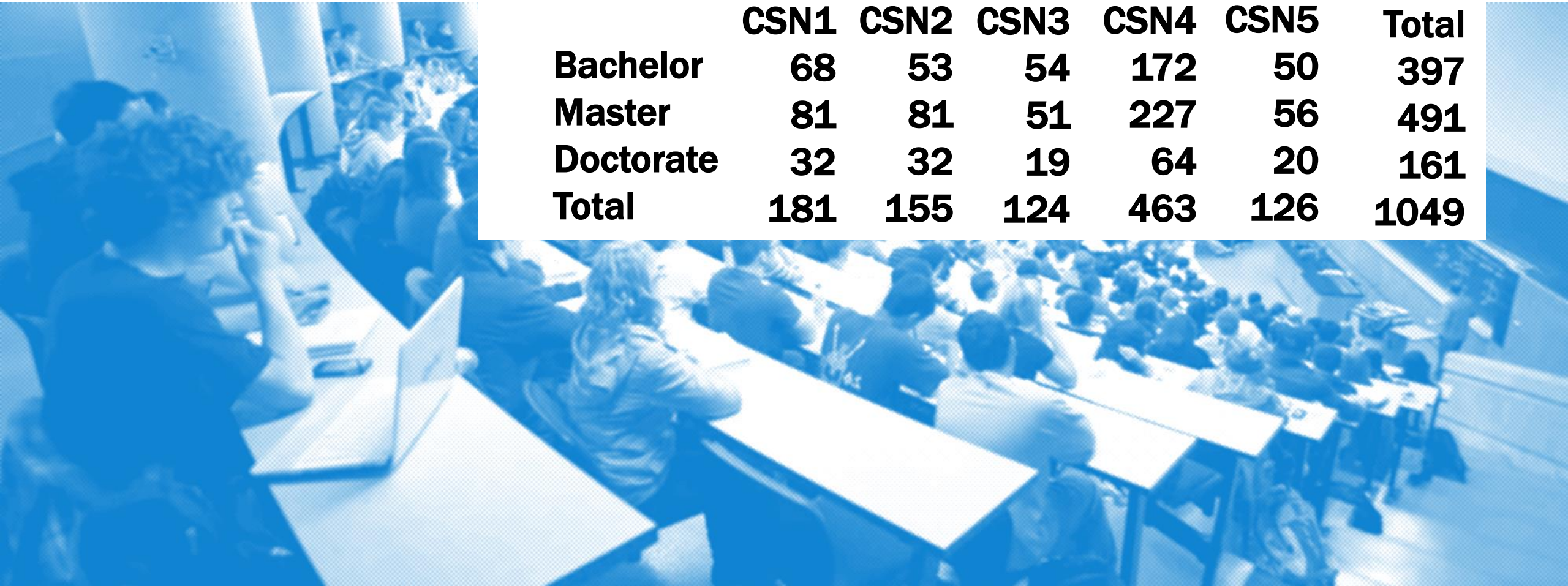
People ... in training

	INFN	Associates
Fellowships	336	344
<i>(incoming)</i> Fellowships	88	38
PhD students		1064
Tech. / Adm. training	24	

Engagement in Higher Education

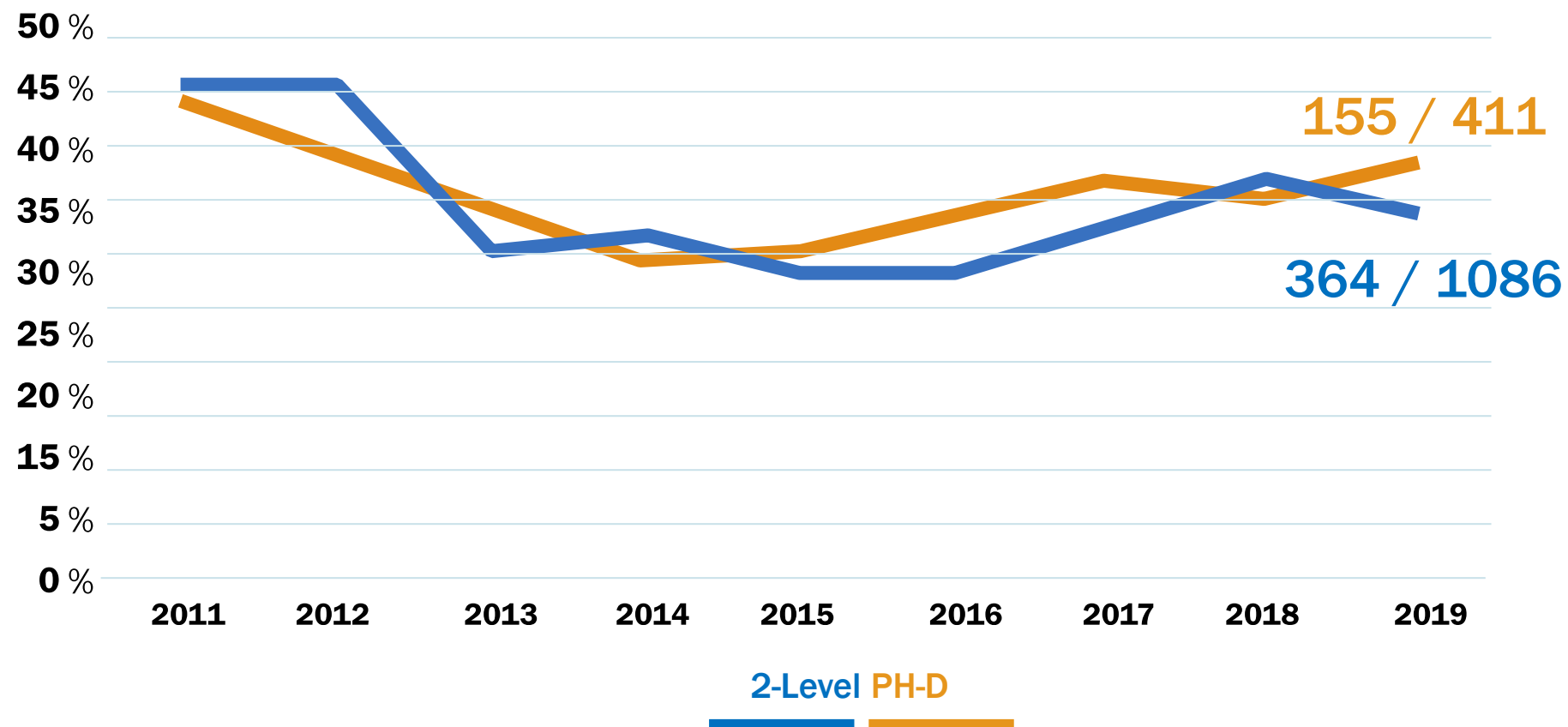
Number of students that completed their University
Theses in INFN research programs in 2020.

	CSN1	CSN2	CSN3	CSN4	CSN5	Total
Bachelor	68	53	54	172	50	397
Master	81	81	51	227	56	491
Doctorate	32	32	19	64	20	161
Total	181	155	124	463	126	1049

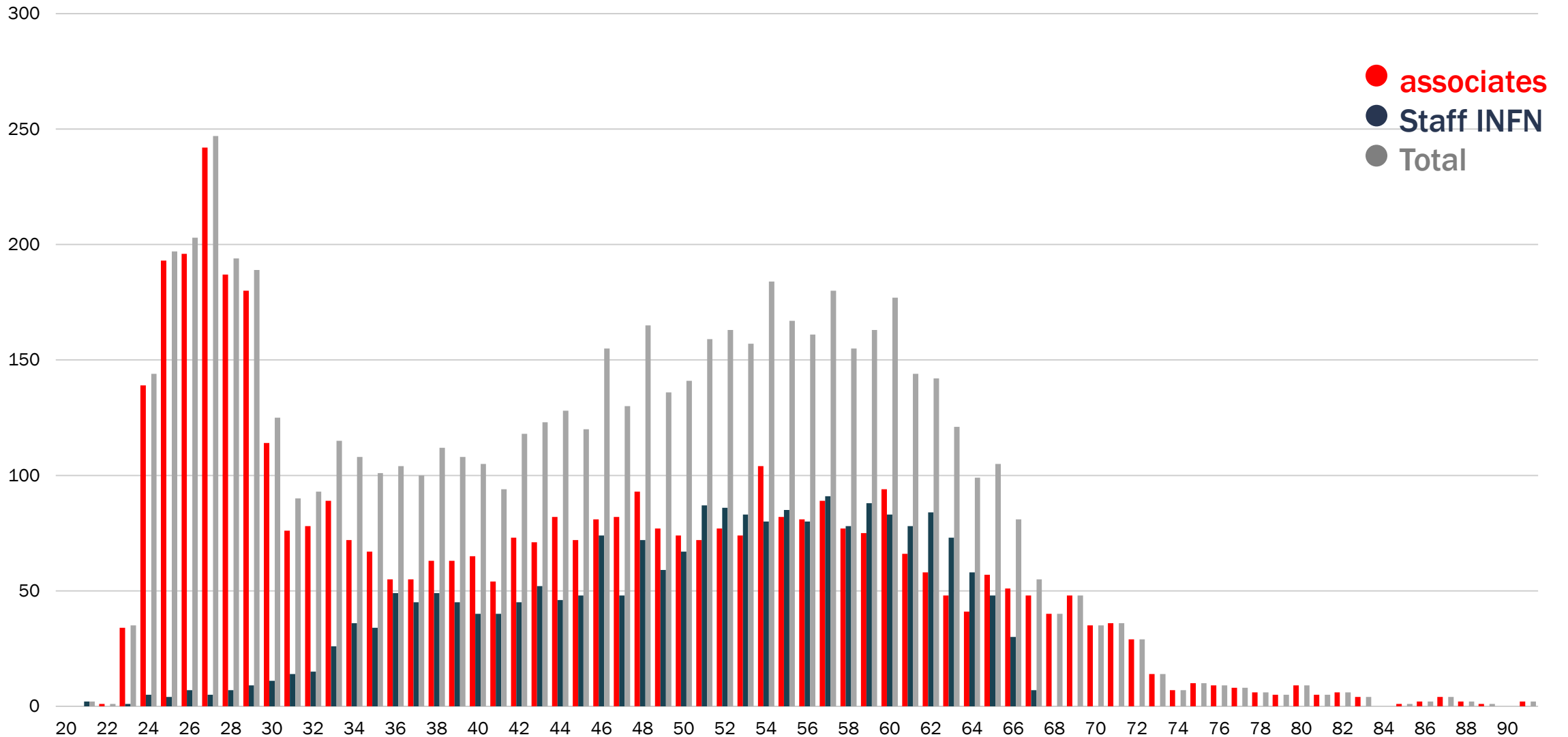


Engagement in Higher Education

Ratio of INFN/all Physics 2-Level and Doctorate theses Year 2019



INFN Frequency distribution of employees/associates according to age



years

Up to 31/12/2021

Budget 2021

383 mln di euro

Financial resources
excluding funds allocated
to specific projects

261
mln di euro



Funds allocated to
specific projects

122
mln di euro

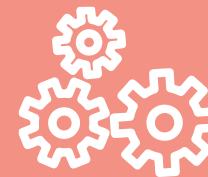
Financial report 2021

Profile of expenditure for
research, personnel, operations and equipment

personel
47,8%

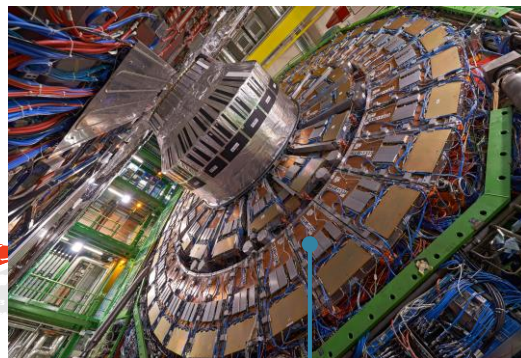


research
37.1 %

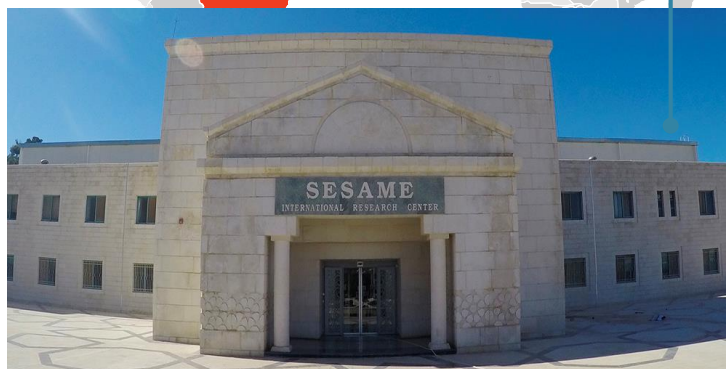


operations
and
equipment
15.1%





An international DNA



Knowledge Transfer



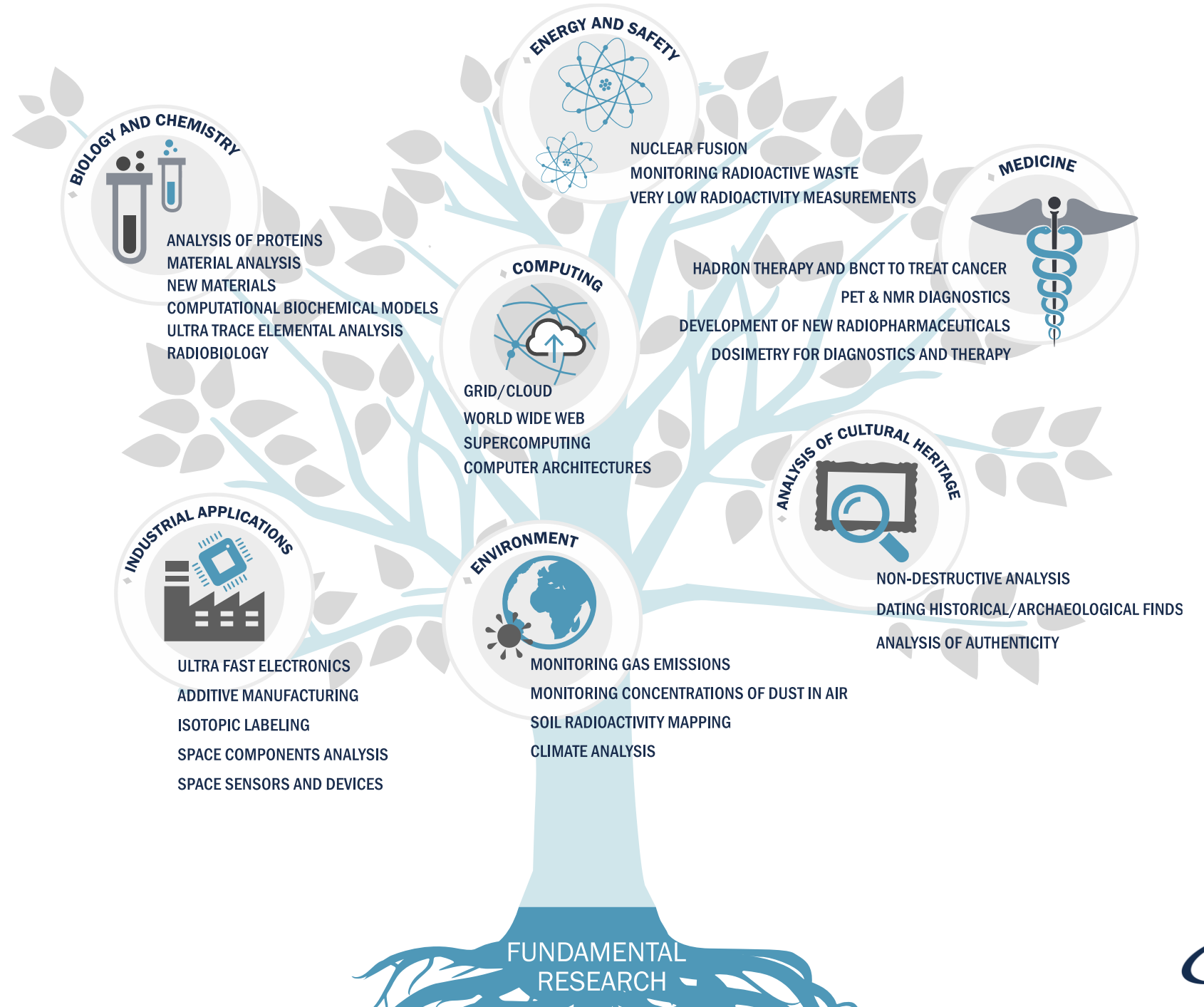
Knowledge Transfer



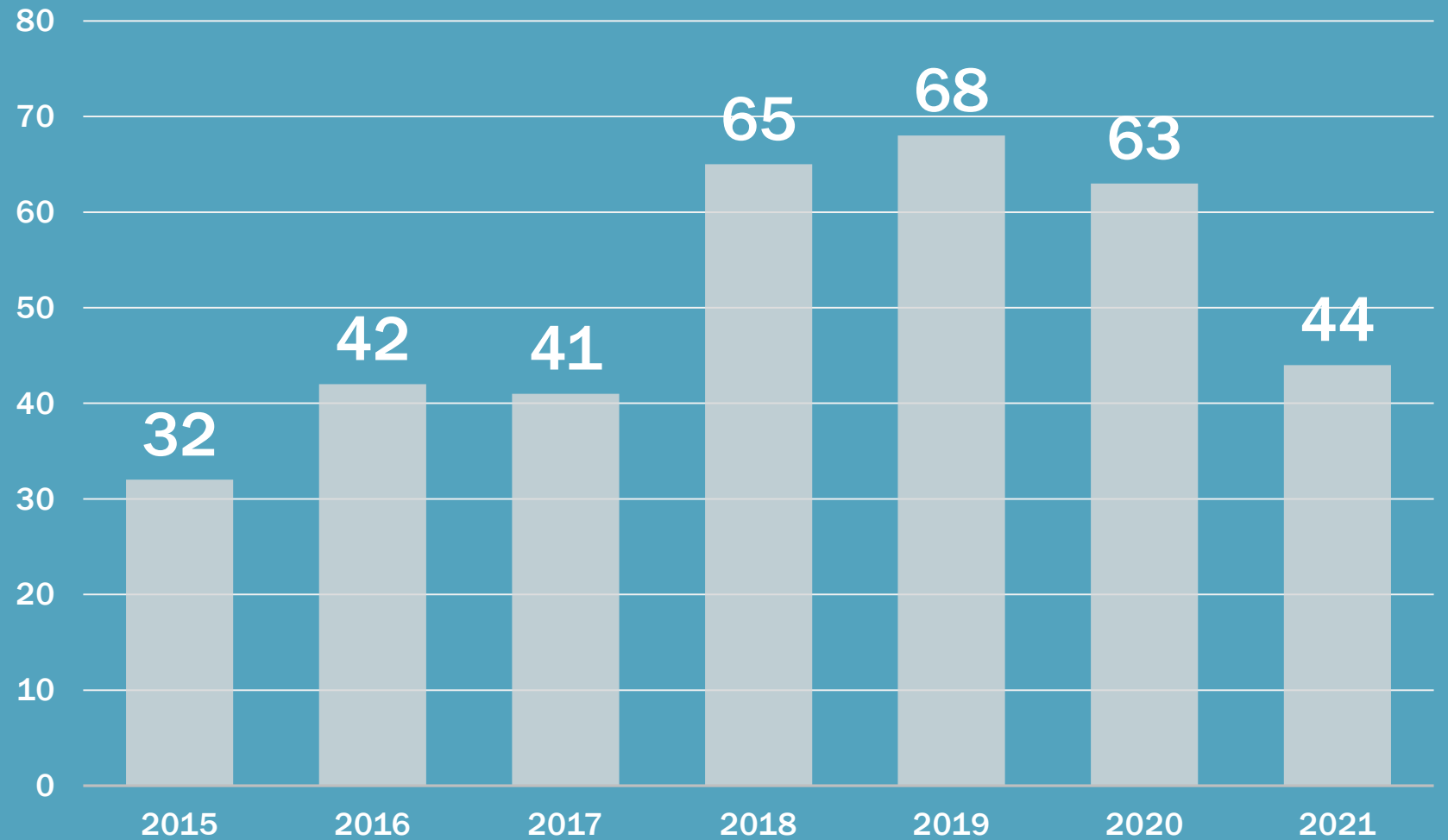
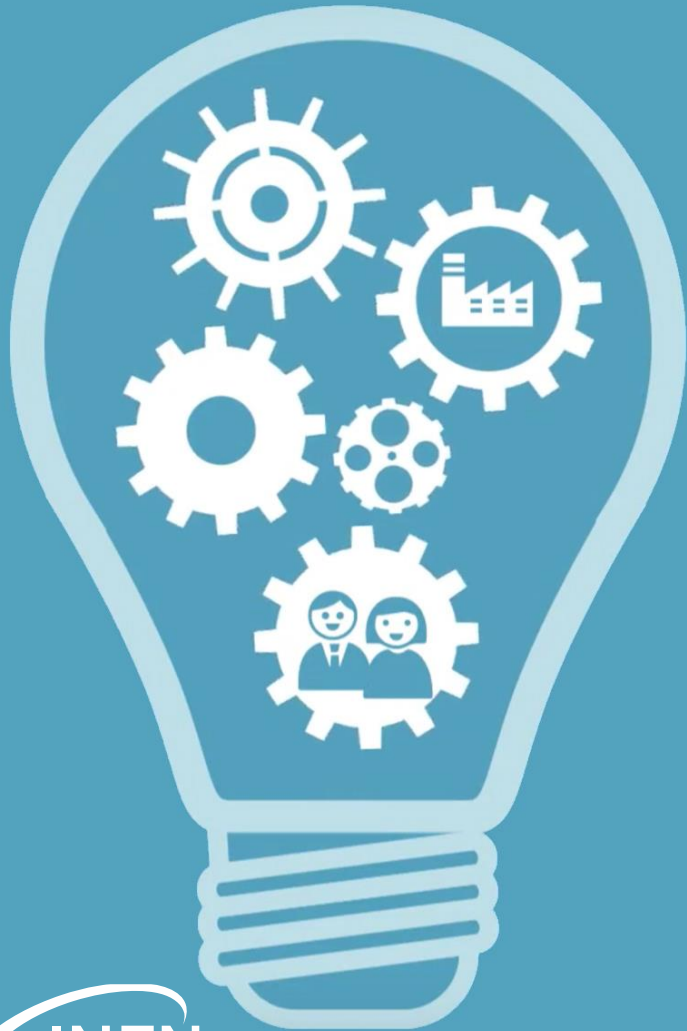
INFN



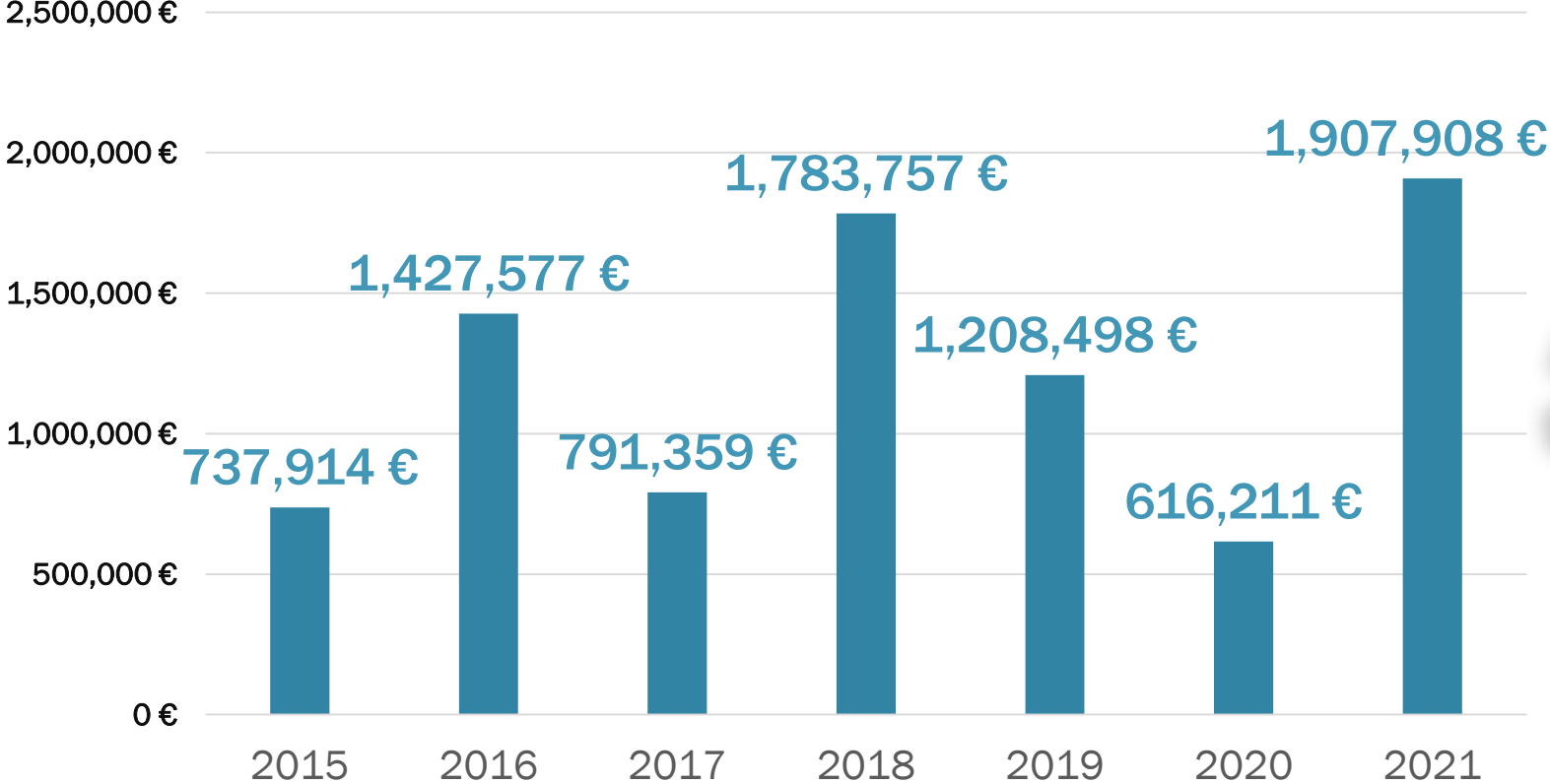
Knowledge Transfer



New TT agreement per year (2021 Q3)

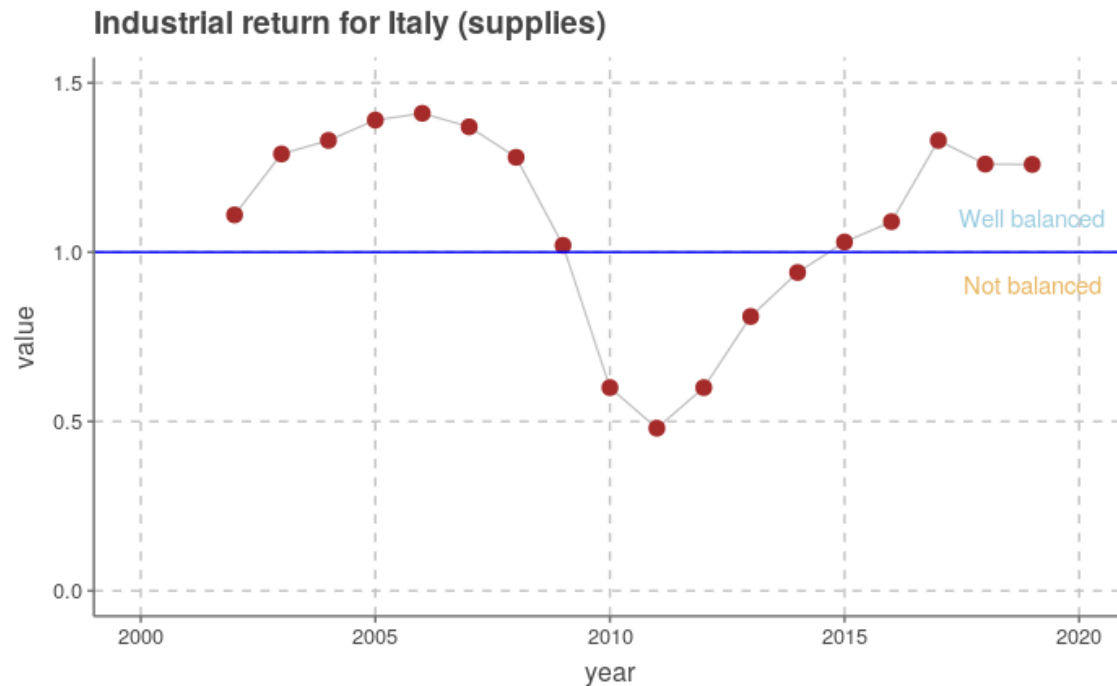
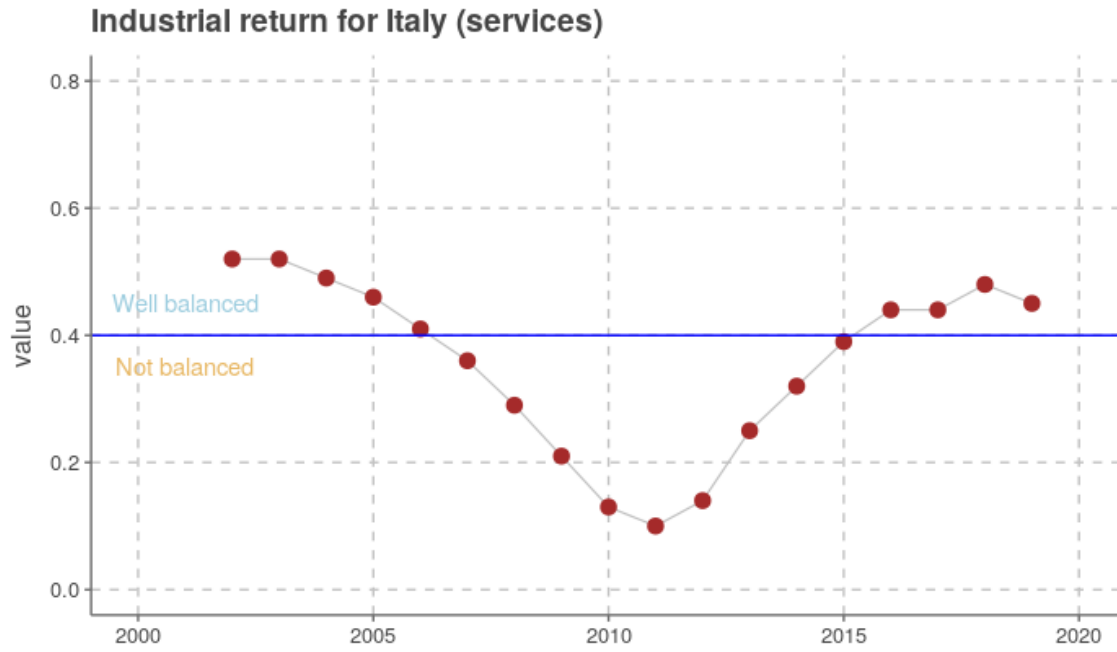


Actual Income per year from TT Agreements (2021 Q3)



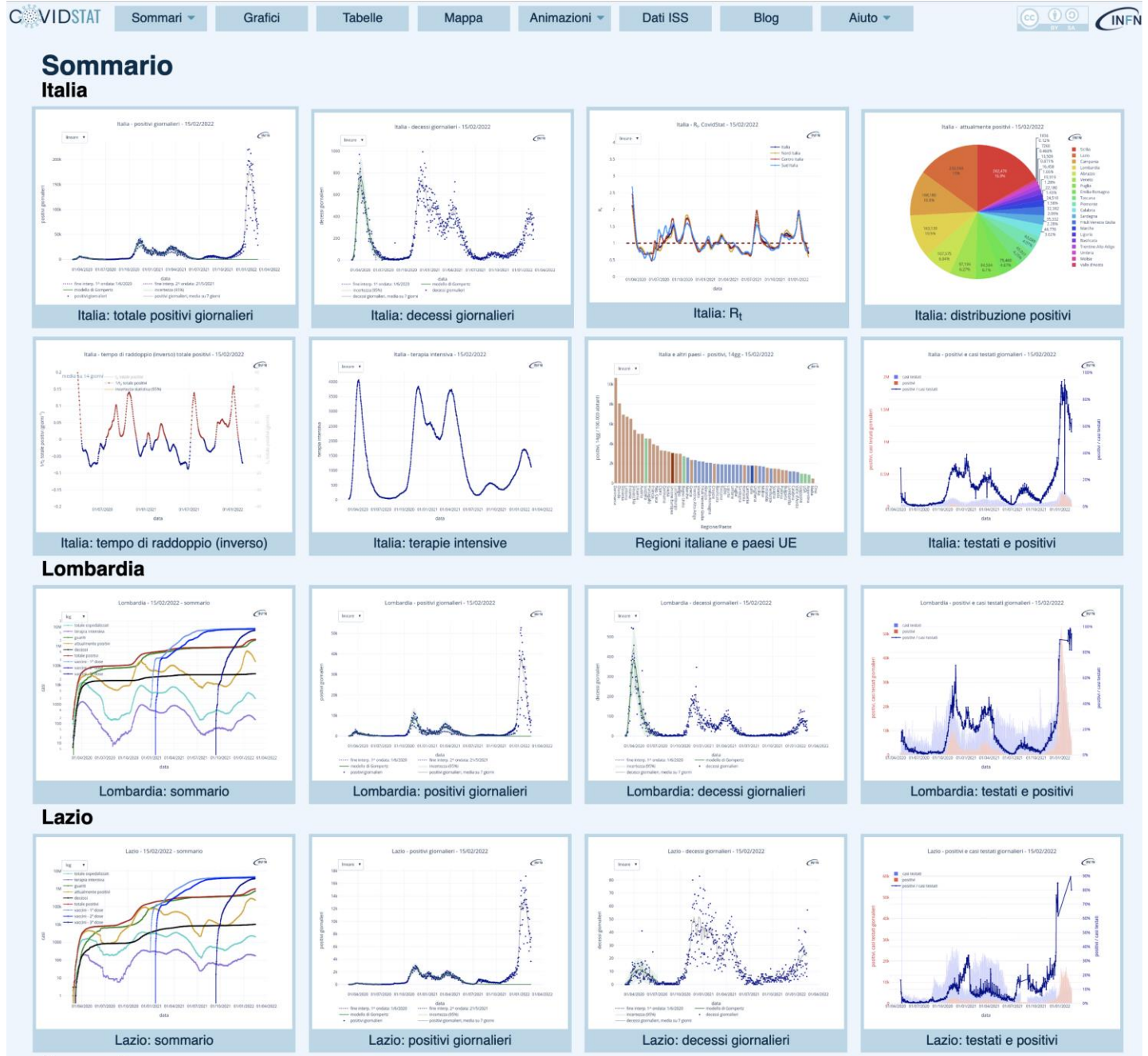
The Italian IRC

Italy has been a well-balanced member state for most of the past years

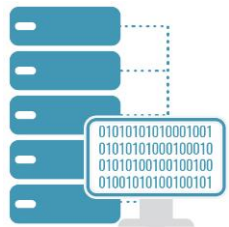


Covid Activities

COVIDSTAT



Covid Activities



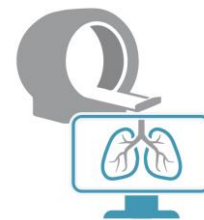
- EXSCALATE4COV (HORIZON2020)
- AIM ARTIFICIAL INTELLIGENCE IN MEDICINE
- CLOUD PER LA GESTIONE DEI DATI



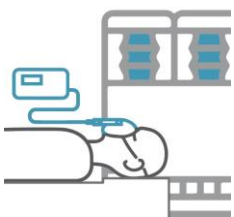
- COVIDSTAT INFN
- ANALISI DATI SULLA DIFFUSIONE DELLA PANDEMIA



- STAMPA 3D VALVOLE CHARLOTTE



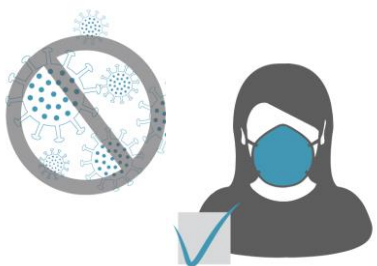
- PROGNOSE E OTTIMIZZAZIONE DELLA TERAPIA
- NANOFARMACI ANTIVIRALI



- MVM MILANO VENTILATORE MECCANICO



- CARATTERIZZAZIONE DI BATTERI E VIRUS IN ATMOSFERA
- QUALITA' DELL'ARIA E DIFFUSIONE DI BIOAEROSOL



- SISTEMA DI STERILIZZAZIONE
- ANTI_COVID_LAB



- SIBYLLA BIOTECH&INFN CONTRO IL COVID-19

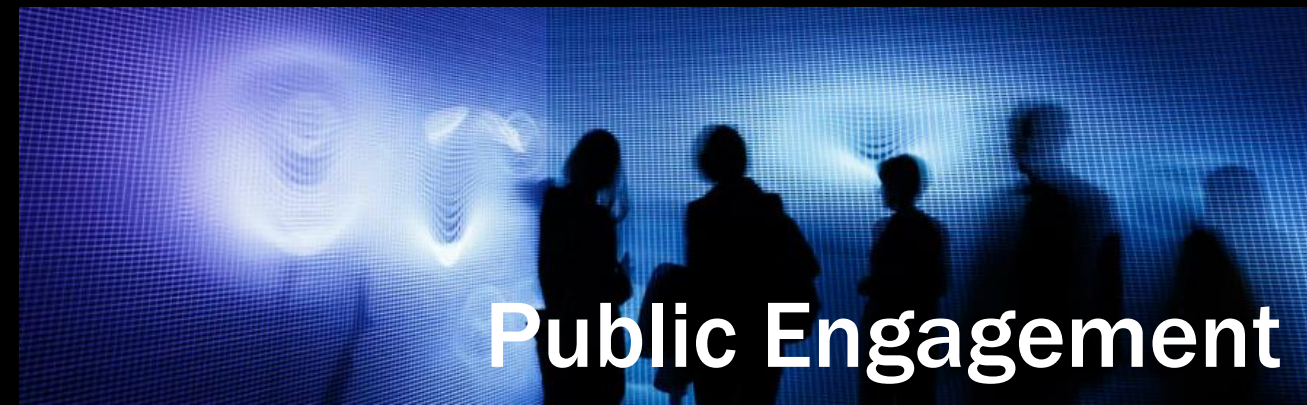
Communication and Public Engagement



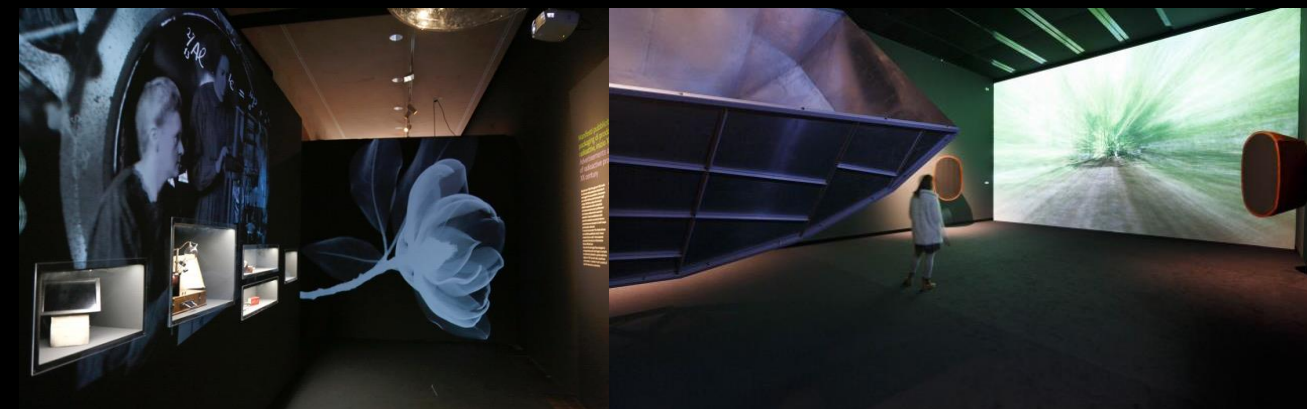


Conference Shows 2011- 2020

25 original events
 20 replicas
 3-6 months for the production of big event
 51.000 spectators
 8 streaming broadcasts on Rai channels
 15 towns
 22 different theatrical venues



Public Engagement

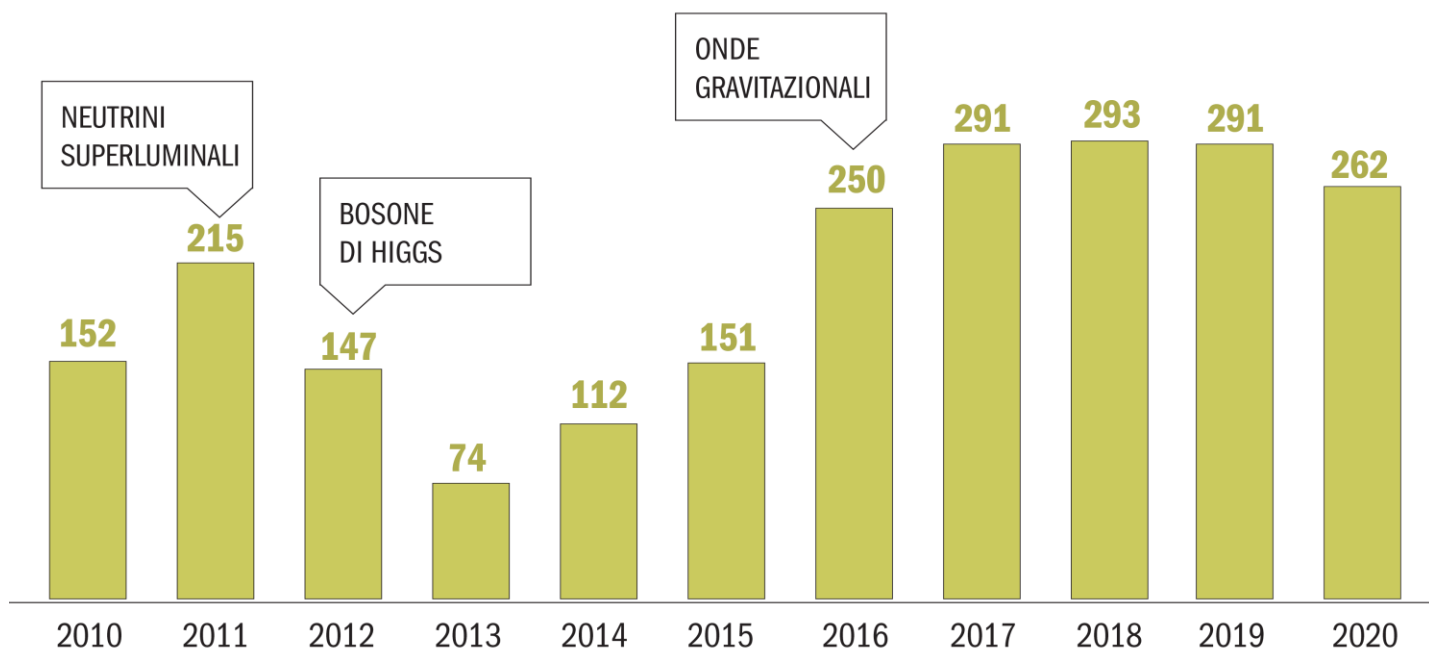
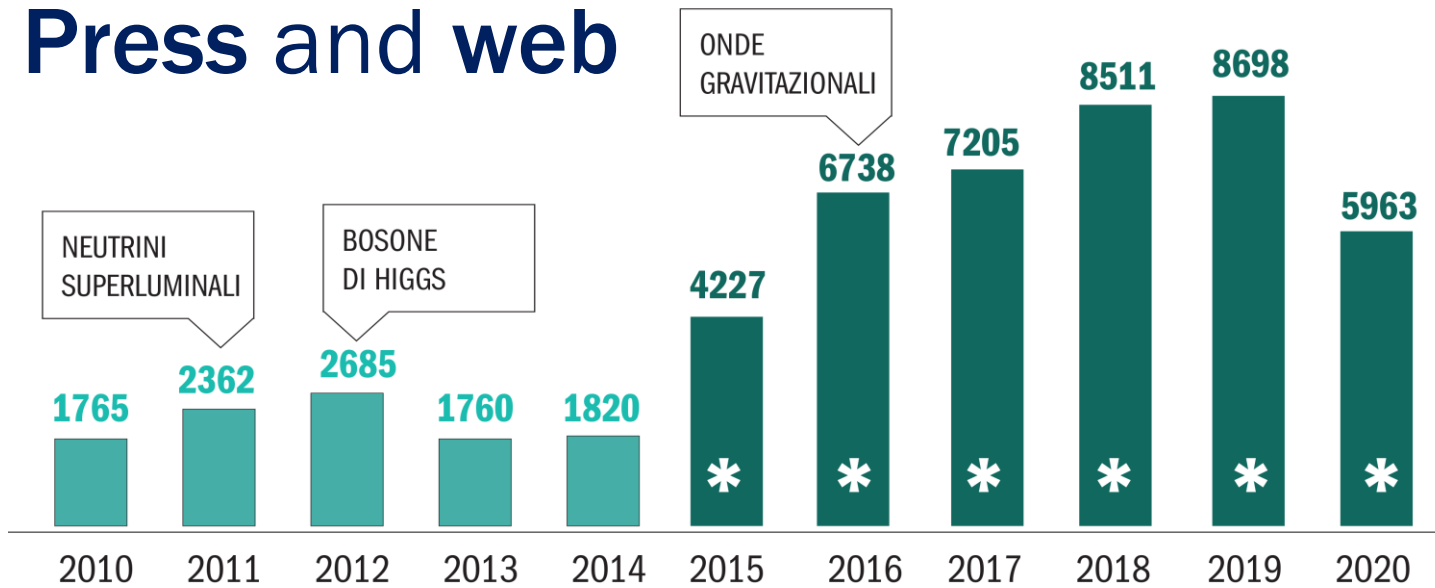


Exhibitions 2009 - 2020

13 great exhibitions
 15 exhibits and labs
 20 different exposition venues
 605.000 visitors at the greatest exhibitions
 22 towns (national and international sites)



Press and web



TV and Radio



PNRR

PIANO NAZIONALE
DI RIPRESA E RESILIENZA



ICSC National Centre for
HPC, Big Data and
Quantum Computing



ETIC Einstein Telescope
Infrastructure Consortium



IRIS Innovative Research
Infrastructure on applied
Superconductivity



KM3NeT



LNGS: Gran Sasso National
Laboratory upgrade



EuAPS
Eupraxia - LNF

ICSC

Centro Nazionale HPC,
Big Data
e Quantum Computing

Cloud national infrastructure for supercomputing.

Hub & Spoke organization:

10 vertical spokes for technology developments and software applications

400 M€ Total Budget

188 M€ Cloud Infrastructure

40 M€ Open Call

40 M€ Innovation & TT

42% investment South Regions

34 MUR Universities
and Research institutions

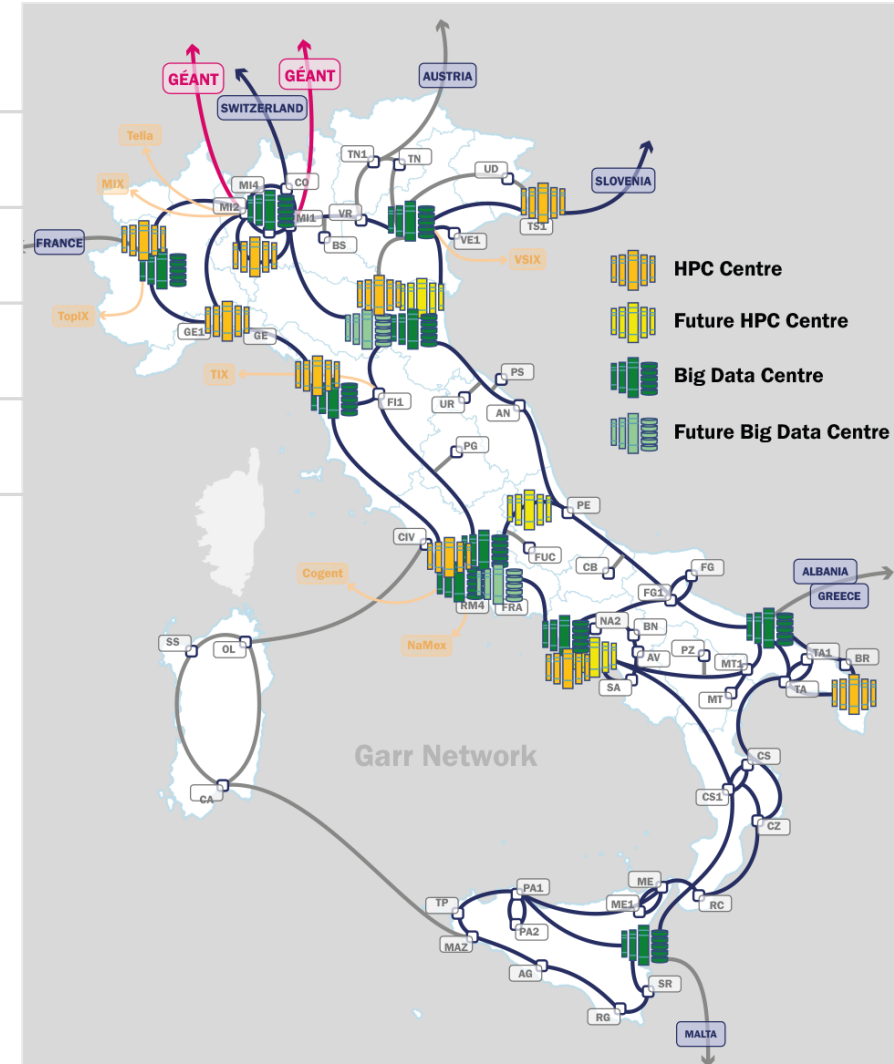
15 Private Companies

1575 Researchers and engineers

250 New Temporary positions

250 New PhD

40 % Female



IRIS

Innovative Research
Infrastructure on applied
Superconductivity

Research Infrastructure for the development of superconducting technologies

Including high temperatures

Industrial spin-offs:

- Superconducting magnets → CERN/Medicine
- Low-dispersion superconducting cables

Budget: 75 M€ (50% in Southern Regions):

- 40 M€ to upgrade infrastructures, laboratories, cutting-edge technologies
- 25 M€ for electric power line prototypes and magnets



ETIC

Einstein Telescope
Infrastructure Consortium

Einstein Telescope (ET)

Research Infrastructure for the observation of gravitational waves

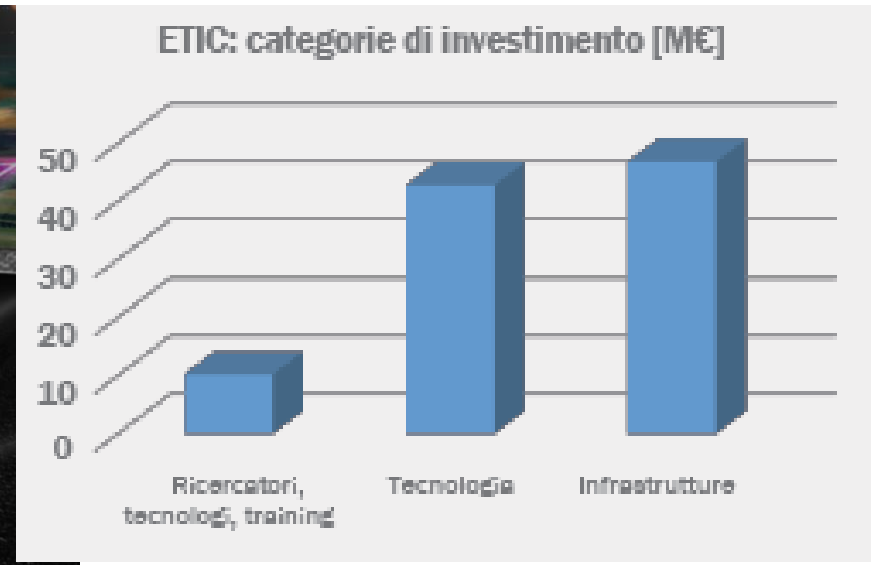
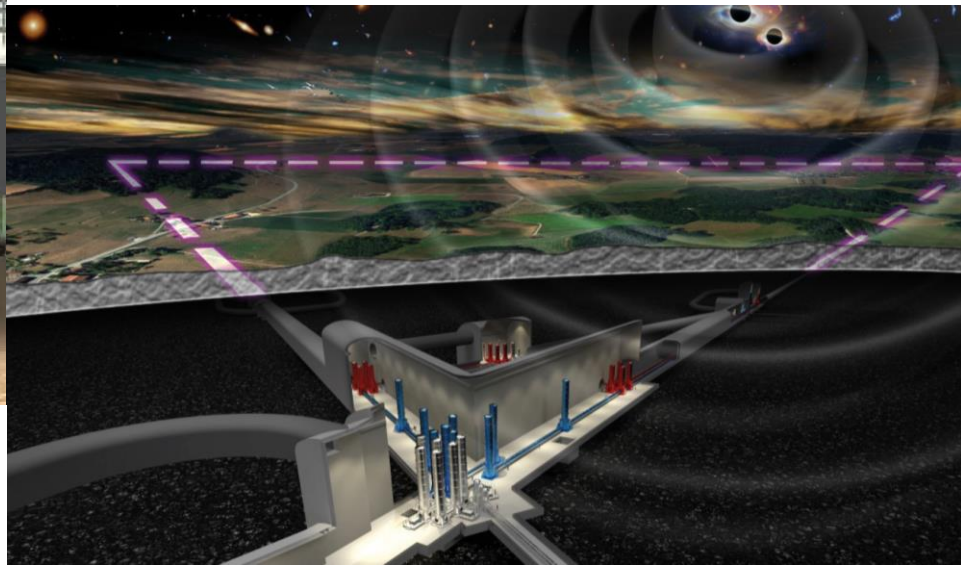
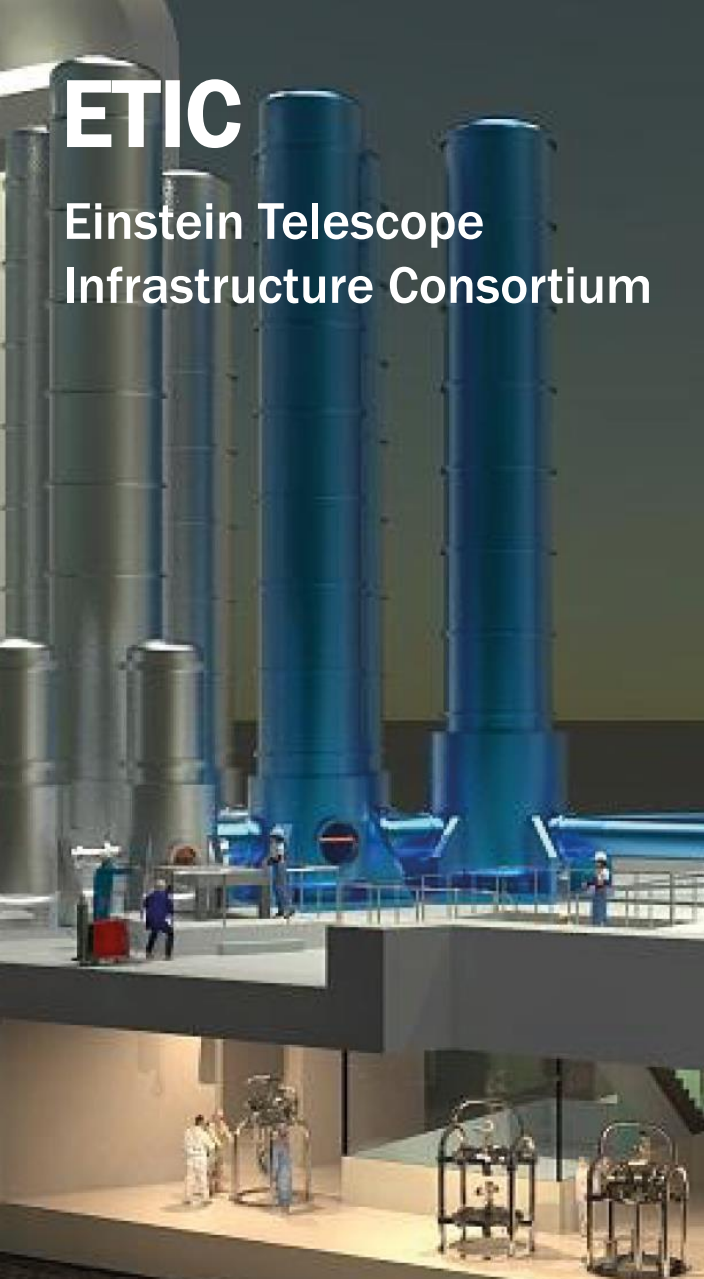
Where: in Sardinia (IT) or Holland

Global cost 1.8 G€ over the next 10 years
(50% to be covered by the host state).

ETIC: Research Infrastructure to implement

- A network of laboratories and interdisciplinary skills to develop cutting-edge technologies needed for ET
- The executive project for Sardinia

Budget: 100 M€ (52% in Southern Regions).



KM3NeT

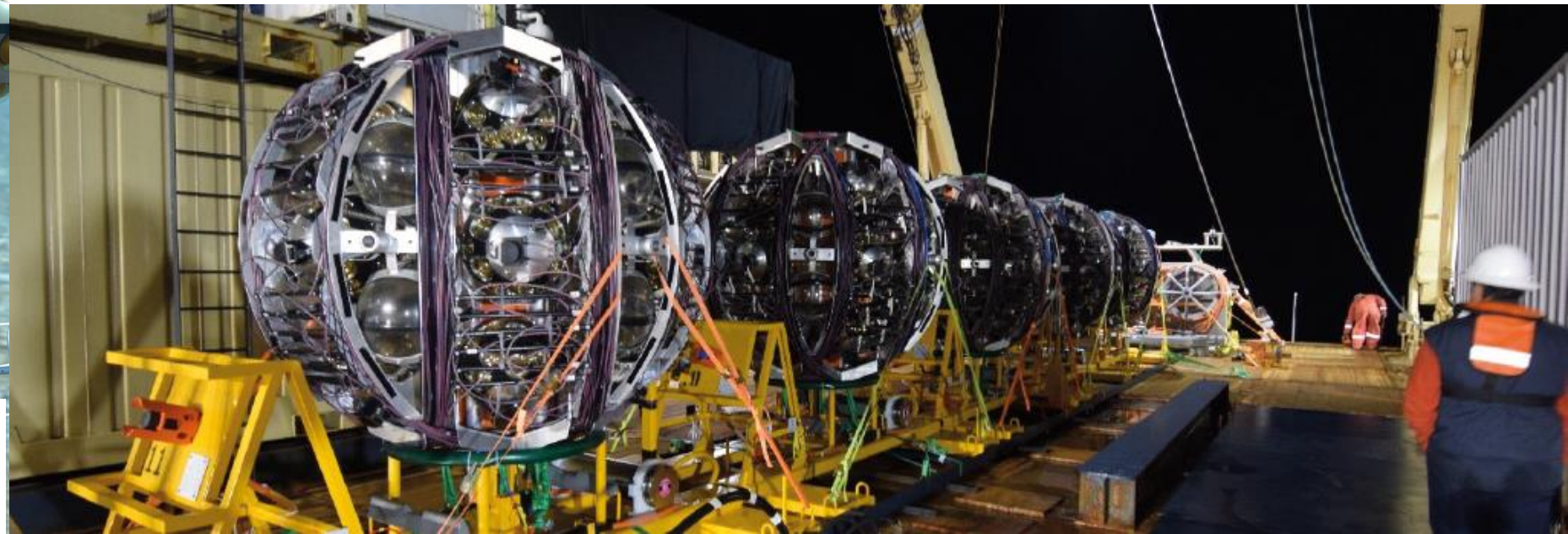


KM3NeT is the largest underwater infrastructure in the northern hemisphere.

In the depths of the Mediterranean Sea, it houses two neutrino telescopes: ARCA off Sicily, Italy, and ORCA off Toulon, France.

Studying neutrinos from deep space to investigate the universe at times around to the Big Bang

Budget: 77 M€ (80% in Southern Regions)



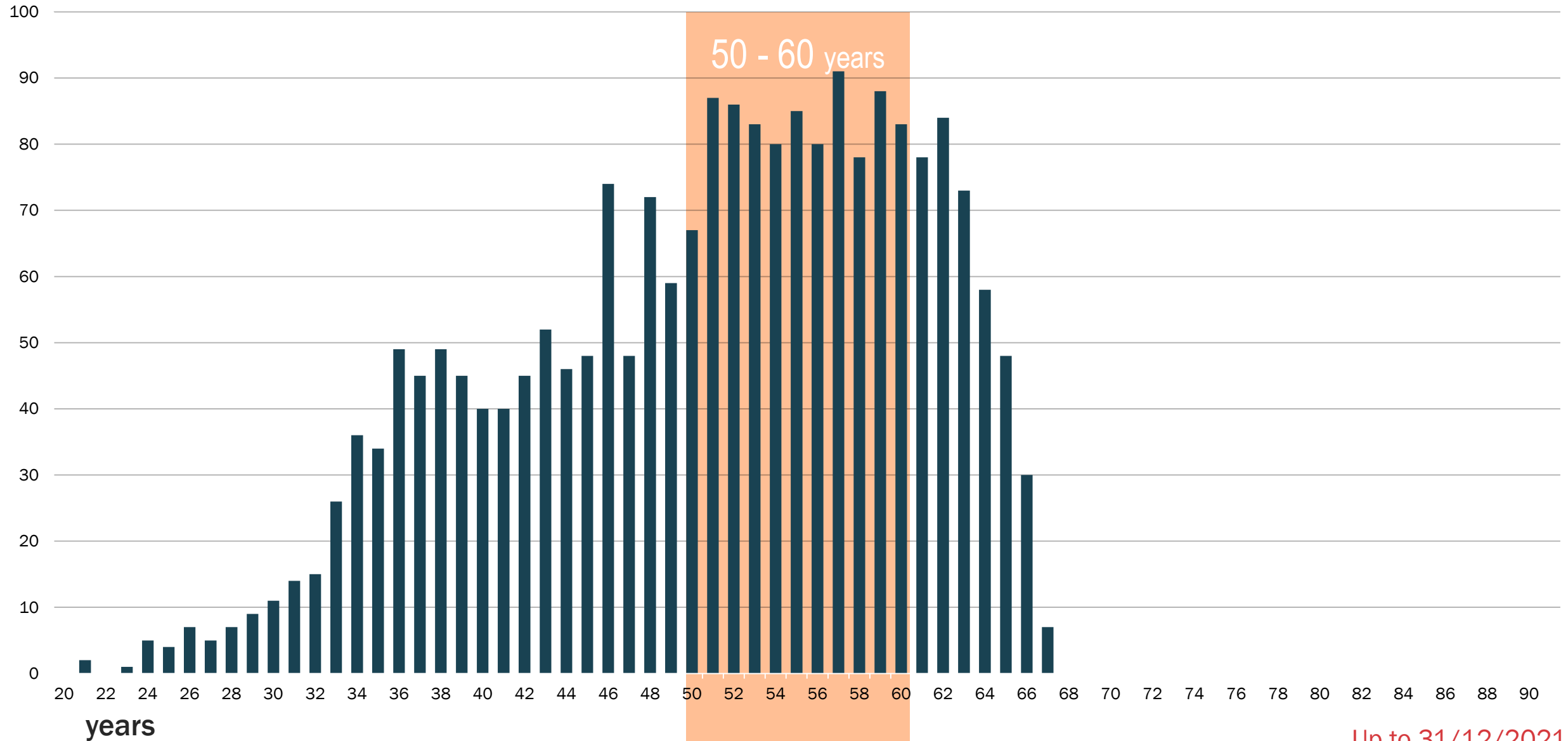


Per Aspera ad Astra

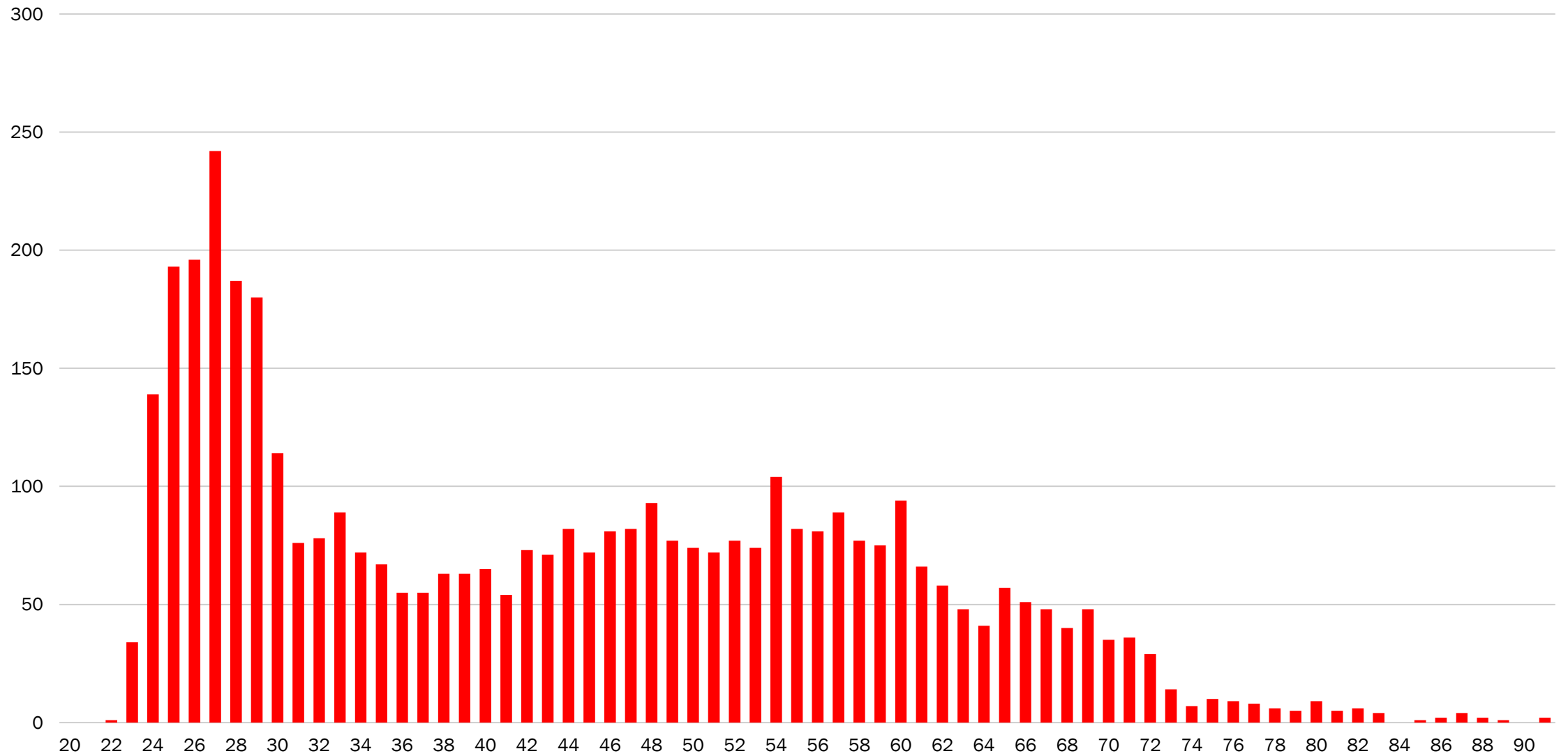
**Thank you for the
attention !**

Backup slides

Frequency distribution of employees according to age



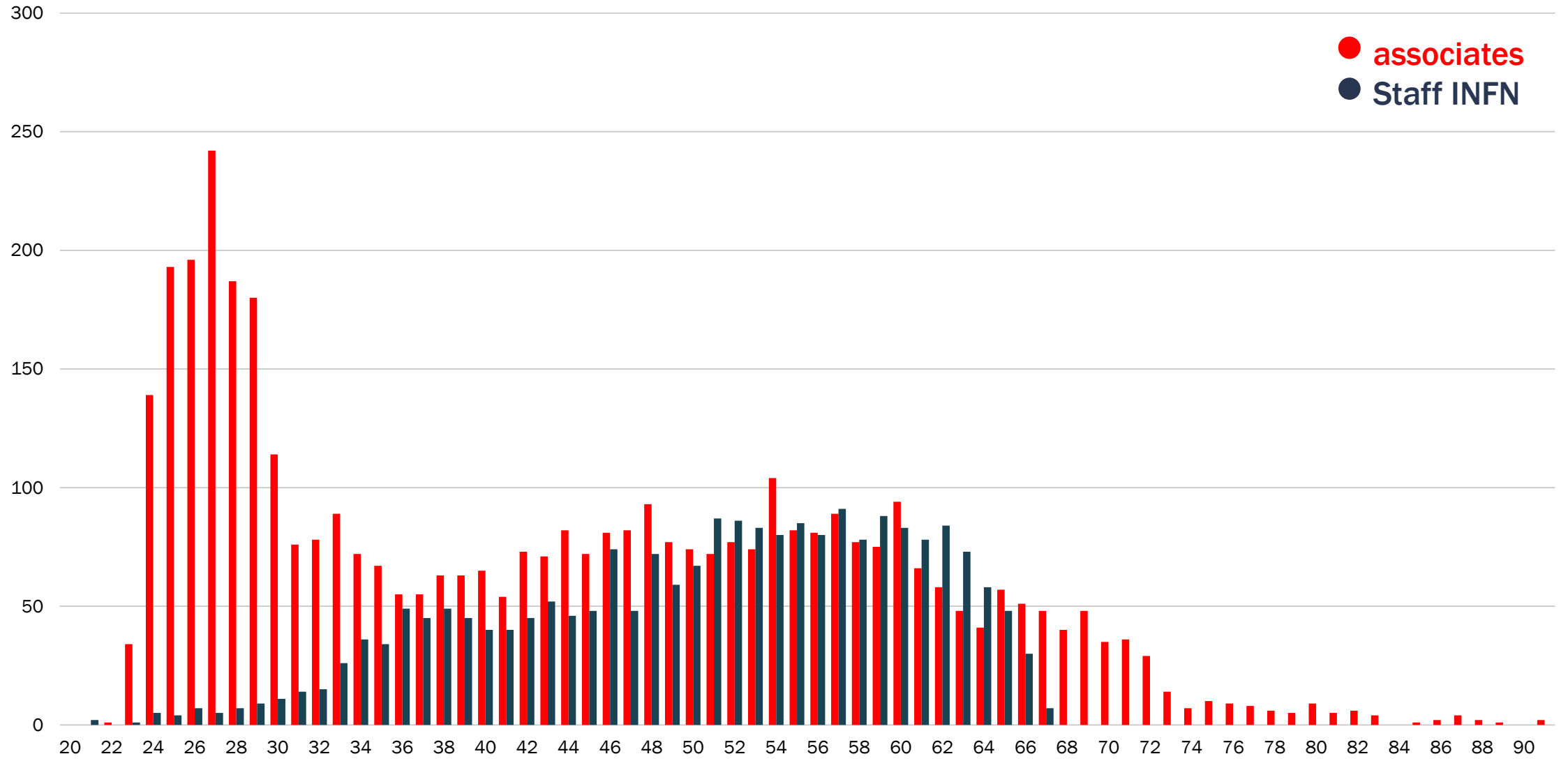
Frequency distribution of associates according to age



years

Up to 31/12/2021

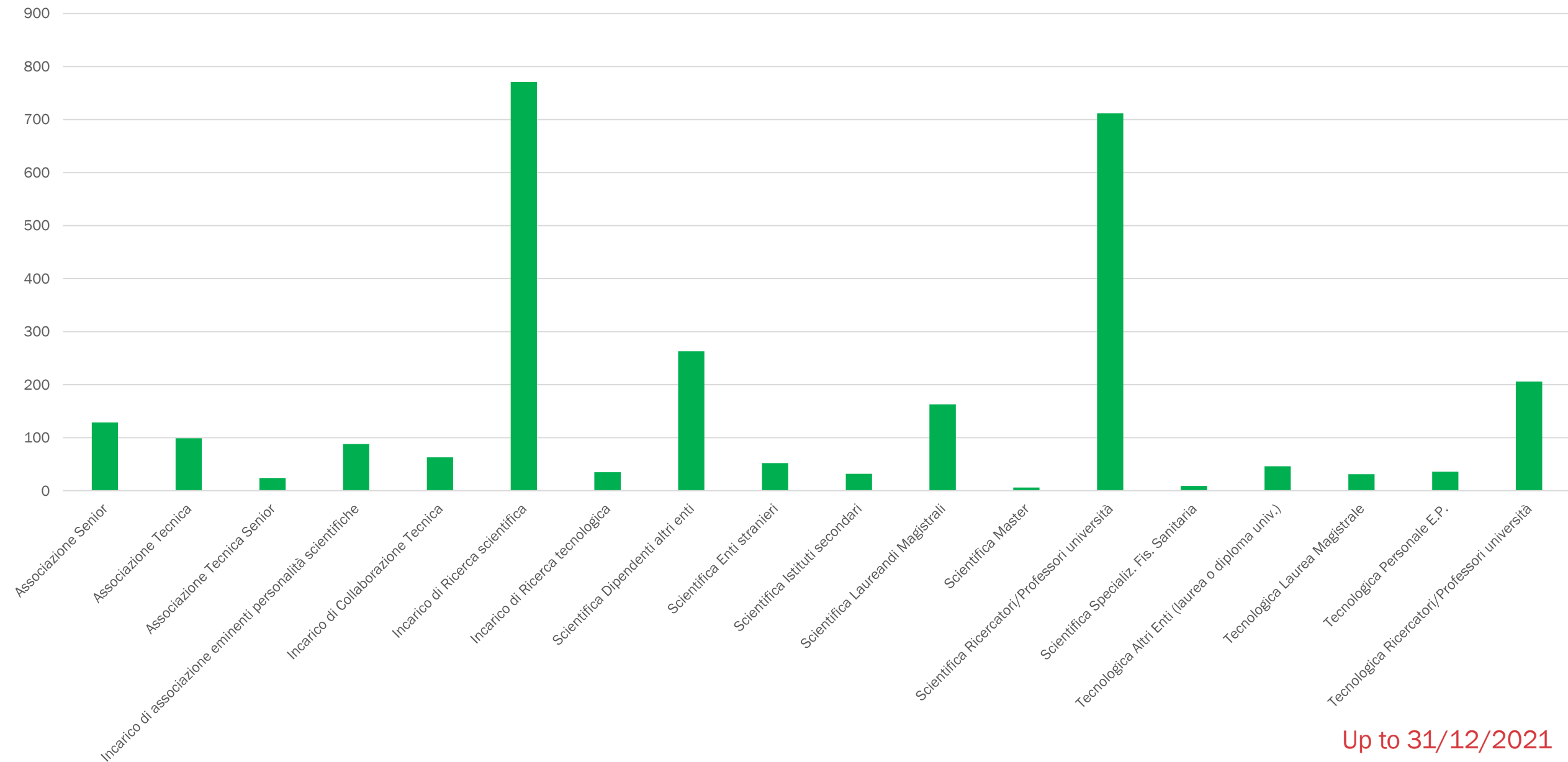
INFN Frequency distribution of employees/associates according to age



years

Up to 31/12/2021

Allocation of work activities assignments





Istituto Nazionale di Fisica Nucleare



Istituto Nazionale di Fisica Nucleare