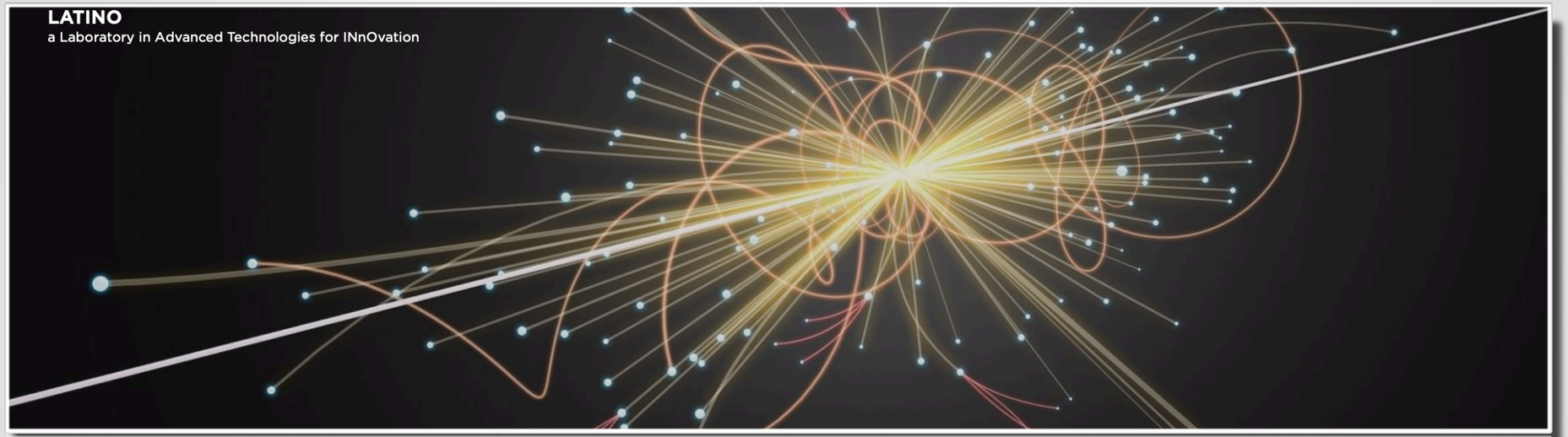


LATINO

L*aboratory in* **A***dvanced* **T***echnologies for* **IN***n***O***vation*

Antonio Falone, INFN-LNF

Bruxelles, 17/09/2019

Outline

- Background, goals and framework
- Services
- Status & Organization

LATINO

LATINO

LATINO program is an initiative funded by Regional Government (Regione Lazio) through European Regional Development Funds, with the goal to open research labs to industries and other research center.

LATINO

LATINO program is an initiative funded by Regional Government (Regione Lazio) through European Regional Development Funds, with the goal to open research labs to industries and other research center.

INFN through Frascati National Lab (INFN-LNF) created a cluster of already existing labs with the aim to offer infrastructures, services and technological know-how on 4 main areas:

- Radiofrequency
- Vacuum
- Magnets
- Mechanical engineering and metrology

LATINO

LATINO program is an initiative funded by Regional Government (Regione Lazio) through European Regional Development Funds, with the goal to open research labs to industries and other research center.

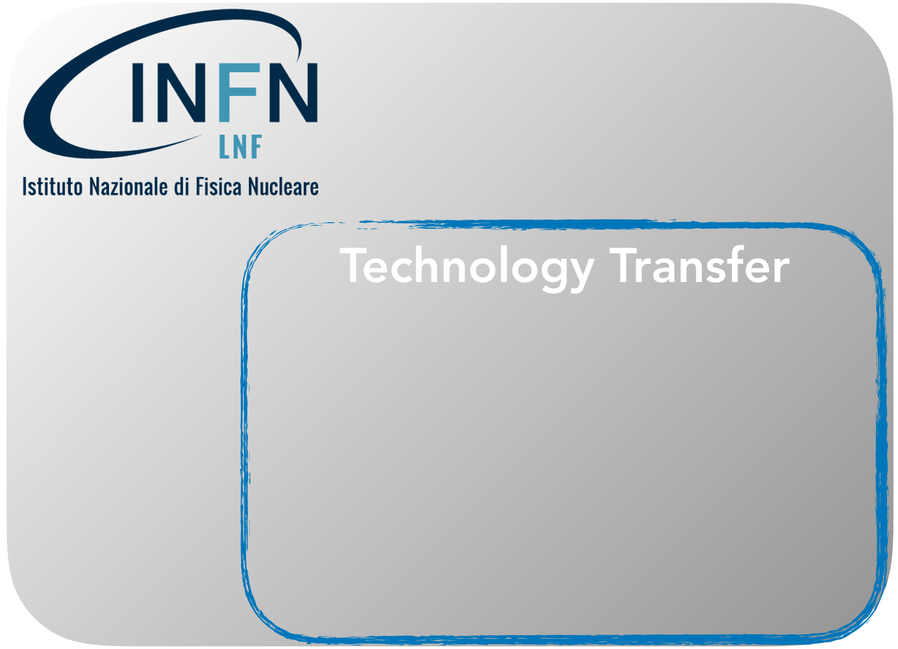
INFN through Frascati National Lab (INFN-LNF) created a cluster of already existing labs with the aim to offer infrastructures, services and technological know-how on 4 main areas:

- Radiofrequency
- Vacuum
- Magnets
- Mechanical engineering and metrology

The funding is aimed to upgrade those laboratories and reserve a time slot (>60%) for collaboration with industries or other research institutions — Work for others

LATINO

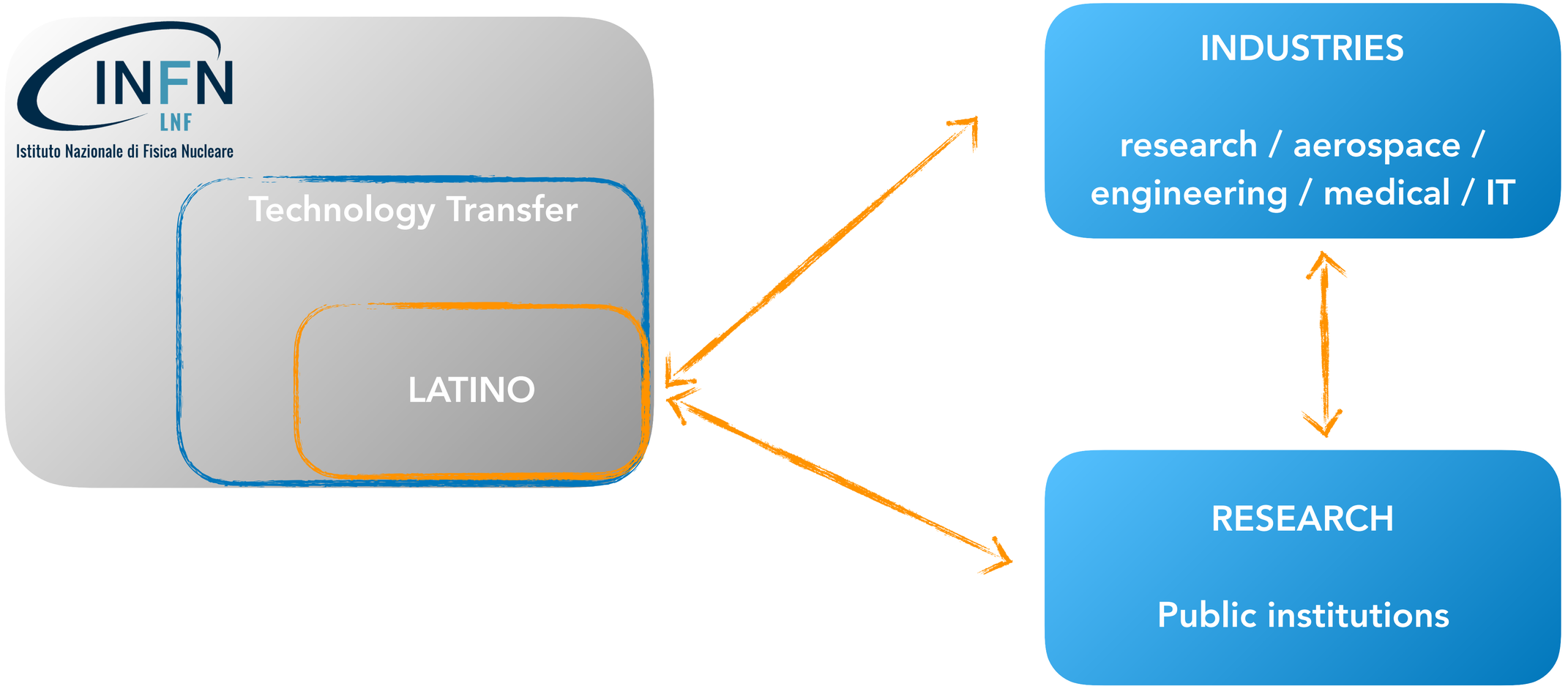
LATINO


INFN
LNF
Istituto Nazionale di Fisica Nucleare
Technology Transfer

LATINO

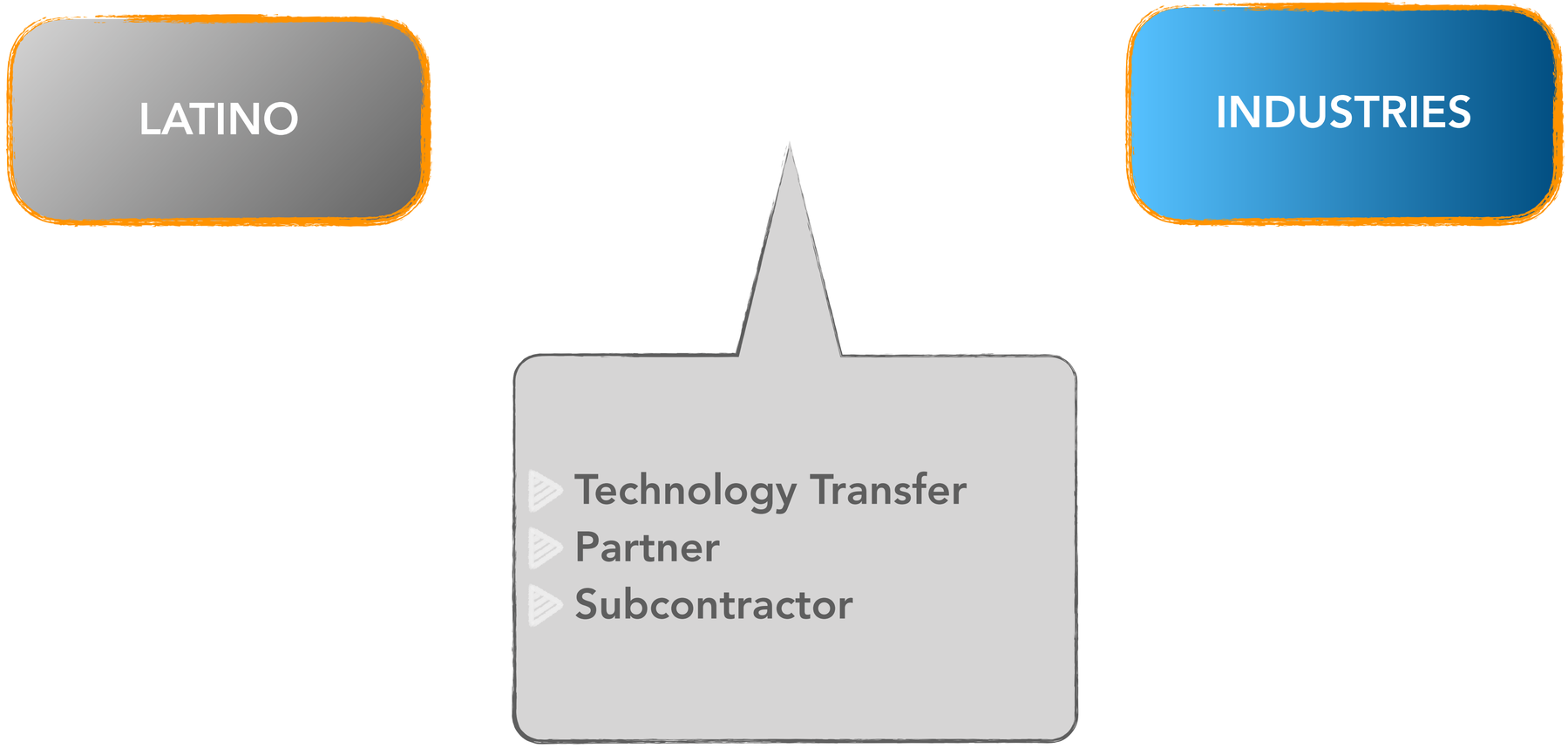

INFN
LNF
Istituto Nazionale di Fisica Nucleare
Technology Transfer
LATINO

LATINO


INFN
LNF
Istituto Nazionale di Fisica Nucleare
Technology Transfer
LATINO
INDUSTRIES
research / aerospace /
engineering / medical / IT
RESEARCH
Public institutions

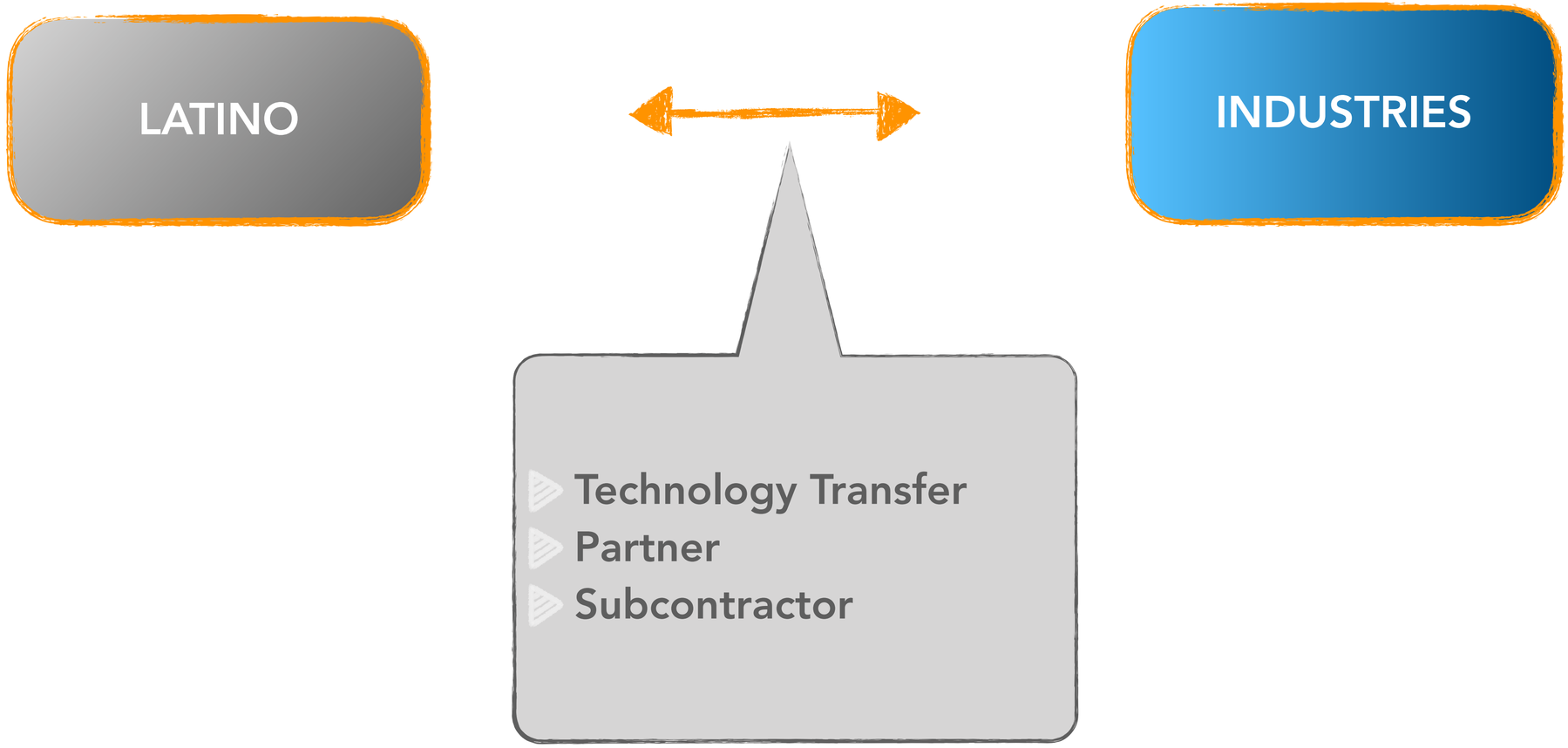
LATINO

How to structure the collaboration with industries: 3 main options



LATINO

How to structure the collaboration with industries: 3 main options



LATINO - main facts

LATINO - main facts

- KET -Key Enabling Technologies

LATINO - main facts

- KET -Key Enabling Technologies
- Co-funded - Total budget 2.5 M€ (1.6M€ Regional funds + 0.9M€ Internal Funds)

LATINO - main facts

- KET -Key Enabling Technologies
- Co-funded - Total budget 2.5 M€ (1.6M€ Regional funds + 0.9M€ Internal Funds)
- Part of a broader program of technology transfer at INFN

LATINO - main facts

- KET -Key Enabling Technologies
- Co-funded - Total budget 2.5 M€ (1.6M€ Regional funds + 0.9M€ Internal Funds)
- Part of a broader program of technology transfer at INFN
- Based on a 5year Business plan, taking into account the growth rate of the market and the involvement of the local industries

LATINO - main facts

- KET -Key Enabling Technologies
- Co-funded - Total budget 2.5 M€ (1.6M€ Regional funds + 0.9M€ Internal Funds)
- Part of a broader program of technology transfer at INFN
- Based on a 5year Business plan, taking into account the growth rate of the market and the involvement of the local industries
- It is not meant to be a “local” infrastructure, i.e. we have no constrains on the location of our customers. Regional Government however (obviously) endorses a collaboration with local industries.

LATINO - main facts

- KET -Key Enabling Technologies
- Co-funded - Total budget 2.5 M€ (1.6M€ Regional funds + 0.9M€ Internal Funds)
- Part of a broader program of technology transfer at INFN
- Based on a 5year Business plan, taking into account the growth rate of the market and the involvement of the local industries
- It is not meant to be a “local” infrastructure, i.e. we have no constrains on the location of our customers. Regional Government however (obviously) endorses a collaboration with local industries.
- We must act fairly and be competitive in the market. We cannot dump the price of the services or make any kind of favourable conditions.

LATINO - main facts

- KET -Key Enabling Technologies
- Co-funded - Total budget 2.5 M€ (1.6M€ Regional funds + 0.9M€ Internal Funds)
- Part of a broader program of technology transfer at INFN
- Based on a 5year Business plan, taking into account the growth rate of the market and the involvement of the local industries
- It is not meant to be a “local” infrastructure, i.e. we have no constrains on the location of our customers. Regional Government however (obviously) endorses a collaboration with local industries.
- We must act fairly and be competitive in the market. We cannot dump the price of the services or make any kind of favourable conditions.

State aid is not allowed.

Not a singularity...

Not a singularity...

Regional Government (Regione Lazio) has replicated the same kind of grant (slightly different though).

Just few days ago we (as INFN-LNF) won another grant: **SABINA**.

Not a singularity…

Regional Government (Regione Lazio) has replicated the same kind of grant (slightly different though).

Just few days ago we (as INFN-LNF) won another grant: **SABINA**.

Source of **A**dvanced **B**eam **I**maging for **N**ovel **A**pplications

Not a singularity…

Regional Government (Regione Lazio) has replicated the same kind of grant (slightly different though).

Just few days ago we (as INFN-LNF) won another grant: **SABINA**.

Source of **A**dvanced **B**eam **I**maging for **N**ovel **A**pplications

This grant is a POR-FESR (European Regional Development Fund) through regional government for the upgrading of existing facilities inside the PNIR (National Plan for Research Infrastructure) to improve competitivity and technology transfer to industries.

Not a singularity…

Regional Government (Regione Lazio) has replicated the same kind of grant (slightly different though).

Just few days ago we (as INFN-LNF) won another grant: **SABINA**.

Source of **A**dvanced **B**eam **I**maging for **N**ovel **A**pplications

This grant is a POR-FESR (European Regional Development Fund) through regional government for the upgrading of existing facilities inside the PNIR (National Plan for Research Infrastructure) to improve competitivity and technology transfer to industries.

This is a bit more research oriented: No business plan needed. Time dedicated to internal research 75%.

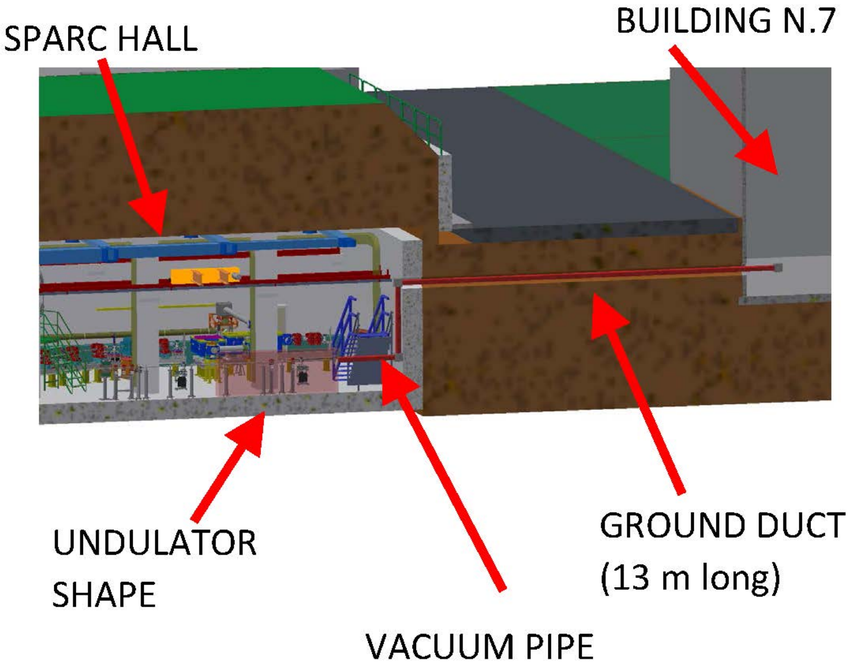
SABINA

6.8 M€ Cofunded, 18 months duration.

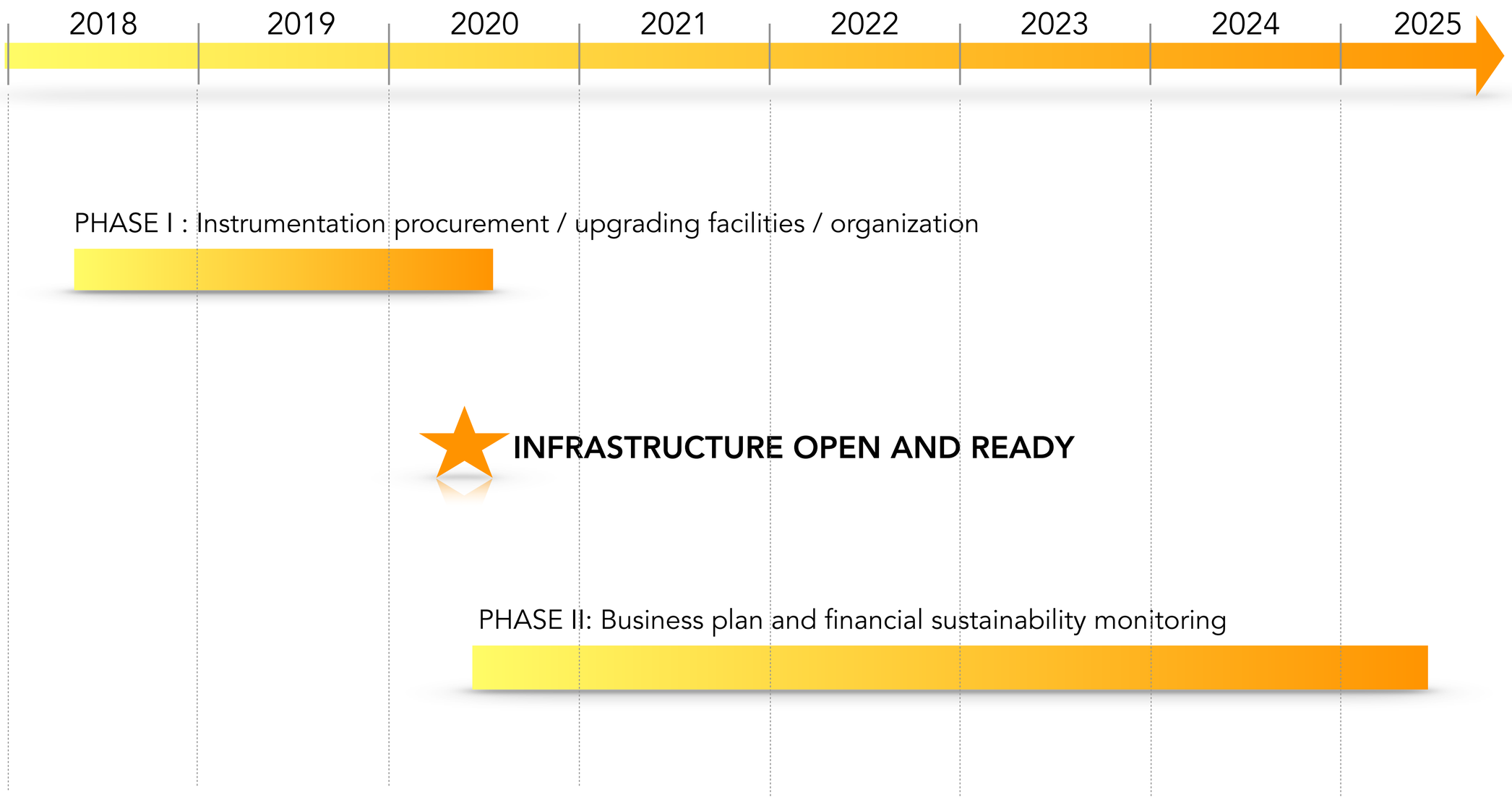
75% related to research - 25% for industrial application.

Upgrading of SPARC_LAB (existing facility) in order to double the uptime and at the same time create a THz facility for industries and research institutions:

- Single point spectroscopy
- Imaging

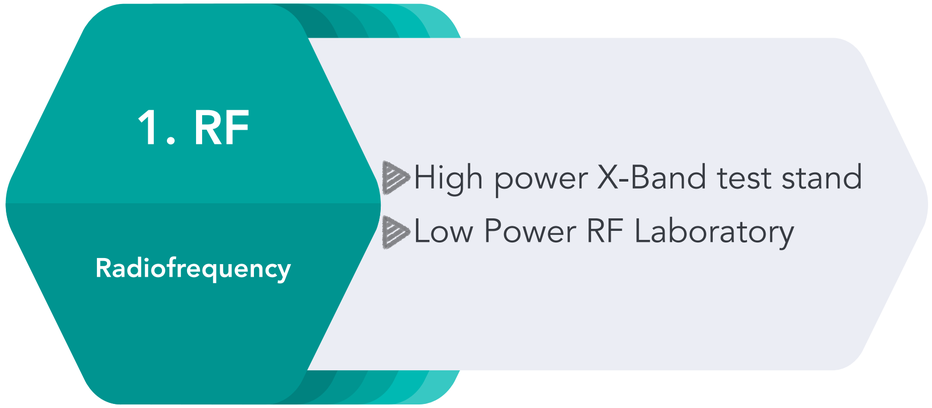


LATINO ROAD MAP



SERVICES AND INFRASTRUCTURES

SERVICES AND INFRASTRUCTURES



SERVICES AND INFRASTRUCTURES

1. RF

Radiofrequency

- High power X-Band test stand
- Low Power RF Laboratory

2. Vacuum

Thermal treatment

- Outgassing meas. bench
- UHV furnace

SERVICES AND INFRASTRUCTURES

1. RF

Radiofrequency

- High power X-Band test stand
- Low Power RF Laboratory

2. Vacuum

Thermal treatment

- Outgassing meas. bench
- UHV furnace

3. Labirint

Mechanical integration

- Laser scanners (steroscopic & ambiental)
- Mechanical design & integration

SERVICES AND INFRASTRUCTURES

1. RF

Radiofrequency

- High power X-Band test stand
- Low Power RF Laboratory

2. Vacuum

Thermal treatment

- Outgassing meas. bench
- UHV furnace

3. Labirint

Mechanical integration

- Laser scanners (steroscopic & ambiental)
- Mechanical design & integration

4. MMAG

Magnetic Measurement

- Rotating coil
- Stretched wire
- Magnets design & testing

Radio Frequency Laboratory - RF LAB

Responsible: A.Gallo (INFN-LNF)

High power X-Band test stand

European X-band
Brand new bunker with ancillary plants.
Environmental temperature controlled
LLRF System dedicated

	Without Pulse Compressor	With Pulse Compressor
Frequency	11.995 GHz	11.995 GHz
RF pulse length	1 μs	0.1 μs
Peak Power	50 MW	200 MW
Repetition Rate	up to 50 Hz	up to 50 Hz

Radio Frequency Laboratory - RF LAB

Responsible: A.Gallo (INFN-LNF)

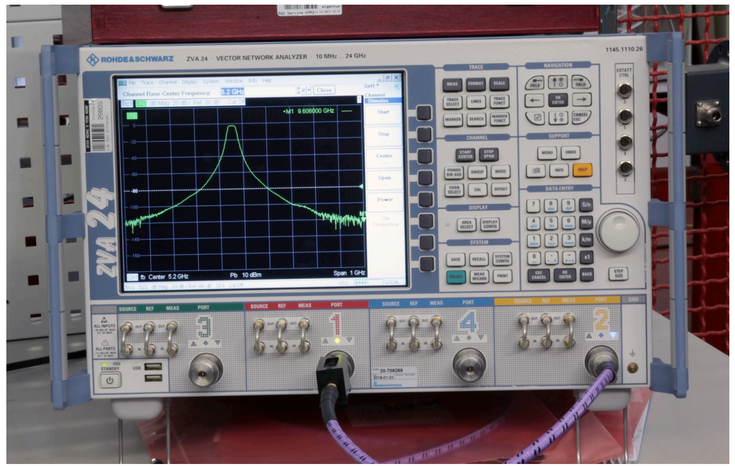
High power X-Band test stand

European X-band
Brand new bunker with ancillary plants.
Environmental temperature controlled
LLRF System dedicated

	Without Pulse Compressor	With Pulse Compressor
Frequency	11.995 GHz	11.995 GHz
RF pulse length	1 μs	0.1 μs
Peak Power	50 MW	200 MW
Repetition Rate	up to 50 Hz	up to 50 Hz

Low power RF Lab

RF Lab equipped with instruments to characterise RF components at low power up to 100GHz (Frequency domain) and 20GHz in the time domain.



Radio Frequency Laboratory - RF LAB - High power

Responsible: A.Gallo (INFN-LNF)

Radio Frequency Laboratory - RF LAB - High power

Responsible: A.Gallo (INFN-LNF)

Solid State modulator (Scandinova) and high power klystron in a dedicated test-stand.

LLRF system dedicated.

New RF Bunker with dedicated utilities and authorised for the use of ionising radiations.

Radio Frequency Laboratory - RF LAB - High power

Responsible: A.Gallo (INFN-LNF)

Solid State modulator (Scandinova) and high power klystron in a dedicated test-stand.

LLRF system dedicated.

New RF Bunker with dedicated utilities and authorised for the use of ionising radiations.

	Without Pulse Compressor	**With Pulse Compressor**
Frequency	11.995 GHz	11.995 GHz
RF pulse length	1 μs	0.1 μs
Peak Power	50 MW	200 MW
Repetition Rate	up to 50 Hz	up to 50 Hz

Radio Frequency Laboratory - RF LAB - High power

Responsible: A.Gallo (INFN-LNF)

Solid State modulator (Scandinova) and high power klystron in a dedicated test-stand.

LLRF system dedicated.

New RF Bunker with dedicated utilities and authorised for the use of ionising radiations.

	Without Pulse Compressor	With Pulse Compressor
Frequency	11.995 GHz	11.995 GHz
RF pulse length	1 μs	0.1 μs
Peak Power	50 MW	200 MW
Repetition Rate	up to 50 Hz	up to 50 Hz

Courtesy Scandinova

Radio Frequency Laboratory - RF LAB - High power

Responsible: A.Gallo (INFN-LNF)

Courtesy CERN

Courtesy CERN

Vacuum technology Laboratory - Vacuum Lab

Responsible: D.Alesini (INFN-LNF)

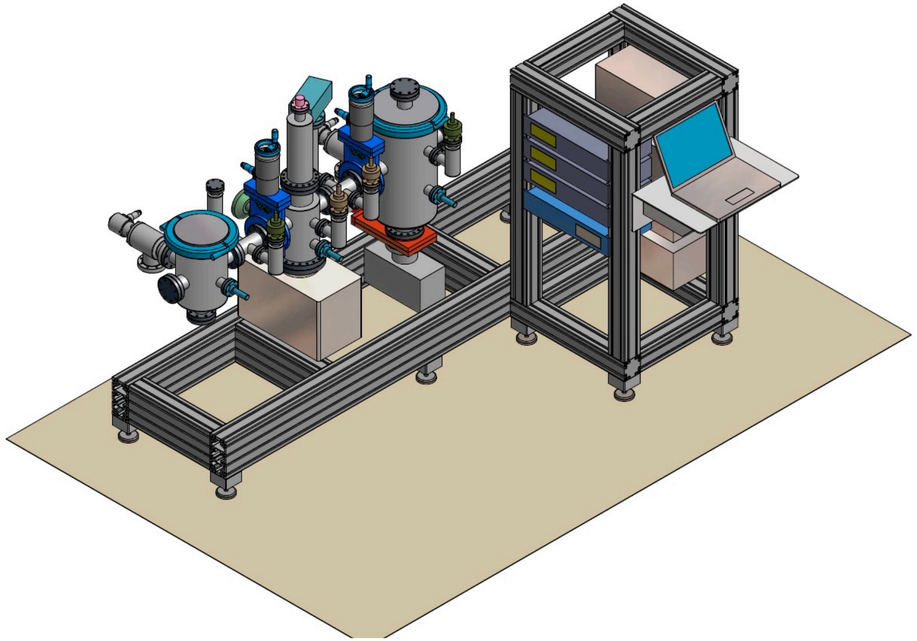
Bench for outgassing measurements

UHV, low outgassing: diameter 250mm, height 500mm

HV, high outgassing: diameter 200mm, height 300mm

Residual gas analyzer: 200 amu, sensitivity up to 2 10-14 mbar

Outgassing rate at different temperature is also possible



Vacuum technology Laboratory - Vacuum Lab

Responsible: D.Alesini (INFN-LNF)

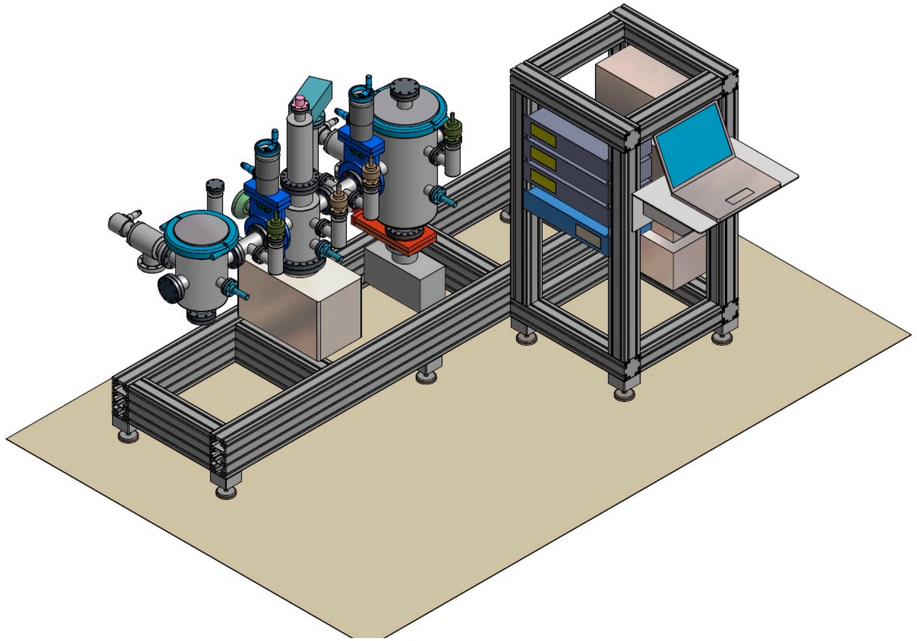
Bench for outgassing measurements

UHV, low outgassing: diameter 250mm, height 500mm

HV, high outgassing: diameter 200mm, height 300mm

Residual gas analyzer: 200 amu, sensitivity up to 2 10-14 mbar

Outgassing rate at different temperature is also possible



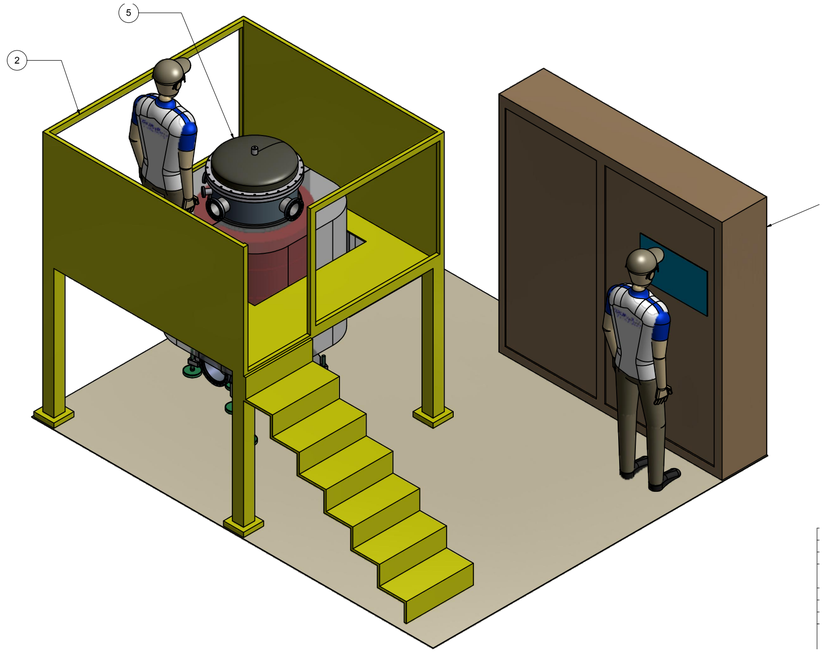
UHV Vacuum Furnace

Diameter 50cm, length 1.5m

T≈900°C, p≈10^{-7} mbar

External heater

It can be used also in controlled atmosphere (H2, N2, etc)



LABIRINT

LAB for Innovation an Research in INTegration

Responsible: V.Pettinacci (INFN-Roma)

Mechanical Integration LAB in collaboration with INFN - ROMA section.

Mechanical Integration LAB in collaboration with INFN - ROMA section.

Architectural Laser Scanner

Scanning of large equipment, building and spaces. Ideal for the geometrical reconstruction of industrial environments and experimental sites, with high accuracy the geometric characteristics of each volume within a radius of hundreds of meters.

Significant strategic advantage for those who need to quickly evaluate a structure in order to carry out a space management study aimed at the installation of new elements (such as entire facilities, machinery or other civil structures).

LABIRINT

LAB for Innovation an Research in INTegration

Responsible: V.Pettinacci (INFN-Roma)

Mechanical Integration LAB in collaboration with INFN - ROMA section.

Architectural Laser Scanner

Scanning of large equipment, building and spaces. Ideal for the geometrical reconstruction of industrial environments and experimental sites, with high accuracy the geometric characteristics of each volume within a radius of hundreds of meters.

Significant strategic advantage for those who need to quickly evaluate a structure in order to carry out a space management study aimed at the installation of new elements (such as entire facilities, machinery or other civil structures).

Blue light scanner

Scanning of small subsystems in order to perform a dimensional quality check and to to reconstruct the CAD3D file of the scanned object and thus be able to perform an integration check always within the three-dimensional CAD.

Remarkable advantage given by the speed of the operations described and the type of result of the process (a CAD file) that can be quickly implemented and controlled from the point of view of integration, through the use of the most advanced software package.

Architectural laser scanner: **FARO FOCUS S150**.

Delivered at INFN-LNF on **May 08th 2019**.

Based at LNF and available for scanning on-site for external facilities

3D scan position accuracy: +/- 2 mm over 10 m, +/- 3,5 mm over 35 m.

Range: 0,6-150 m

Equipped with software SCENE and CAM AS-BUILT (AutoCAD plug-in).

More information at:

https://www.faro.com/products/construction-bim-cim/faro-focus

Blue Light Scanner: **Range Vision PRO**

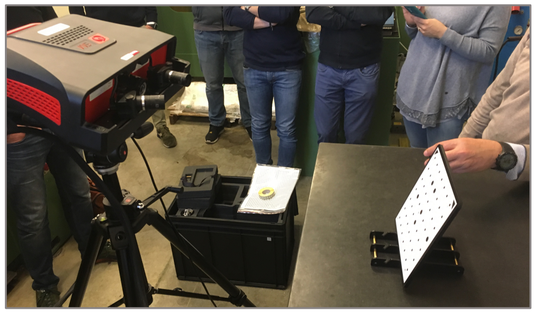
Delivered at INFN Roma on **May 09th 2019**.

Based inside INFN Roma Metrology Lab.

Equipped with RHINO and *MeshToSurface* software for 3D reconstruction.

More info at: https://rangevision.com/en/products/pro/

	[1]	[2]	[3]	[4]
Field of view (HxWxL) [mm]	460x345x345	300x225x225	133x100x100	66x50x50
3D point accuracy [mm]	0.06	0.03	18	18
3D resolution PRO2M [mm]	0.19	0.12	0.06	0.03
3D resolution PRO 5M [mm]	0.15	0.1	0.04	-
Working distance [mm]	900	520	350	350



Magnetic Measurement Laboratory - MMAG

Responsible: L.Sabbatini (INFN-LNF)

Magnetic Measurements Lab offers a wide range of instrumentation for the complete characterisation of a normal conducting magnet. In addition it is possible to make a complete design from the conceptual design to the executive drawings.

Magnetic Measurement Laboratory - MMAG

Responsible: L.Sabbatini (INFN-LNF)

Magnetic Measurements Lab offers a wide range of instrumentation for the complete characterisation of a normal conducting magnet. In addition it is possible to make a complete design from the conceptual design to the executive drawings.

Magnetic measurements

Field map
Integral Fields
Magnetic length
Good Field Region
Field quality
Harmonics
Linearity (B vs I)

Magnetic Measurement Laboratory - MMAG

Responsible: L.Sabbatini (INFN-LNF)

Magnetic Measurements Lab offers a wide range of instrumentation for the complete characterisation of a normal conducting magnet. In addition it is possible to make a complete design from the conceptual design to the executive drawings.

Magnetic measurements

Field map
Integral Fields
Magnetic length
Good Field Region
Field quality
Harmonics
Linearity (B vs I)

Instrumentation

Hall probe
Rotating coil
Stretched wire
Large set of power supplies (high stability)

POTENTIAL APPLICATIONS

POTENTIAL APPLICATIONS

1. RF

Radiofrequency

- High power X-Band test stand
- Low Power RF Laboratory

- RF Conditioning and RF characterisation of accelerating structure and waveguide components.
- Testing of Small Medical accelerator
- Test & Characterization of RF Components up to 100GHz

Telecommunication
Medical
Aerospace / Defence
Research

POTENTIAL APPLICATIONS

1. RF

Radiofrequency

- High power X-Band test stand
- Low Power RF Laboratory

- RF Conditioning and RF characterisation of accelerating structure and waveguide components.
- Testing of Small Medical accelerator
- Test & Characterization of RF Components up to 100GHz

Telecommunication
Medical
Aerospace / Defence
Research

2. Vacuum

Thermal treatment

- Outgassing meas. bench
- UHV furnace

- UHV Brazing for accelerating sections and thermal treatments.
- Outgassing measurement UHV
- Quality Check UHV Components

Aerospace
Research
UHV Industry

POTENTIAL APPLICATIONS

POTENTIAL APPLICATIONS

3. Labirint

Mechanical integration

- Laser scanners (steroscopic & ambiental)
- Mechanical design & integration

- Space management industrial facilities and plants
- CAD Analysis for industrial facilities and large ambients
- Reverse engineering
- Quality Control tool for high precision mechanical components.

Mechanical
Plants engineering
Integration

POTENTIAL APPLICATIONS

3. Labirint

Mechanical integration

- Laser scanners (steroscopic & ambiental)
- Mechanical design & integration

- Space management industrial facilities and plants
- CAD Analysis for industrial facilities and large ambients
- Reverse engineering
- Quality Control tool for high precision mechanical components.

Mechanical
Plants engineering
Integration

4. MMAG

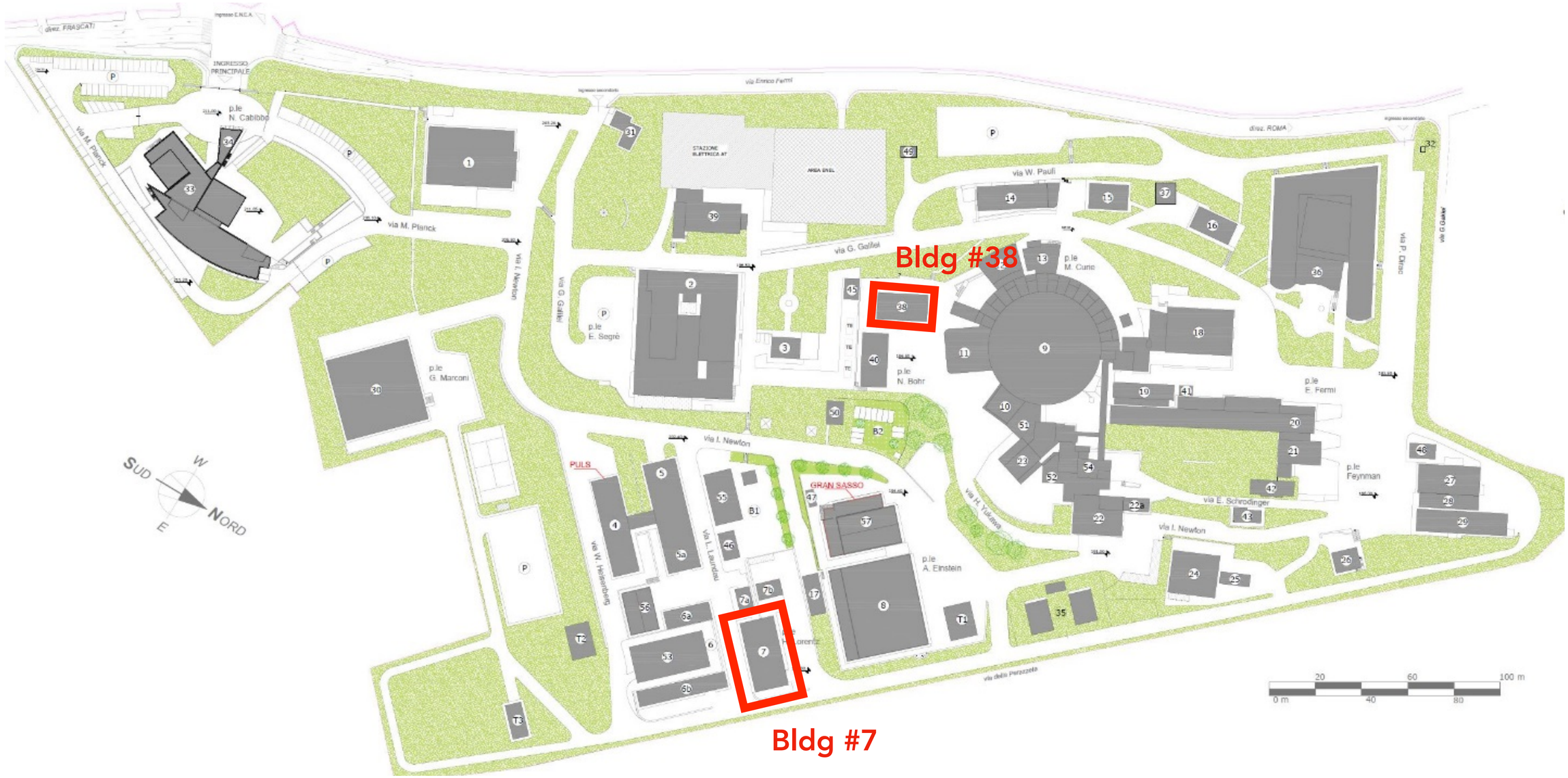
Magnetic Measurement

- Rotating coil
- Stretched wire
- Magnets design & testing

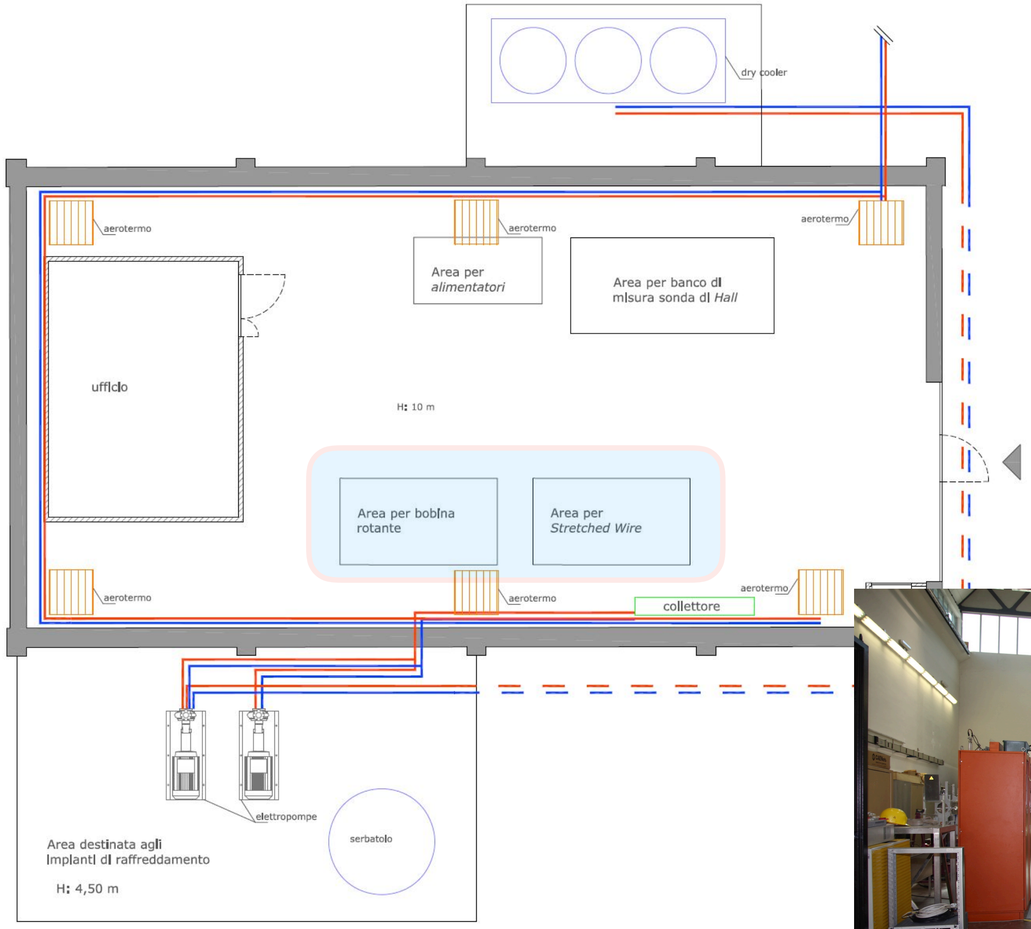
- Field map & Harmonic analysis of NC Magnets
- Magnet design & characterisation
- Magnet fiducialization

Research
Magnets

INFN-LNF Upgrading laboratories

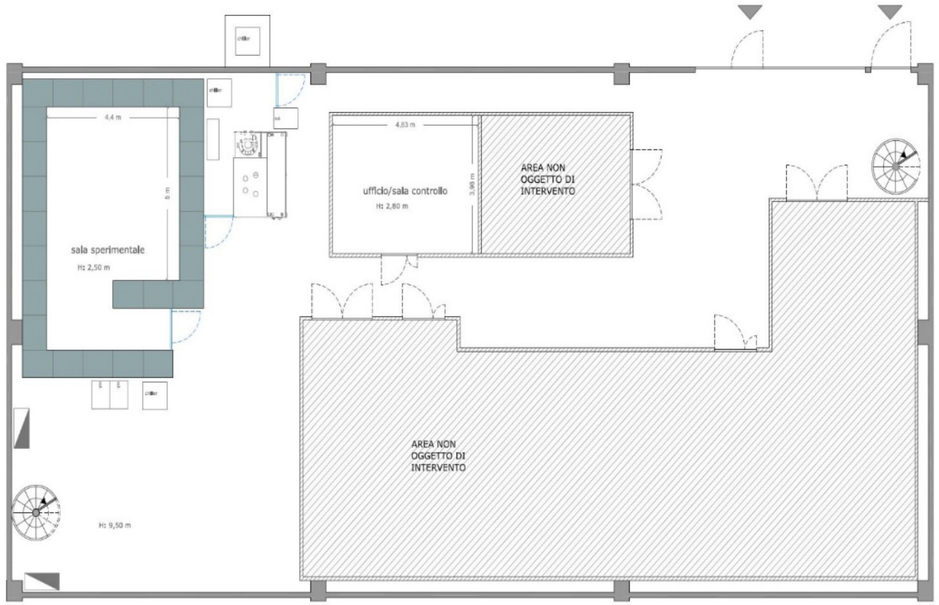


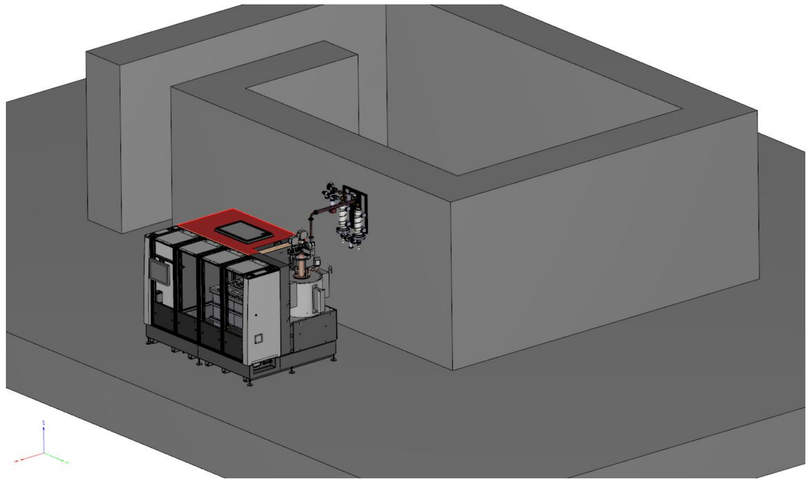
INFN-LNF Upgrading laboratories - Bld#38



- Magnet dedicated cooling system (for better efficiency and performances)
- Main doors replacement
- Floor renewal

INFN-LNF Upgrading laboratories - Bld#7

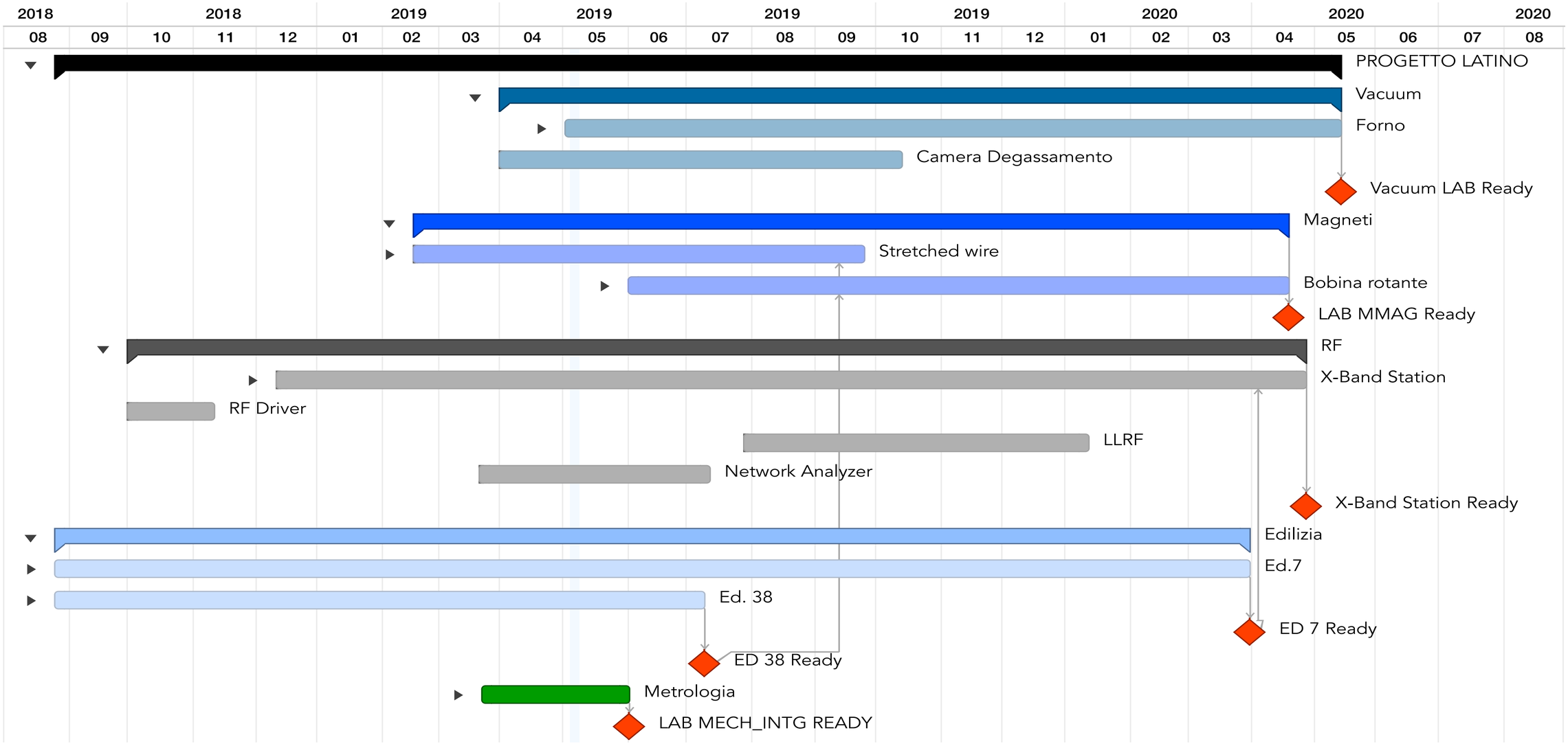




- Bunker* X-Band system and ancillary systems
- X-Band Cooling system
- HVAC for temperature control of the building

** Authorized for the use of ionising radiation*

Status


2018
2018
2019
2019
2019
2019
2020
2020
2020
08 09 10 11 12 01 02 03 04 05 06 07 08 09 10 11 12 01 02 03 04 05 06 07 08
PROGETTO LATINO
Vacuum
Forno
Camera Degassamento
Vacuum LAB Ready
Magneti
Stretched wire
Bobina rotante
LAB MMAG Ready
RF
X-Band Station
RF Driver
LLRF
Network Analyzer
X-Band Station Ready
Edilizia
Ed.7
Ed. 38
ED 7 Ready
ED 38 Ready
Metrologia
LAB MECH_INTG READY

Activities on going

Internal organization

Internal organization

- Set-up of the organization chart

Internal organization

- Set-up of the organization chart
- Quality Assurance Plan

Internal organization

- Set-up of the organization chart
- Quality Assurance Plan
- Methodology to determine cost of each service provided - industrial engineering standard

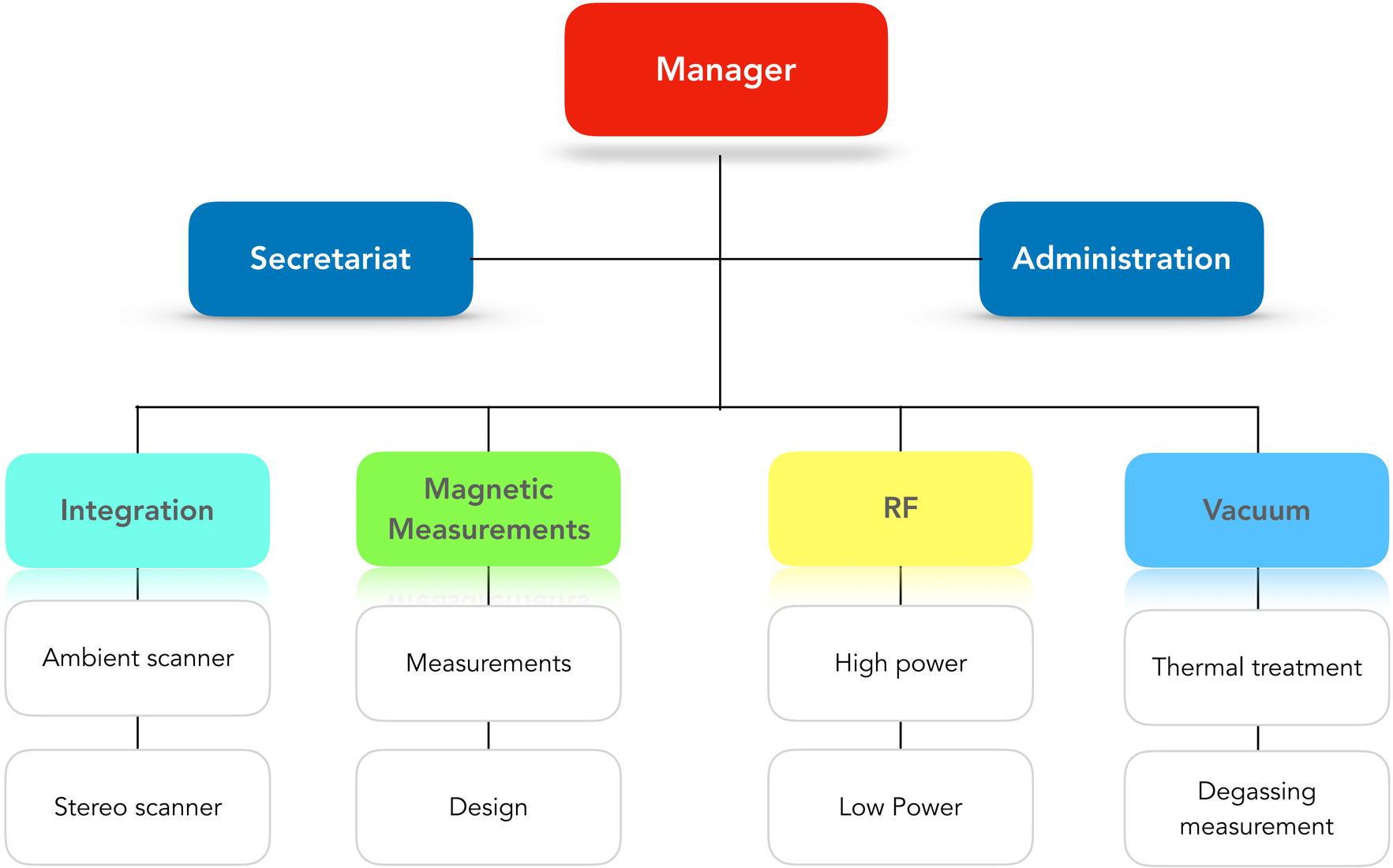
Internal organization

- Set-up of the organization chart
- Quality Assurance Plan
- Methodology to determine cost of each service provided - industrial engineering standard
- Accounting and management tools

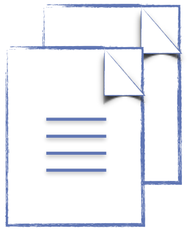
Internal organization

- Set-up of the organization chart
- Quality Assurance Plan
- Methodology to determine cost of each service provided - industrial engineering standard
- Accounting and management tools
- Training on new instruments

ORGANIZATION CHART



Quality Assurance Plan & Cost estimation



A QAP has been prepared in order to guarantee that all the processes (management and technical) will be performed under quality models (traceability and reproducibility, defect minimization).

€

Cost estimation model has been prepared taking into account the best practices in industrial engineering. Direct and Indirect costs will be taken into account.

Benchmarking showed that we are in line with market prices (competitive).

Marketing actions

The commercial activities will be intensified as we are approaching the opening of the infrastructure.

So far:

Marketing actions

The commercial activities will be intensified as we are approaching the opening of the infrastructure.

So far:

- **Dedicated internal seminar (1 every 6 weeks) open to industries**

Marketing actions

The commercial activities will be intensified as we are approaching the opening of the infrastructure.

So far:

- **Dedicated internal seminar (1 every 6 weeks) open to industries**
- **One to one contacts**

Marketing actions

The commercial activities will be intensified as we are approaching the opening of the infrastructure.

So far:

- **Dedicated internal seminar (1 every 6 weeks) open to industries**
- **One to one contacts**
- **Workshops and industrial days (4 since the beginning of the project)**

Marketing actions

The commercial activities will be intensified as we are approaching the opening of the infrastructure.

So far:

- **Dedicated internal seminar (1 every 6 weeks) open to industries**
- **One to one contacts**
- **Workshops and industrial days (4 since the beginning of the project)**
- **Webpage: www.latino.lnf.infn.it (to be updated in a short term)**

Marketing actions

Main outcomes

Marketing actions

Main outcomes

- 20 letters of intent received so far

Marketing actions

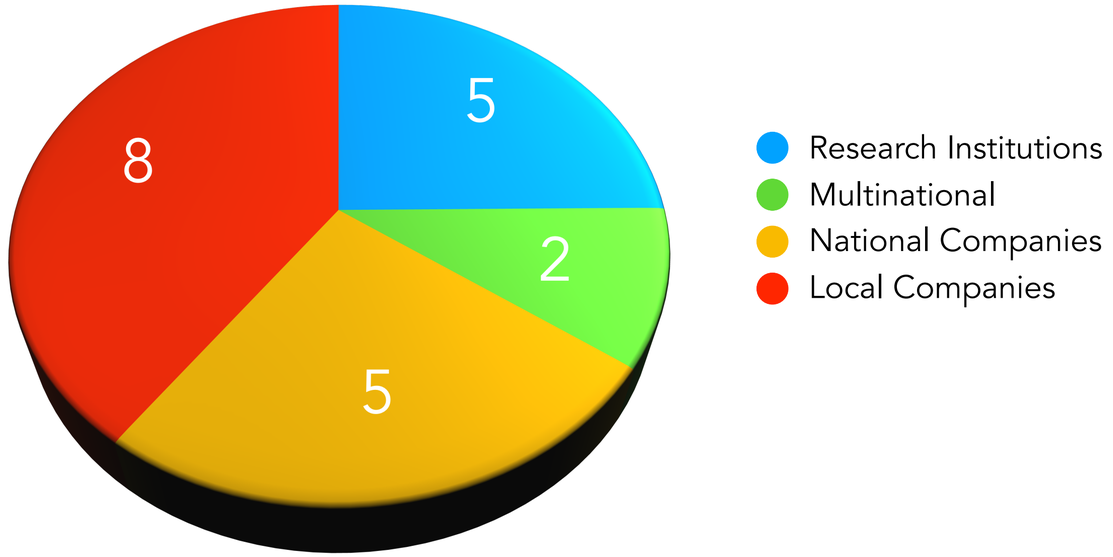
Main outcomes

- 20 letters of intent received so far 

Marketing actions

Main outcomes

- 20 letters of intent received so far

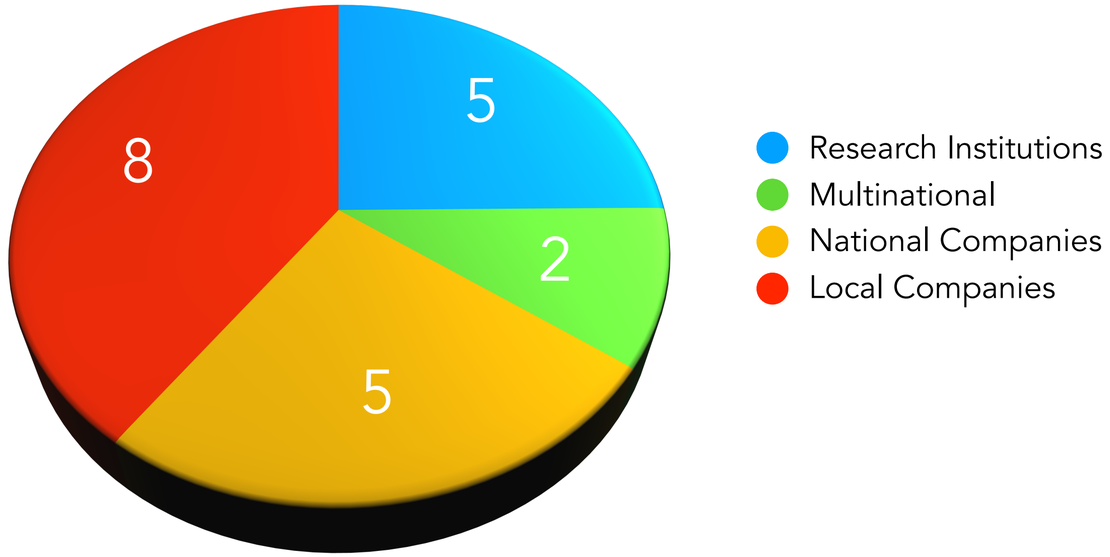


Marketing actions

Main outcomes

- 20 letters of intent received so far

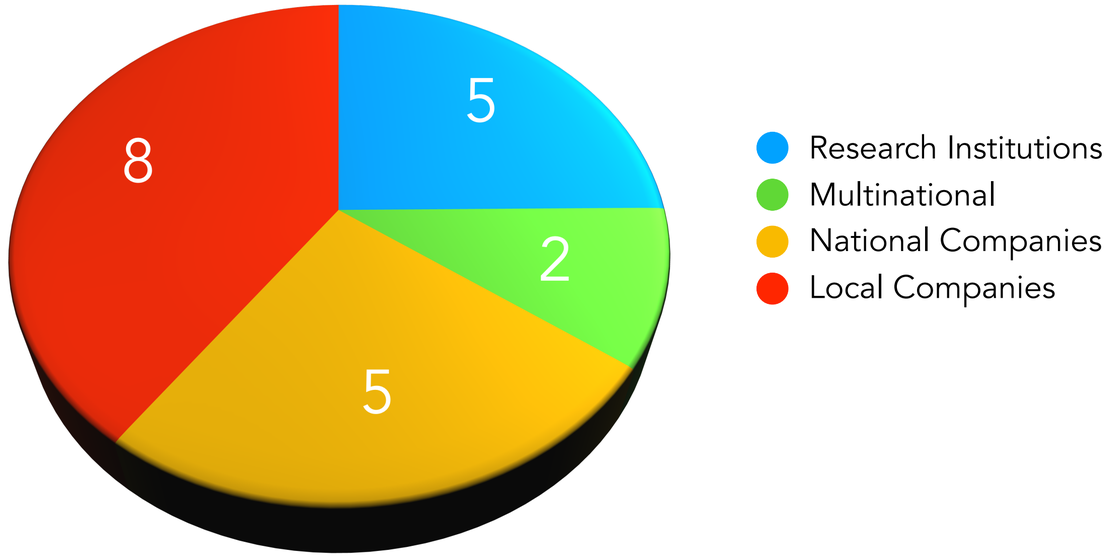
- 2 requests of offer



Marketing actions

Main outcomes

- 20 letters of intent received so far



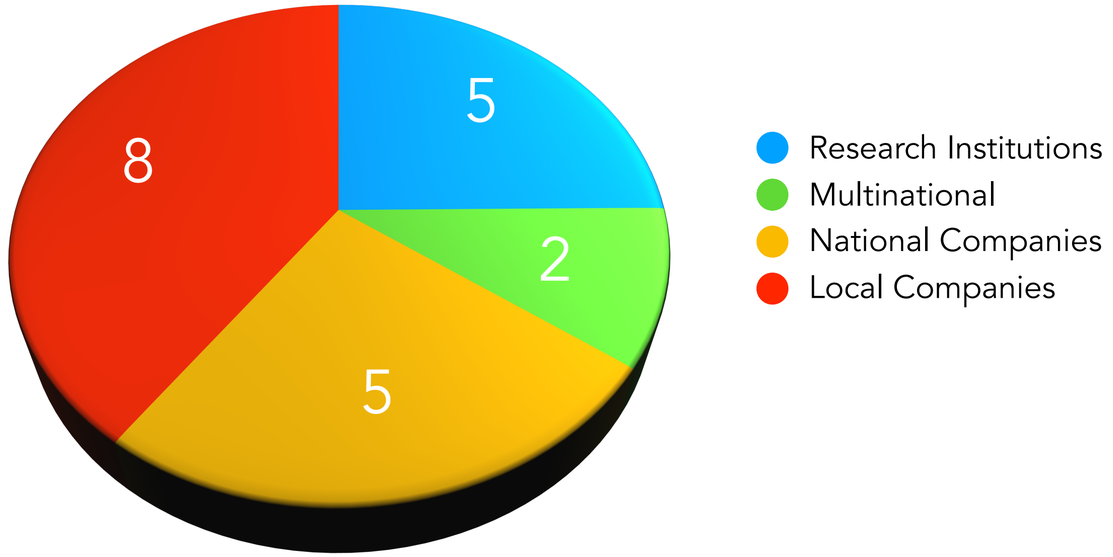
- 2 requests of offer

- General interests and appreciation of the initiative

Marketing actions

Main outcomes

- 20 letters of intent received so far



- 2 requests of offer

- General interests and appreciation of the initiative

Note that the infrastructure has not officially started yet!

Conclusions

Conclusions

✔ Regional Government funding initiatives (through European Regional Development Funds) are a powerful tool to fund research AND industries.
Latino is an interesting way on how to make the two worlds interacting and sustain each other.

Conclusions

- ✔ Regional Government funding initiatives (through European Regional Development Funds) are a powerful tool to fund research AND industries.
  Latino is an interesting way on how to make the two worlds interacting and sustain each other.

- ✔ Economical impact is expected to be : very high added value, maybe not big volume (but we are not meant to work on large scale).

Conclusions

- ✔ Regional Government funding initiatives (through European Regional Development Funds) are a powerful tool to fund research AND industries.
  Latino is an interesting way on how to make the two worlds interacting and sustain each other.

- ✔ Economical impact is expected to be : very high added value, maybe not big volume (but we are not meant to work on large scale).

- ✔ First of a (hopefully long) series.

Conclusions

- ✔ Regional Government funding initiatives (through European Regional Development Funds) are a powerful tool to fund research AND industries.
  Latino is an interesting way on how to make the two worlds interacting and sustain each other.

- ✔ Economical impact is expected to be : very high added value, maybe not big volume (but we are not meant to work on large scale).

- ✔ First of a (hopefully long) series.

- ✔ There is generally a genuine appreciation and interests on this initiative especially from SME companies which sometimes lack of resources and highly specialised technology.

Conclusions

- ✔ Regional Government funding initiatives (through European Regional Development Funds) are a powerful tool to fund research AND industries.
  Latino is an interesting way on how to make the two worlds interacting and sustain each other.

- ✔ Economical impact is expected to be : very high added value, maybe not big volume (but we are not meant to work on large scale).

- ✔ First of a (hopefully long) series.

- ✔ There is generally a genuine appreciation and interests on this initiative especially from SME companies which sometimes lack of resources and highly specialised technology.

best answer so far: "Finally !"

Conclusions

Open research infrastructures can lead to big benefits for industries and research institutions and hence to the whole society.

Conclusions

Open research infrastructures can lead to big benefits for industries and research institutions and hence to the whole society.

Industries can have access to state of the art technology (otherwise not reachable especially for SMEs).

!

Conclusions

Open research infrastructures can lead to big benefits for industries and research institutions and hence to the whole society.

Industries can have access to state of the art technology (otherwise not reachable especially for SMEs).

Research institutions can have more financial tools to keep the research alive and it improves the way of working in a much more “industrial way”.

Conclusions

Conclusions

- Technology Transfer will be more and more important in the future.
- ✔ Aside economical factors ~~maybe~~ it is an ethical imperative to make our research available to the real economy.

Conclusions

- Technology Transfer will be more and more important in the future.
- Aside economical factors ~~maybe~~ it is an ethical imperative to make our research available to the real economy.

- But don't forget that basic research must be funded to keep the stream flowing. Relationship with industries cannot replace basic research funding.

Conclusions

- Technology Transfer will be more and more important in the future.
  Aside economical factors ~~maybe~~ it is an ethical imperative to make our research available to the real economy.

- But don't forget that basic research must be funded to keep the stream flowing. Relationship with industries cannot replace basic research funding.

- There is plenty of room however, to make the collaboration between research and industry more solid, more efficient and more profound.

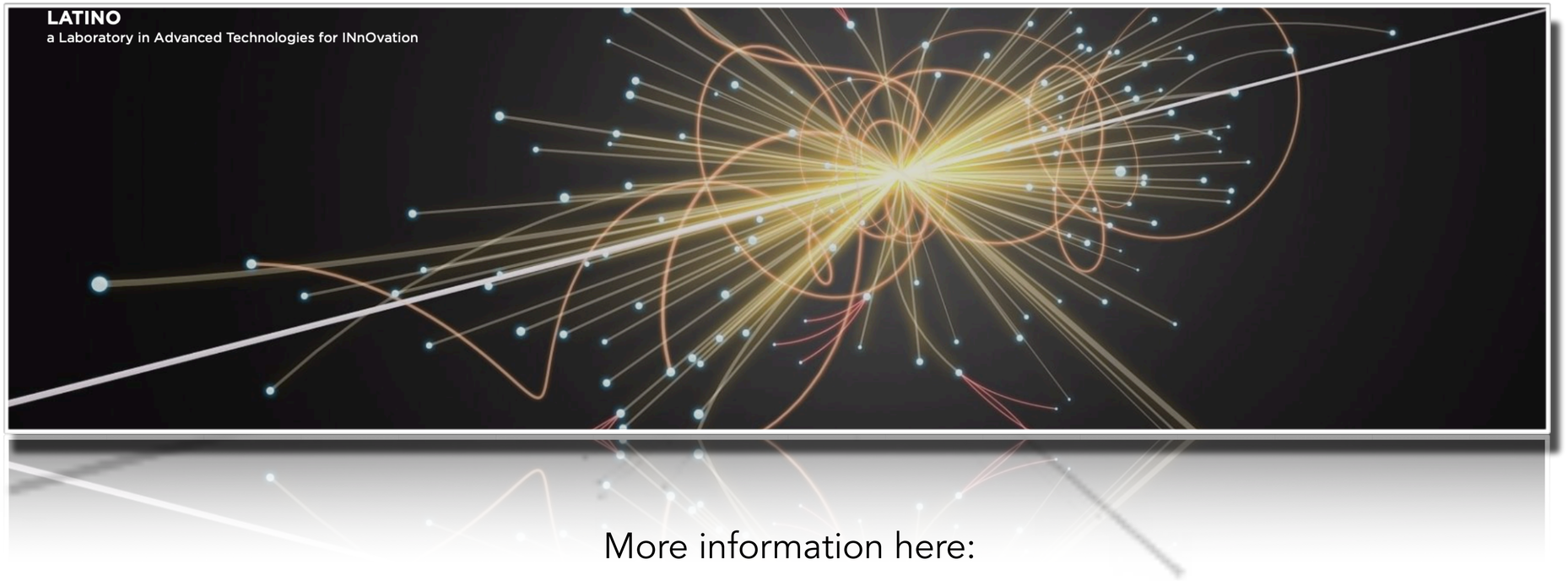
Conclusions

- ✔ Technology Transfer will be more and more important in the future.
  Aside economical factors ~~maybe~~ it is an ethical imperative to make our research available to the real economy.

- ✔ But don't forget that basic research must be funded to keep the stream flowing. Relationship with industries cannot replace basic research funding.

- ✔ There is plenty of room however, to make the collaboration between research and industry more solid, more efficient and more profound.

Let's keep moving forward in this direction!



More information here:

www.latino.lnf.infn.it

antonio.falone@lnf.infn.it