

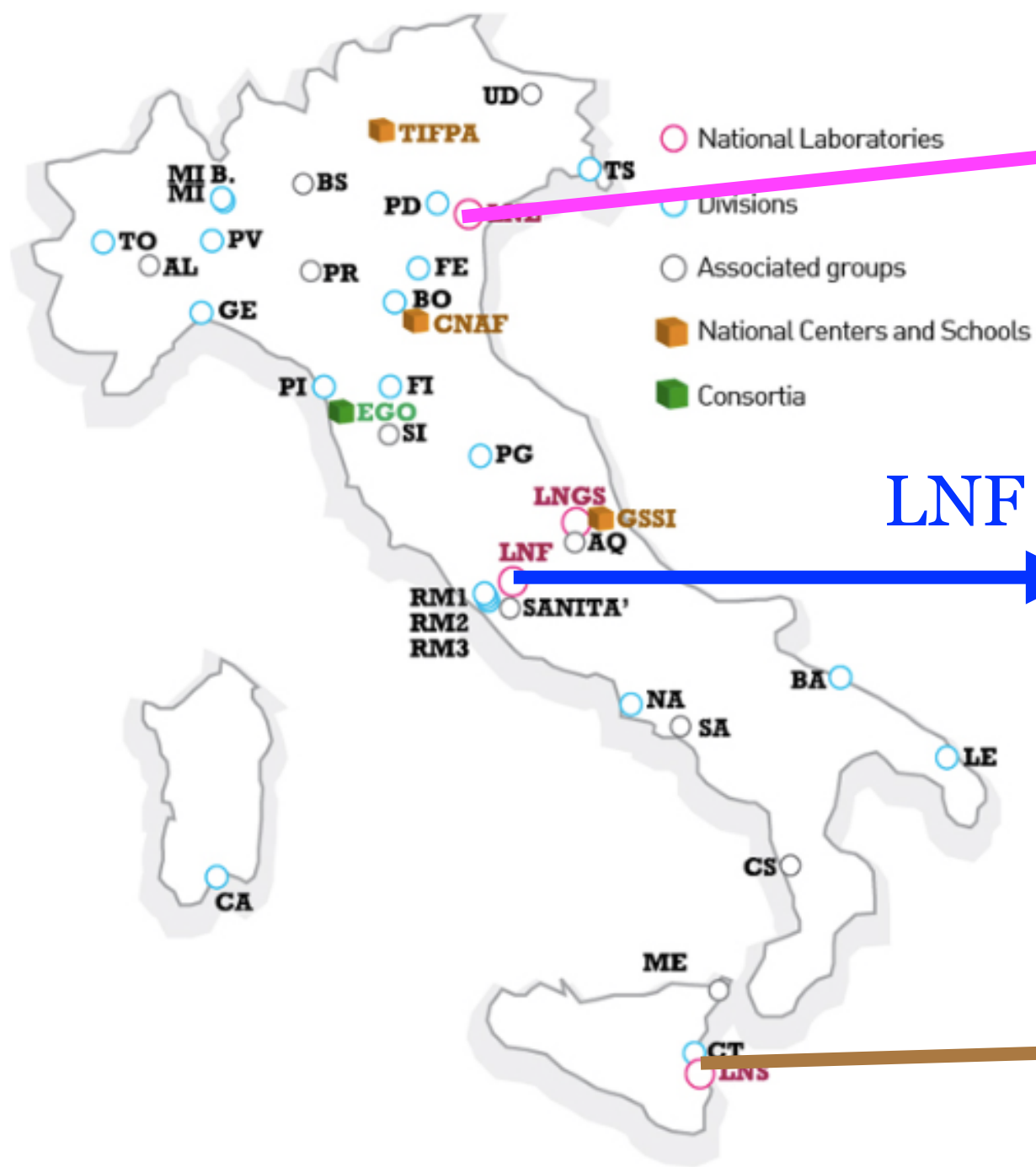


SYNERGIES AND COMPLEMENTARIES AMONG LABORATORIES

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INFN & Sapienza Università' di Roma

13th Frontier Detectors for Frontier Physics Conference

INFN LABS (WITH ACCELERATORS)



LNL



LNF



LNS



MAIN FOCUS (NOW)

- LNL: SPES
- LNF: DAFNE & SPAR-C
- LNS : Superconducting cyclotron

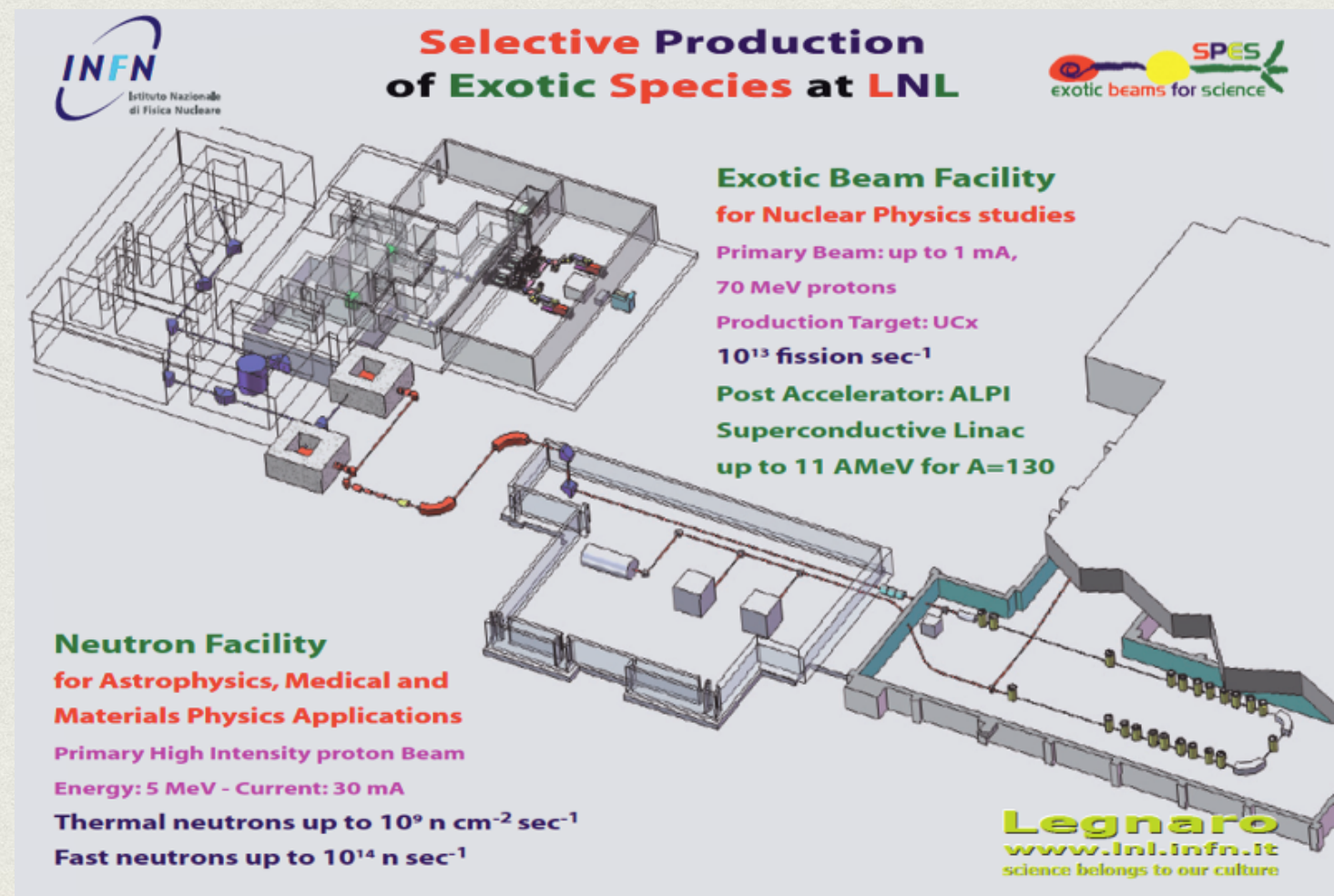
and a Lab without accelerators but fundamental in our strategy



LNL

1. Radioactive Ion Beams are produced by proton induced fission on a UCx direct target at a rate of 10^{13} fission/s.
2. Neutron rich re-accelerated beams will be available at energies up to 13 MeV/u in the mass region A=130.
3. Re-acceleration will be performed by the superconducting linear accelerator complex (PIAVE-ALPI) of the Laboratori Nazionali di Legnaro.
4. The facility for applied physics is based on proton and neutron beams from a two exit port cyclotron (70 MeV, 500 microA) and the high intensity RFQ TRASCO (5 MeV, 30 mA).

Working out an agreement with a private company for radioisotopes production



JUST ARRIVED



Radioisotopes by 2016

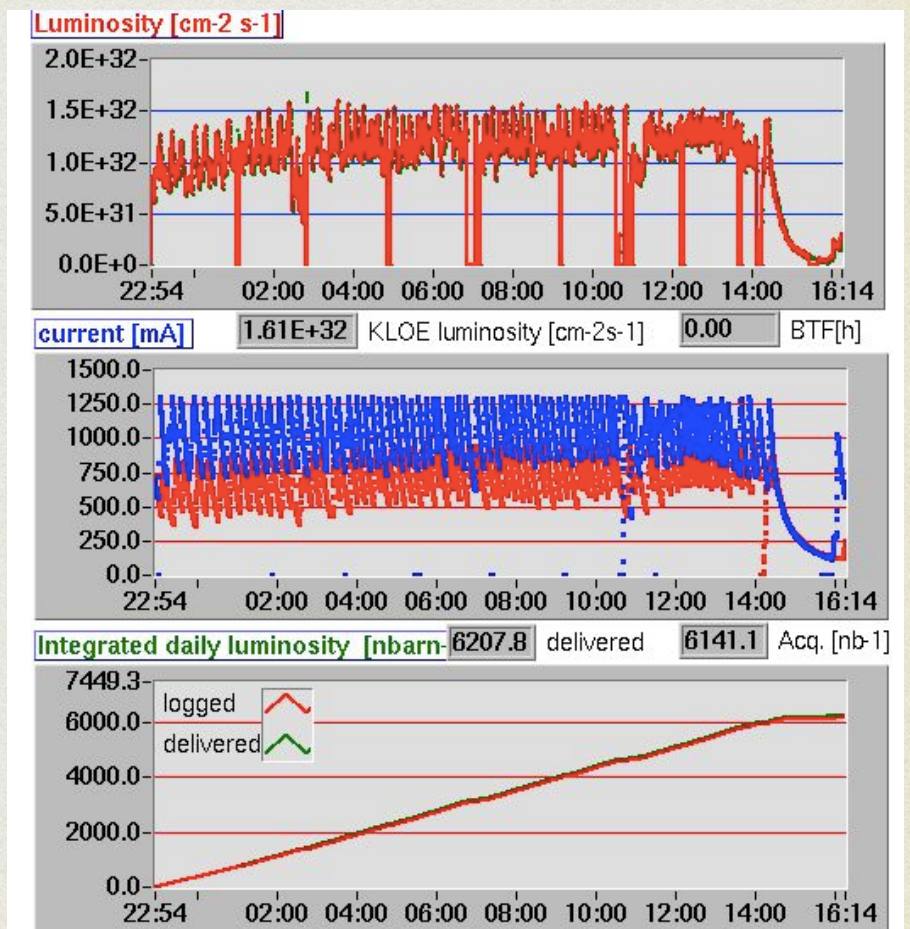
NP by 2018



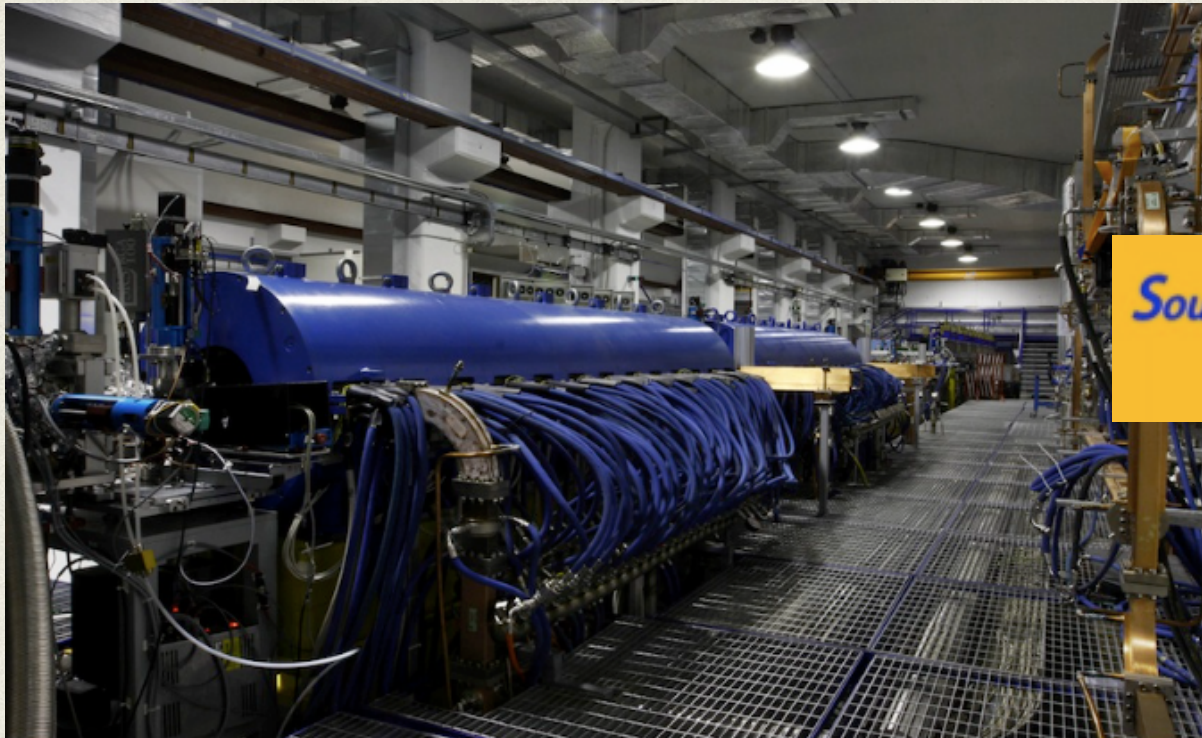
LNF: DAFNE



Serving KLOE: no more than a couple of years in front

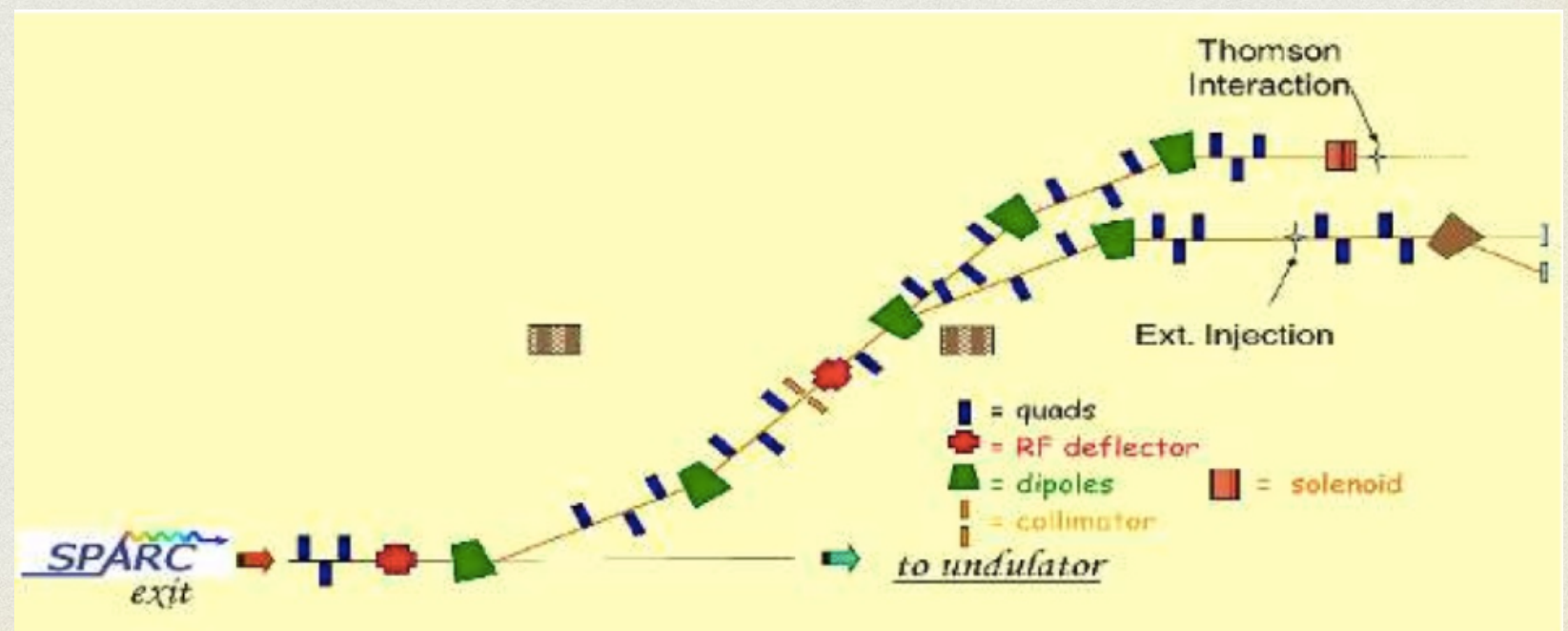


LNF: SPARC

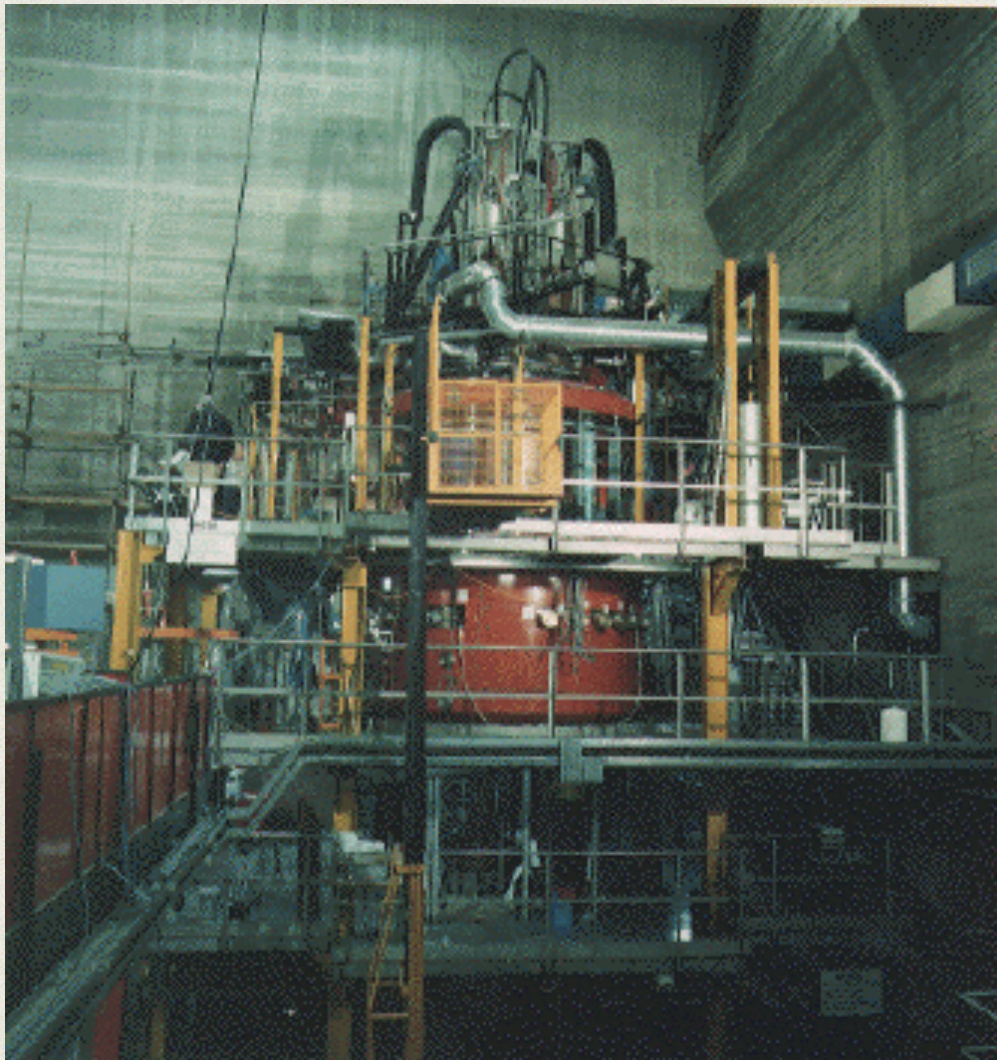


*Sources for Plasma Accelerators and Radiation Compton
with Lasers And Beams*

Main focus: PWA
either with a Laser
(300TW) generated
plasma or electron
driven plasma



LNS : SC



Main focus: Nuclear Physics
Evaluating an upgrade for
exploring double charge
exchange processes with the
goal of improving NME
calculation for Double Beta Decay

A LOT OF ACCELERATOR PHYSICIST AND EXPERT

- on the other end the road to build larger machine than the one we have is unlikely to be open (lack of money at a level of a couple of hundred MEuro in, say, 5 years)
- look outside, there are several sites in Europe (and perhaps elsewhere) where our contribution can be substantial
- find the right balance between maintaining the expertise, have new people to train , offer in-kind contribution made at home , send people to help (and possibly get them back !)

WHERE DO WE GO ?

- ELI-NP at Magurele (Romania)
- ESRF at Grenoble (France)
- ESS at Lund (Sweden)
- X-FEL at Hamburg (Germany)
- SESAME at Allan (Jordan)
- CERN is too obvious to discuss....

ELI NUCLEAR PHYSICS

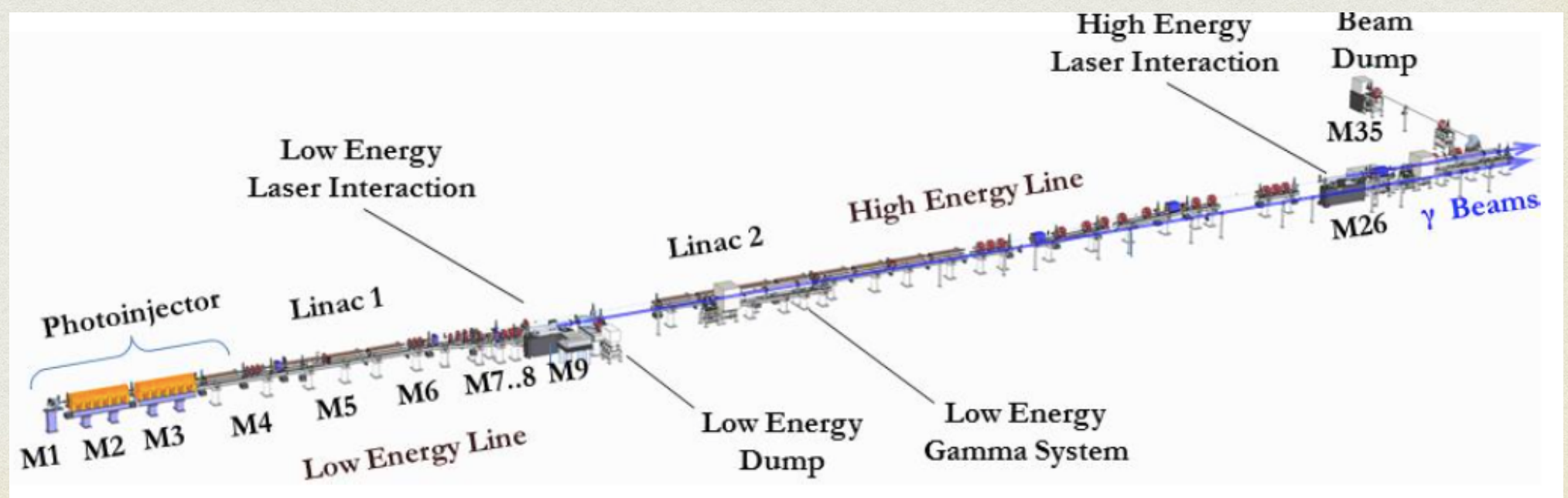


INFN leader of an association with many partners (IN2P3, industries, STFC..): awarded the contract to build the accelerator

A very intense (10^{13} γ/s), brilliant γ beam, 0.1 % bandwidth, with $E_{\text{gamma}} > 19$ MeV, which is obtained by incoherent Compton back scattering of a laser light off a very brilliant, intense, classical electron beam ($E_e > 700$ MeV) produced by a warm linac.

LNF

based on SPARC Thomson source



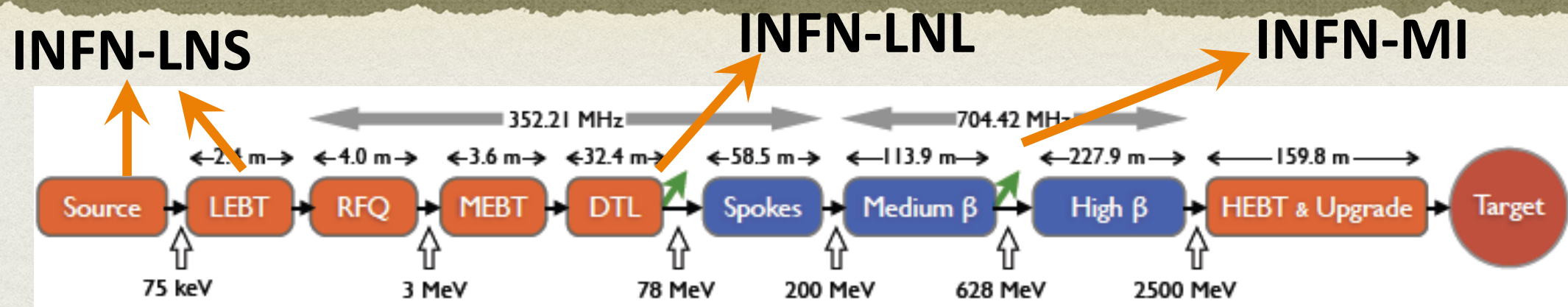
and a very little brother at Uni Cosenza with the name STAR

ESRF

LNF

- Design of the (non trivial) Al vacuum chambers for the ESRF upgrade

ESS



INFN is in charge of the management of the WP3-Normal Conducting Linac

1. Ion Source & LEBT (INFN-Laboratori Nazionali del Sud, Italy)

2. RFQ (CEA-IRFU, France),

3. MEBT (ESS Bilbao, Spain)

4. Drift Tube Linac (INFN-Laboratori Nazionali di Legnaro, Italy)

5. INFN-LASA-Milano (superconducting elliptical cavities for WP5)

construction of medium beta section (**strong industrial background for series construction**)

6. Potential: LNL for ICS ; LNS, LNL and Milan for support to commissioning

1+4+5+management WP3 is agreed with ESS Accelerator Division, 6 under discussion

SESAME

- cavities together with ELETTRA synchrotron ...a nice collaboration for an extremely important project both for science and scientific policy notwithstanding peace

During the meeting in Frascati an agreement was signed between [Elettra-Sincrotrone](#) Trieste S.C.p.A., SESAME and the Istituto Nazionale di Fisica Nucleare ([INFN](#)) to establish scientific-technical collaboration between the three research institutions for the joint development of the RF (radio frequency) cavities needed for SESAME's storage ring. The agreement will allow SESAME to benefit from the Italian institutions' expertise in accelerator physics, as well as financial support from Italy – through INFN

X-FEL

superconducting lab LASA in Milan

1.3 GHz SC cavities and 3.9 GHz cryomodule

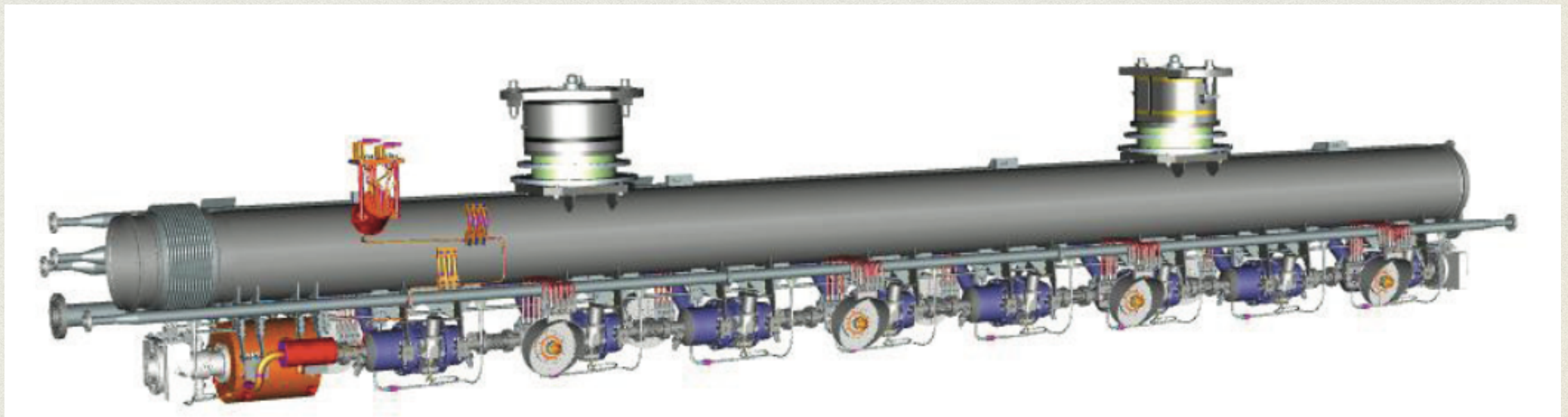


Figure 3: The string of beamline elements (8 cavities and a magnet package) supported by the Helium Gas Return Pipe of the cryomodule.

CONCLUSION

- accelerator physics is well alive in INFN laboratories
- a specific Ph.D. in Sapienza on the subject
- labs with running machines, copying with what is possible , not too big but with enough money for upgrades and extensions
- healthy synergy with many labs and projects around Europe and beyond
- try to balance education at home, forefront research in our labs and outgoing flux of researchers