



EUROPEAN UNION



GOVERNMENT OF ROMANIA



Structural Instruments
2007-2013

Sectoral Operational Programme “Increase of Economic Competitiveness”
“Investments for Your Future!”



Extreme **Light** Infrastructure - Nuclear Physics



(ELI-NP) - Phase II

Project co-financed by the European Regional Development Fund

ELI-NP Implementation Status, in images

Ioan Ursu for the ELI-NP Team @ March 2nd , 2019

ELI-NP

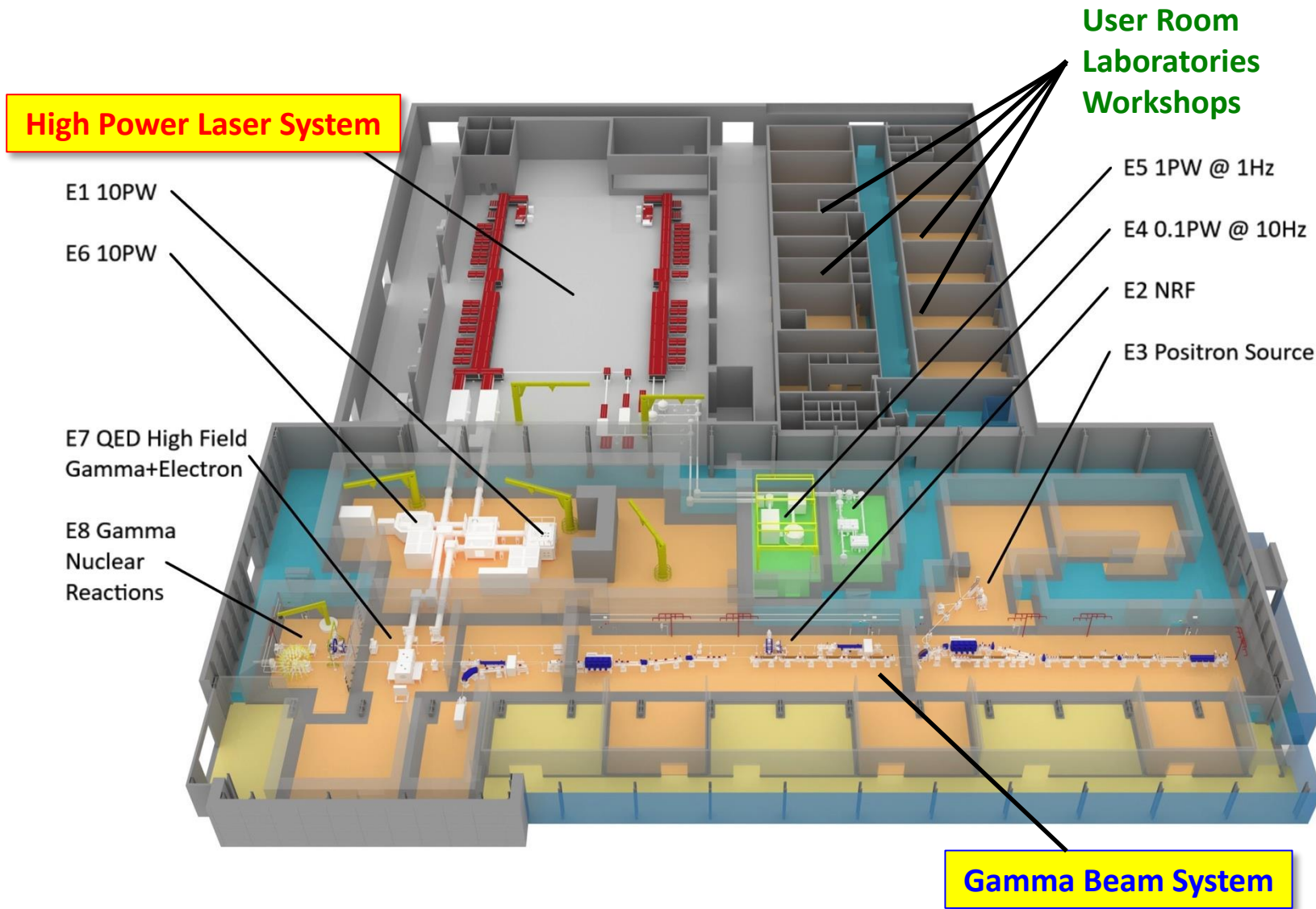


Implementation Status:

1. Special buildings and Annexes - finalized;
2. High Power Laser System – under tests; reached 7 PW
3. The Gamma System – contract ceased
4. Towards Day-One Experiments:
 - ✓ Technical Design Reports (TDR), validated by ISAB – finalized
 - ✓ Acquiring the necessary equipment– under way



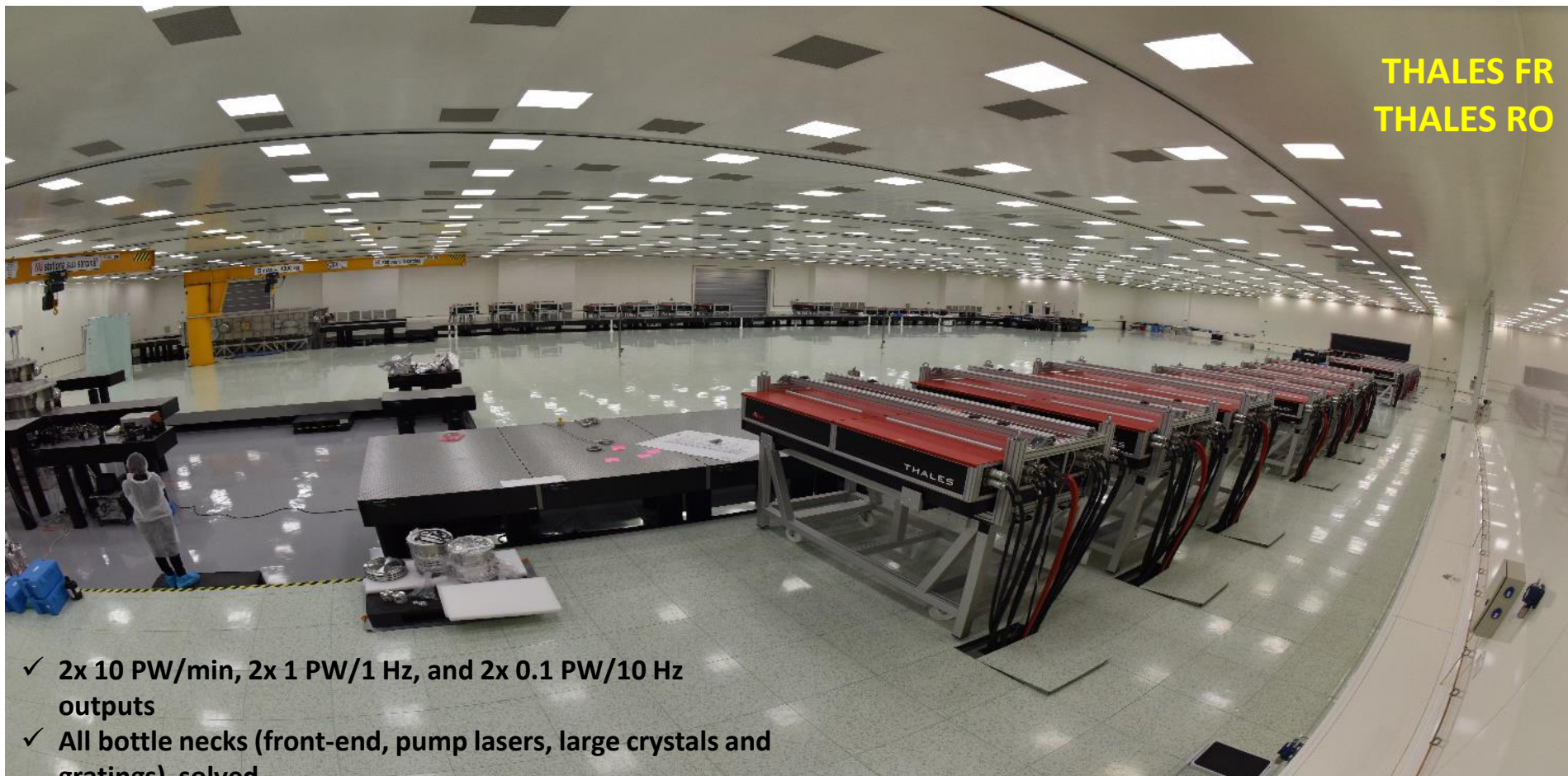
ELI-NP 3D Model Experimental Building



ELI-NP – Experimental Building



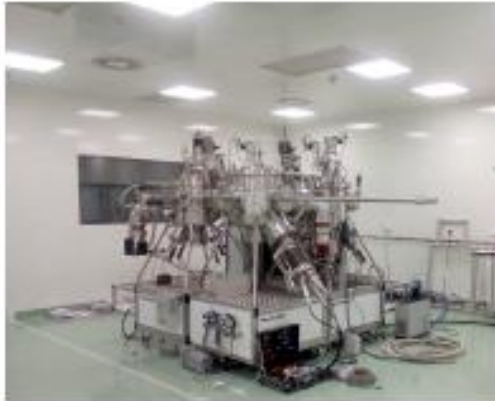
THALES FR
THALES RO



- ✓ 2x 10 PW/min, 2x 1 PW/1 Hz, and 2x 0.1 PW/10 Hz outputs
- ✓ All bottle necks (front-end, pump lasers, large crystals and gratings) solved
- ✓ Both front-ends + all 48 pump lasers operational
- ✓ 1 PW and 0.1 PW amp operational: 4J/10Hz, 39J/1Hz
- ✓ All vacuum vessels in final position
- ✓ HPLS on track for 2018-2019 commissioning, as scheduled
 - Preparatory:
 - Maintenance and operation

Deposition techniques

- UHV RF/DC sputtering
- UHV e-beam evaporation
- spin coating



Structuring /patterning techniques

- reactive ion etching
- optical lithography
- Ar ion milling



Characterization

- SEM (EDS / EBSD / EBL)
- optical profilometer
- AFM
- XRD
- optical microscope

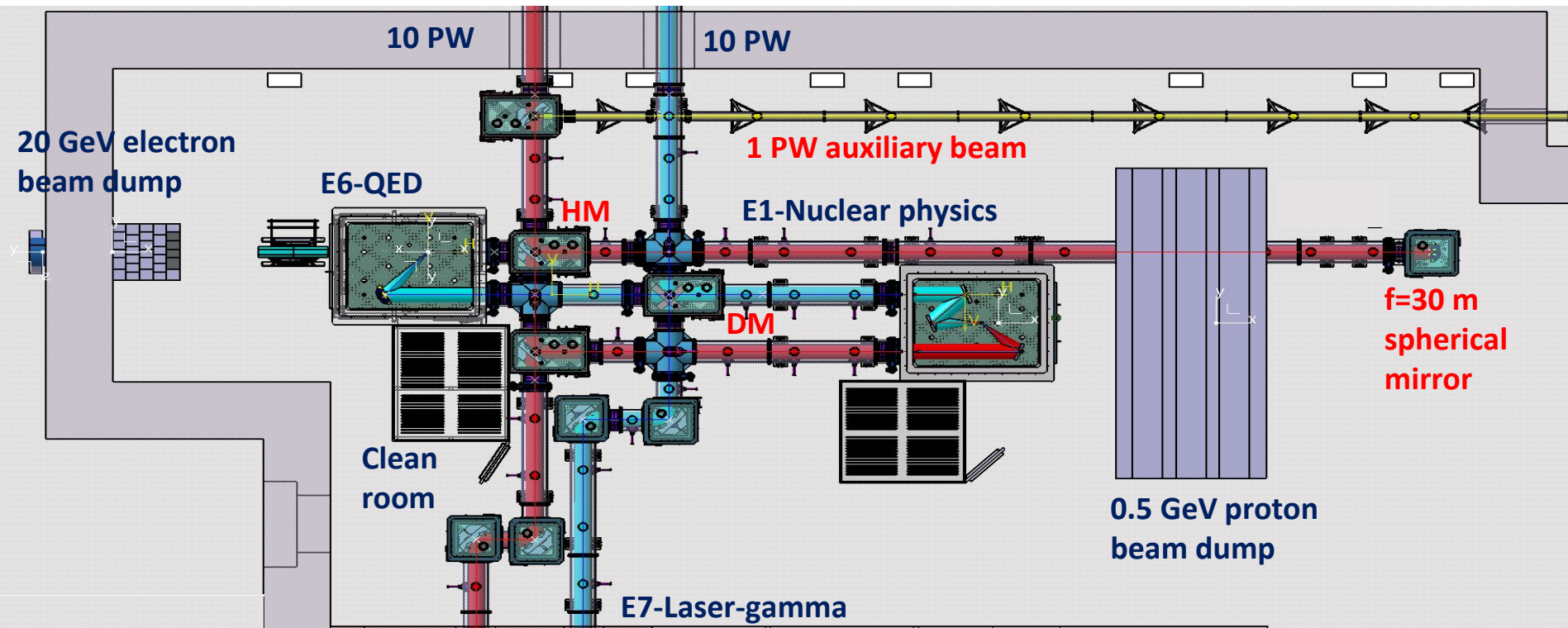


Cleaning methods

- Plasma (O_2 , Ar, SF_6)
- Ion beam (Ar)
- thermal treatments



Laser Beam Transport System



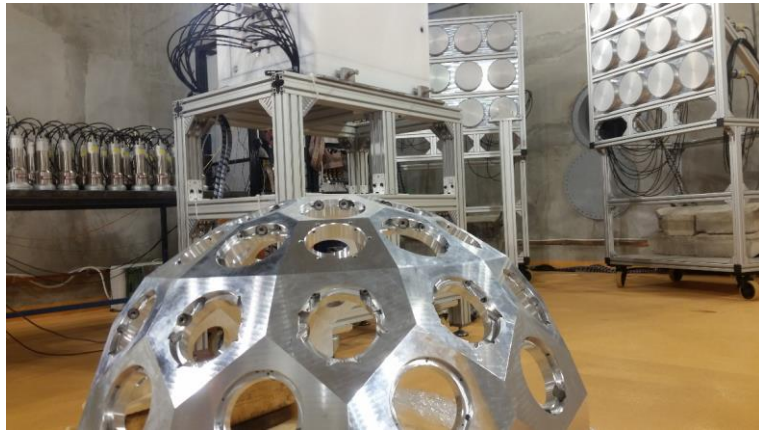
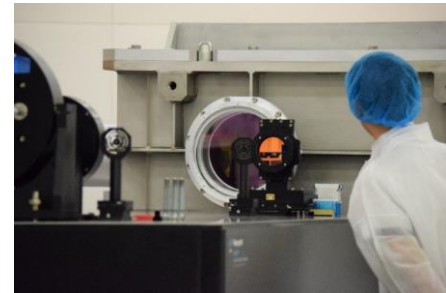
- ✓ By Thales – December 2017
- ✓ Starts installing by the end of 2018
- ✓ LBTS estimated commissioning 2019

Experiments&Labs

Labs operational:

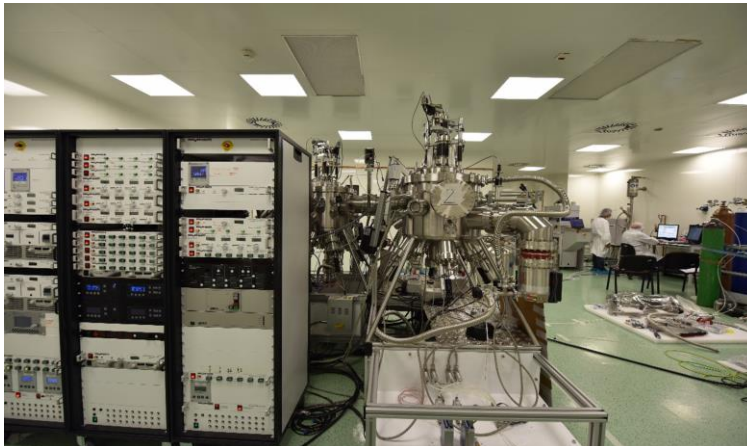
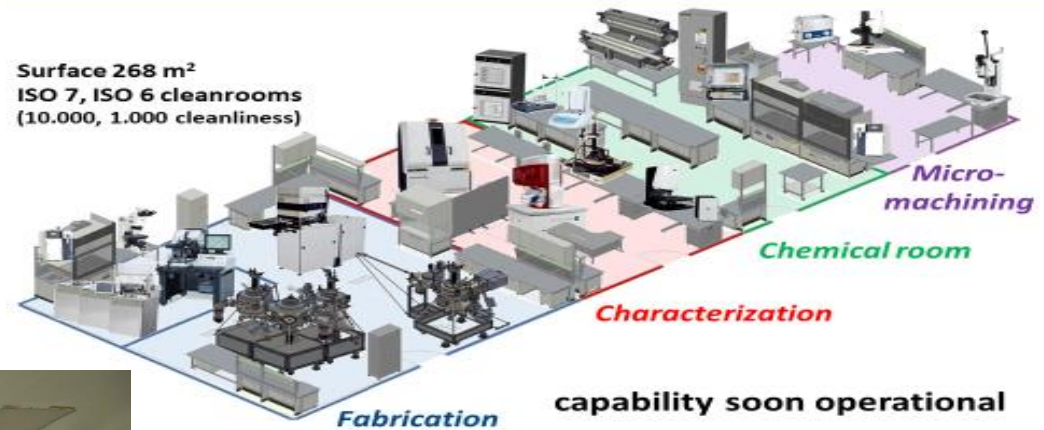
- ✓ Target laboratory
- ✓ Detectors
- ✓ Optics
- ✓ Dosimetry
- ✓ Electronic, Mechanical, HVAC

Interaction Chambers and PW Optics:
In manufacturing process, as
scheduled



Target laboratory with state-of-the-art micro and nanofabrication

Surface 268 m²
ISO 7, ISO 6 cleanrooms
(10.000, 1.000 cleanliness)

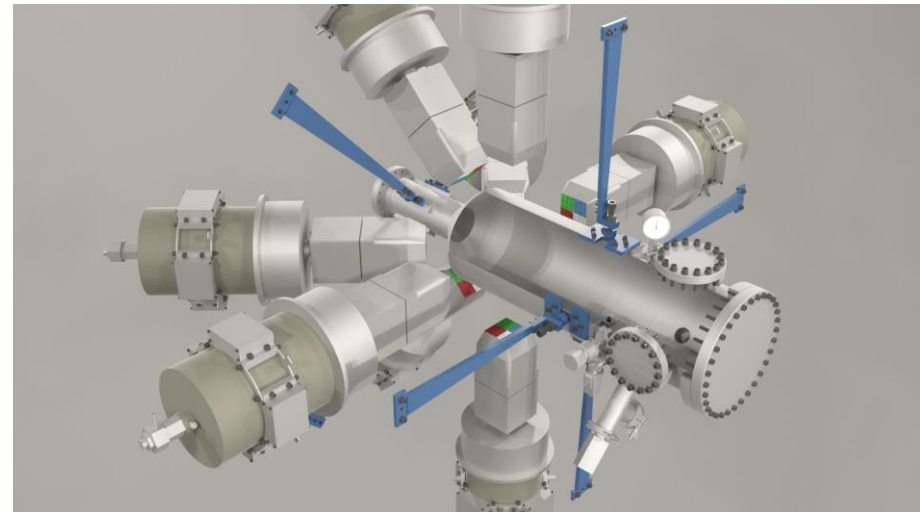


GBS – Day-1 Experiments

ELIADE array

in collaboration with U.
Koeln and TU Darmstadt

- detector and electronics tests are ongoing
- array implementation is at a final stage
- day-one experiments are under discussion



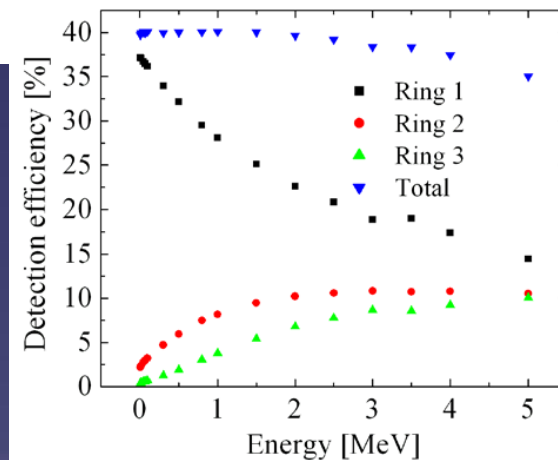
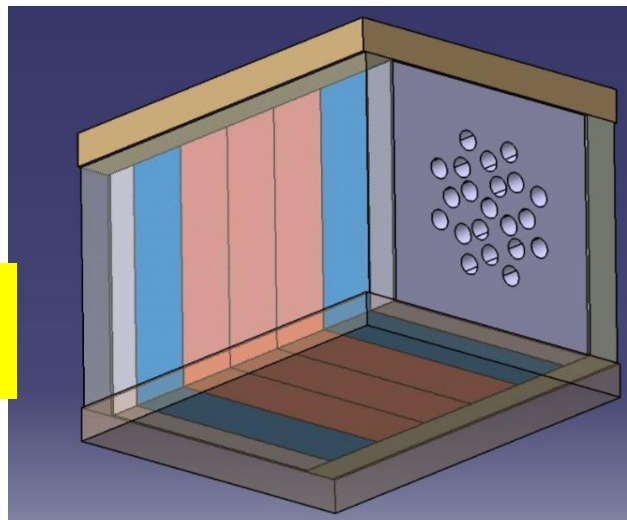
angular distributions
polarization measurements

GBS – Day-1 Experiments

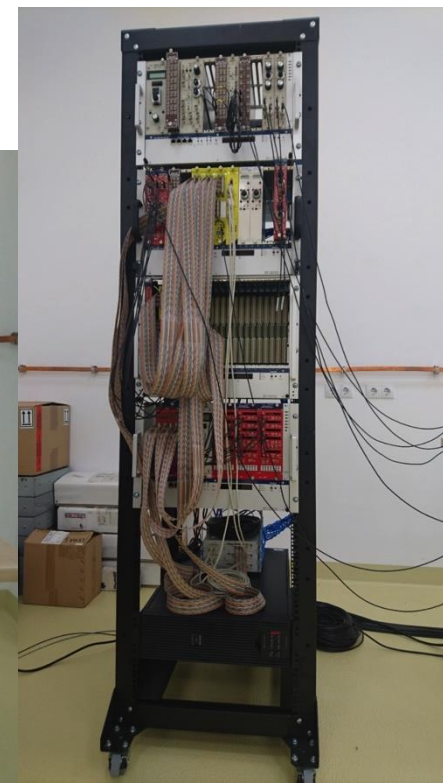
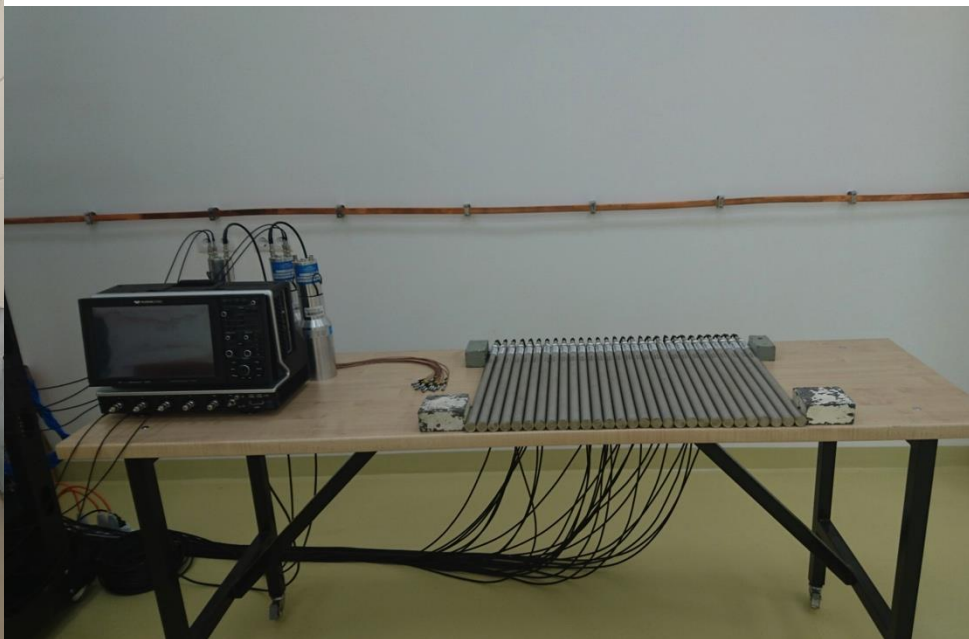
ELIGANT-TN array

30 ^3He counters
40% detector efficiency
In collaboration with U. Konan

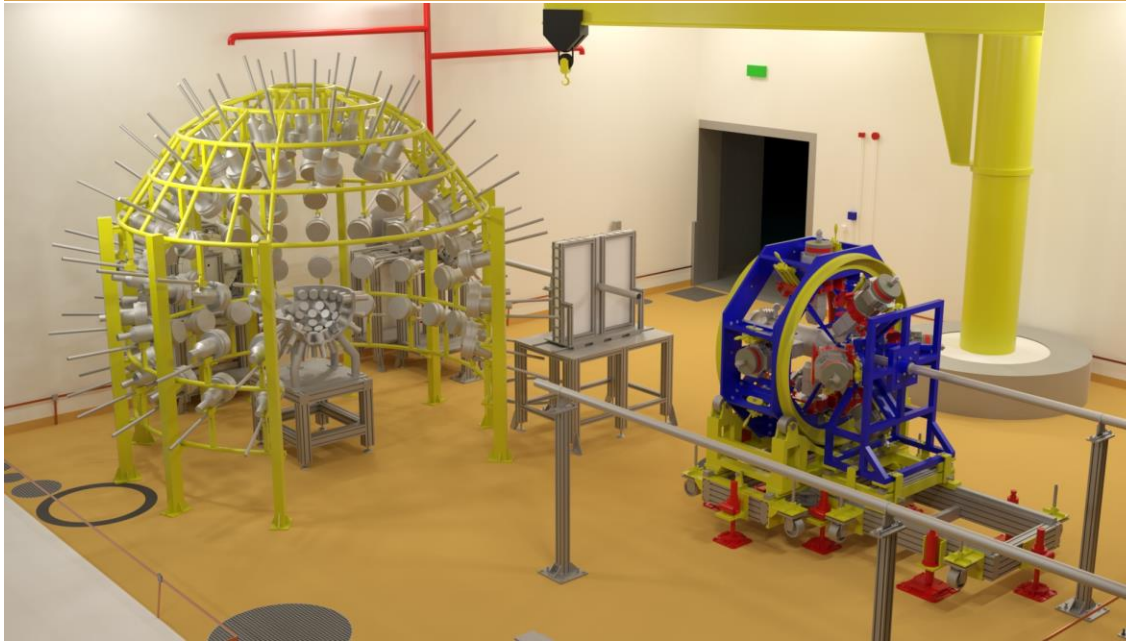
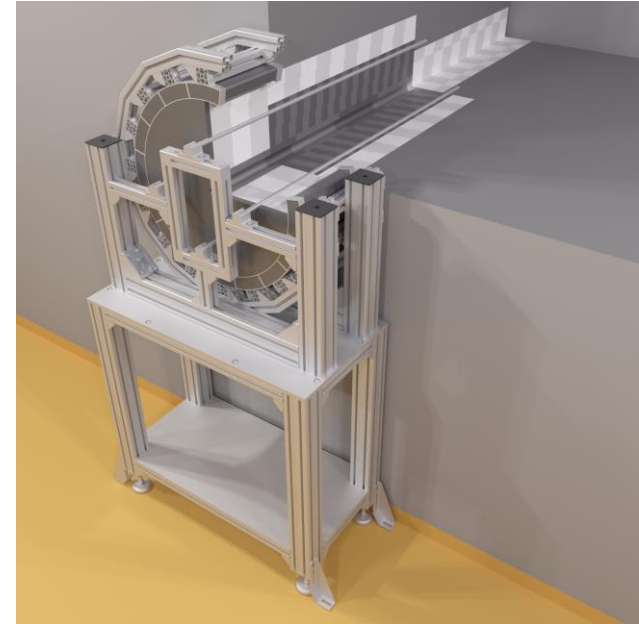
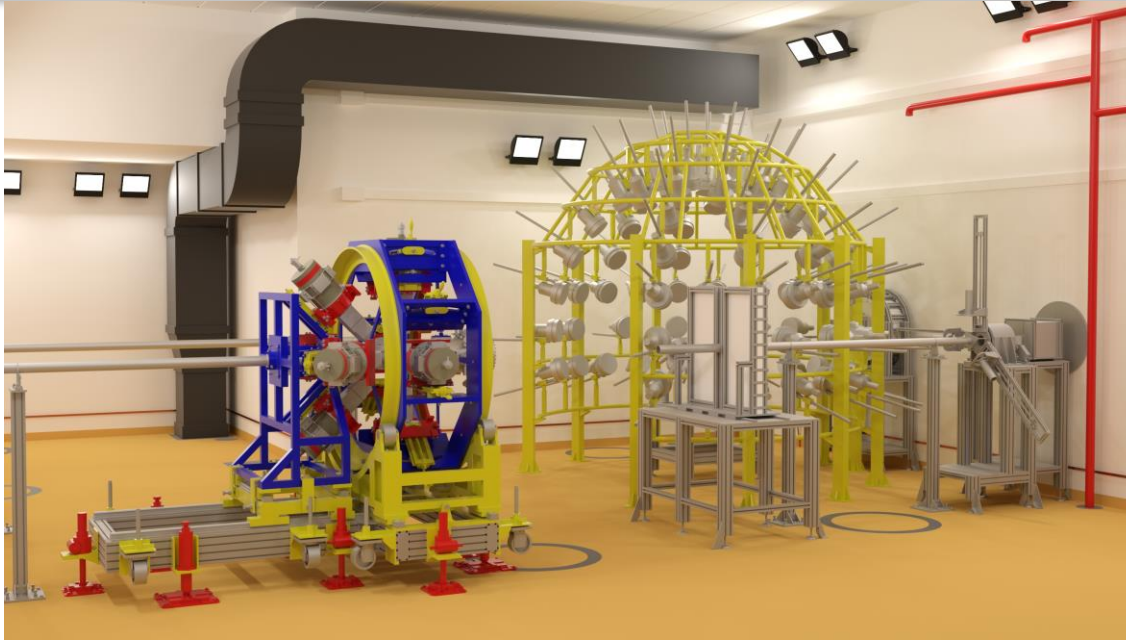
**Ready for first in-beam tests:
today**



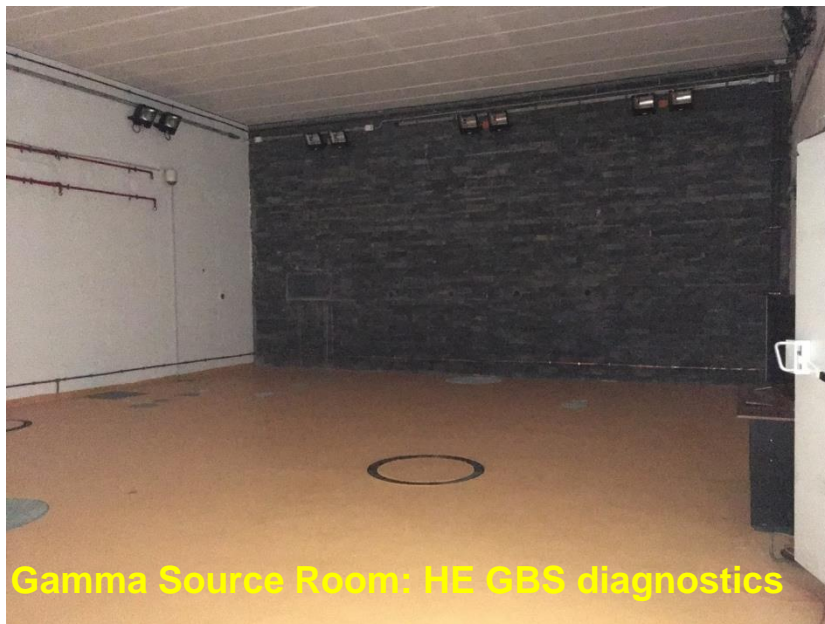
ELIGANT-TN



GBS Experimental Hall E8



Gamma Beam System – Status of Implementation



**Same as in
March 15th, 2018 !**

**EuroGammaS Association
(INFN, Univ. Sapienza, CNRS,
Scandinova Systems, COMEB,
ACP, ALSYOM)**

Gamma Beam System

Implementation Status

- ✓ **Stage I** – 31.10.2015 – accomplished, all Stage I components delivered on ELI-NP site of except for the Centurion Laser
 - **Stage II** – 31.10.2017 – not accomplished
 - **Stage III** – 31.05.2018 – not accomplished
 - **Stage IV** – 31.07.2019
- 30 MEUR already paid by ELI-NP for Stage I
- 1.8 + 1.3 MEUR penalties paid by EGS for not accomplishing Stage II and III

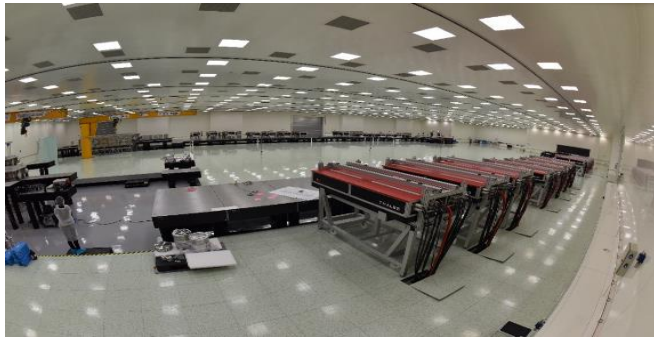
Delayed, Contract ceasation by IFIN-HH due to Supplier-EGS refusal to fulfil their obligations: Activities Schedule, OHS Plan, Insurances,starts installation works.

Still time and budget available to start a new contract.

**GBS shall be implemented!
WE COUNT ON YOUR SUPPORT!**

Concluding Remarks

Special building and all infrastructures fully operational



Commissioning Phase in 2019.

- We will focus on the characterization of each machines: 10PW laser and 19 MeV Gamma beam systems.

10 PW Laser System

- Laser intensity: 10^{22} W/cm²
- Electron acceleration > GeV
- Proton acceleration > 200 MeV

Gamma Beam System

- Gamma photon energy calibration-Nuclear excitation 3.5 or 19.5 MeV
- Polarization > 95%

A Future with ELI

... first major beyond state of the art research and education centre in East Europe, reversing brain drain to brain gain!

... advanced technology pole, a catalyst for innovation in industry and the private sector

... narrowing the technological gap between East and West

I invite you to join us, to show the world that we are able to impose a new paradigm:
science for society!

That will lead us to our ultimate goal, our ideal:

through science, through knowledge, to prosperity!

