ELI EGS-IFIN Meeting

Frascati 26/10/2022

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SUMMARY

- Status
- Proposal
- New integration
- Budget
- Who do what

STATUS

We have proposed a two phases project.

The first will be surely assured by an EGS-IFIN collaboration

The second should be the object of a new MoU for a future facility

The main characteristics were resumed in the following table:

Parameter	Phase 1	Phase 2	
N Bunch/pulse	1	16/32/64 tbd	
Repetition frequency	10 Hz	100 Hz	
Charge per bunch	100 pC	3 nC@ 32 pulses	
Average current	1 nA	10 μΑ	
Max beam energy	100 MeV	150-200 MeV tbd	
Total beam power	0.1 W	1.5-2 kW tbd	
Gun Gradient	80-100 MV/m	80-100 MV/m	
S band accelerating gradient	20 MV/m	20 MV/m	
C Band accelerating gradient	25 MV/m	25 MV/m	

STATUS

- For a long period we worked together with the IFIN colleagues on the hypothesis of the new machine integration in the old cyclotron Hall
- Unfortunately this scenario is now postponed, and the building renovation is delayed of many years.
- So the new proposal is to go back to the main ELI building
- After some discussion we have a installation proposal (to be discussed later, see C.Pectu talk)

Proposal

- The new proposal is to install the stage 1 machine inside the accelerator hall (the one in which it was foresee the ELI NP GBS installation)
- This has to take into account some aspects:
- 1) The zone is partially occupied by the installation of the LynceanTech linac. We will work sharing the tunnel
- 2) The external halls are now partially occupied, so the eventual use form EGS (racks, clean room, control room) has to be evaluated.
- 3) The eventual support form IFIN will be shared with the other installation activity
- 4) In this configuration I suppose that Nuclear Authorities authorization will be easier.
- 5) The alternative is to install in the Annex room, but this seems to us very, very challenging

New integration

- We have to establish a new plan for the machine integration
- This has to be synchronized with the other linac installation
- We must explore what aspects can be shared with the other linac (accesses, radioprotection, control system...)
- We have to foresee, ASAP, an accurate phase of tests of the elements stored in Magurele

Budget

• Our old estimation for the additive budget is pretty independent from the new site. It remains to be evaluated the impact of the new positioning, as far as the optical lines, cables and RF lines are concerned.

Estimates NOT INCLUDING THE SUBSTITUTION OF DAMAGED ELEMENTS

IFIN 50000 + 15000 Final vacuum chamber (different angle) Final elements of all the RF power lines Final elements of the laser transport line (with shielding and elative supports) Final connections for the cooling systems Final connections filter (the) Final connections			
Final vacuum chamber (different angle) Final elements of all the RF power lines Final elements of all the RF power lines Final elements of the laser transport line (with shielding and elative supports) Final connections for the cooling systems Final connections for the cooling syst	Dump(s) with eventual current measurement		
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elative supports) EGS 60000 Final connections for the cooling systems IFIN 30000 Cables acquisition and pulling FIFIN 1500000 Network and control system modifications (tbe) EGS 200000 Network configuration FIFIN 175000 Caussian beam system (tbe) EGS 0 EGS 250000 ELRF modules EGS 0 EGS 10000 EGS 20000 EGS 10000 EGS 10000 EGM at the end of the line EGS 20000 EGS 10000	Final elements of all the RF power lines	EGS	40000
Tables acquisition and pulling Network and control system modifications (tbe) Network configuration Laser clean room modifications (tbe) Laser clean room modifications (tbe) Seam delivery diagnostics (tbe) Seam delivery diagnostics (tbe) Machine protection system modifications (tbe) LEF modules MPS system Seas compress sopra Modulators filters (tbe) Seas compress sopra Seam screen cameras Seam screen cameras Seam screens Seam screens Seam screens Seam supports Seam agement tool SEG soooo SEG sooo SEG soooo SEG management tool SEG soooo SEG sooo SE	Different elements of the laser transport line (with shielding and relative supports)	EGS	60000
Network and control system modifications (tbe) Network configuration Network configuratio	Final connections for the cooling systems	IFIN	30000
Network configuration Laser clean room modifications (tbe) Laser clean room modifications (tbe) Beaussian beam system (tbe) Beam delivery diagnostics (tbe) Machine protection system modifications (tbe) LEF modules MPS system Modulators filters (tbe) EGS Compresso sopra Modulators filters (tbe) EGS Compresso sopra EGS Conpresso sopra EGS Compresso sopra EGS Loooo	Cables acquisition and pulling	IFIN	1500000
Laser clean room modifications (tbe) Gaussian beam system (tbe) Beam delivery diagnostics (tbe) Machine protection system modifications (tbe) LLRF modules MPS system Modulators filters (tbe) Fast valve with gauge OC Controls updates Beam screen cameras Machine protection system modifications (tbe) Fast valve with gauge Compress sopra Beam screen cameras Feds Compress sopra Beam screen cameras Feds F	Network and control system modifications (tbe)	EGS	200000
Gaussian beam system (tbe) Beam delivery diagnostics (tbe) Machine protection system modifications (tbe) LLRF modules MPS system Modulators filters (tbe) EGS Compreso sopra Modulators filters (tbe) EGS Compreso sopra EGS Compres	Network configuration	IFIN	tbe by IFIN
Beam delivery diagnostics (tbe) Machine protection system modifications (tbe) LLRF modules MPS system Modulators filters (tbe) Fast valve with gauge OC Controls updates Beam screen cameras MAG screens Cameras supports EGS 10000 EGS 1	Laser clean room modifications (tbe)	IFIN	175000
Machine protection system modifications (tbe) LLRF modules MPS system Modulators filters (tbe) Fast valve with gauge OC Controls updates Beam screen cameras MAG screens Cameras supports BECM at the end of the line SF6 management tool RF Loads (to be checked) EGS 250000 EGS 50000 EGS 250000 EGS 250	Gaussian beam system (tbe)	EGS	0
LLRF modules MPS system Modulators filters (tbe) Fast valve with gauge OC Controls updates Beam screen cameras FAGS FAG	Beam delivery diagnostics (tbe)	EGS	0
MPS system Modulators filters (tbe) Fast valve with gauge OC Controls updates Beam screen cameras CAG screens EAGS 10000 Cameras supports EAGS 10000 EAGS 10000 EA	Machine protection system modifications (tbe)	EGS	250000
Modulators filters (tbe) Fast valve with gauge OC Controls updates Beam screen cameras CAG screens EGS 10000	LLRF modules	EGS	50000
Fast valve with gauge OC Controls updates Beam screen cameras EGS - COSYLAB compreso sopra EGS - 10000 E	MPS system	EGS	compreso sopra
OC Controls updates Beam screen cameras CAG screens EGS 10000 CAG screens EGS 10000 EGS 10000	Modulators filters (tbe)	EGS	0
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ZAG screens EGS 10000 Cameras supports EGS 20000 EGS 20000 EF6 management tool EF Loads (to be checked) EGS 20000	IOC Controls updates	EGS - COSYLAB	compreso sopra
EGS 10000 EBCM at the end of the line EGS 20000 EF6 management tool EGS 20000 EF Loads (to be checked) EGS 25000	Beam screen cameras	EGS	10000
BCM at the end of the line EGS 20000 EF6 management tool EGS 20000 EF Loads (to be checked) EGS 25000	YAG screens	EGS	10000
FF6 management tool EGS 20000 RF Loads (to be checked) EGS 25000	Cameras supports	EGS	10000
RF Loads (to be checked) EGS 25000	1 BCM at the end of the line	EGS	20000
	SF6 management tool	EGS	20000
2435000	RF Loads (to be checked)	EGS	25000
2435000			
			2435000

60-90 kEuros has to be added to the radioprotection system if the EGS one will be used Plants and other civil infra has to be evaluated by IFIN

MISSIONS

- Missions have to be evaluated after the final decision on the task sharing. One mission cost (one week) close to 1200-1700 Euro (depending on the EGS partner)
- Taking into account one year (12 months) integrated in the EGS partners, with four people per mission with an average price of 1500 euros: around 300.000 euros.

WHO DO WHAT

- Already a list was agreed in the case of the cyclotron hall.
- To be more efficient in the expenses and in the sharing I have a proposal (to trigger the discussion)
- EGS will:
- Install the modules and connect them
- Connect the tubes for the cooling systems
- Align the machine
- Connect vacuum system, bake the system and pump down
- Install the modulators and testing with the support of IFIN crane operators
- Connect the RF Systems and conditioning of the RF elements (guides, sections...)
- Install the laser systems
- Design and install the new optical line
- Test the optical systems
- Test all the components and debug the control system
- Install and test the diagnostics
- Install and test of the Machine Protection System
- · Machine commissioning and training
- All these and the other phases will be followed by the EGS experts, especially the cooling systems connections.
- If this is done rapidly this could be an excellent training for IFIN to install the other machine

DISCUSSION