ELISA

Experimental Linac for Surface Analysis

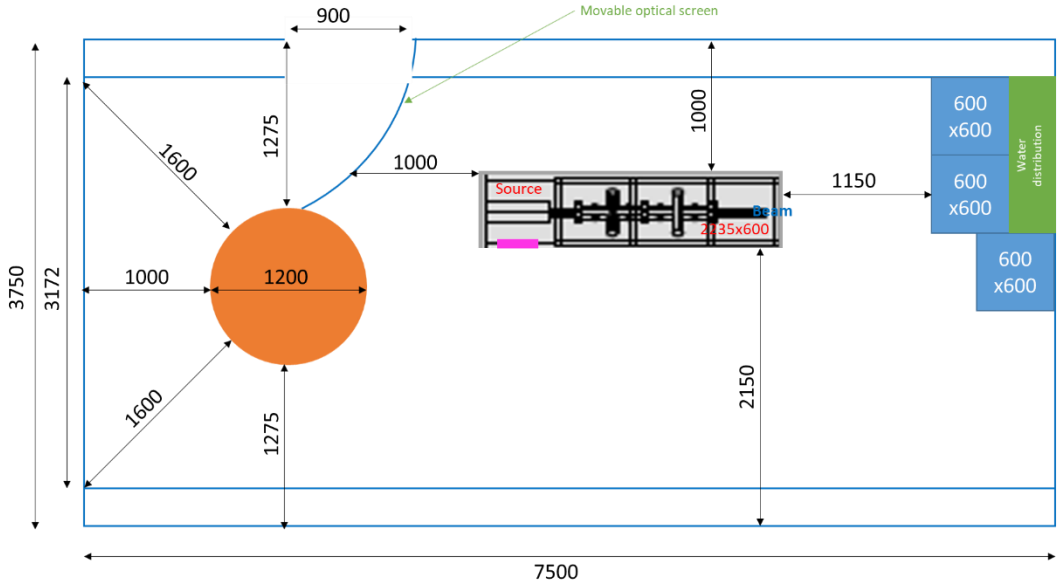
CERN Science Gateway

A miniature proton accelerator for Science Gateway

4° Joint Technical Meeting
1 July 2021

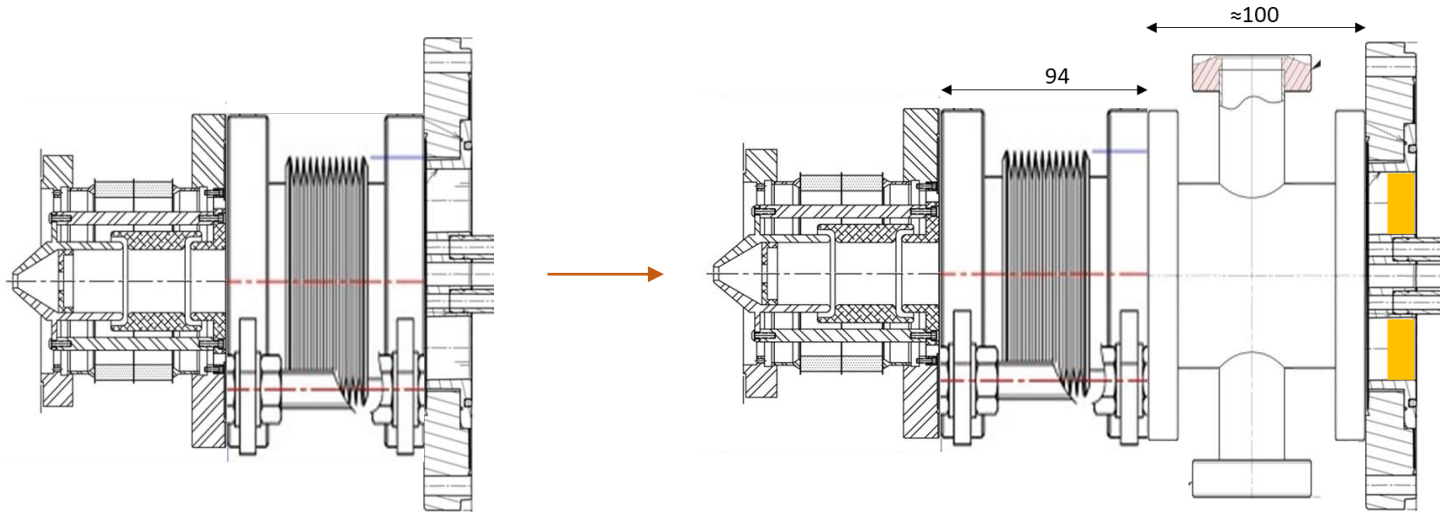
1: ELISA – *News from the project*

- New logo for Science Gateway.
- Integration : Questions about the distance between the public and the RF amplifier and about the water distribution.



1: ELISA – *News from the project*

- Control: BE/ICS will have an associate (PJAS) for one year for the ELISA control system, starting September 21.
- LEBT : Pumping ports must be added before the RFQ, but no valve.



Distance(Einzel lens / MP) 103 to 139 mm … will be ≈ 200 – 240 mm

2: ELISA – *Safety File status*

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SAFETY FILE

ELISA
Experimental LInac for Surface Analysis

ABSTRACT:

[Abstract of the document]

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Part 1: Descriptive part

1.6 Systems

This section contains a description of each system and sub-system which compose ELISA. List of the documents available and an inventory of the risks is also included for each system and sub-system.

The main systems composing ELISA are:

1. The proton source & LEBT
2. The RFQ
3. The high energy side (HEBT) and experimental set-ups.
4. The vacuum system.
5. The RF amplifier.
6. The chiller & cooling circuit.
7. The control system.
8. The entire ELISA accelerator.

1.6.1 System 1: The proton source & LEBT

1.6.1.1 Main system description.

The proton source, in its initial design, is a commercial RF ion source manufactured by NEC (National Electrostatics Corp., US), model 2JA066400. A focalization system (Einzel lens) is added at the output of the source. The output of the Einzel lens is connected to the RFQ by a CF100 bellow and reinforcement screws. A passive system (isolated electrodes) allows a measurement of the current arriving at the level of the RFQ. The following figure gives a schematic of the proton source and the LEBT, with the identification for the sub-systems and showing the high voltage regions.

1.6.1.2 Sub-systems description.

N° 1.1: High voltage parts: The high voltage parts include the proton source, the RF enclosure, the Einzel lens (except for the outlet flange which is grounded), the high voltage deck containing the gas system (with its control), the probe power supply and the RF oscillator. The high voltages are different for the probe, the extraction and the focalization. Maximum values are less than 20 kV.

N° 1.2: The proton source is composed of the quartz envelope, where the hydrogen plasma is formed and which is connected to the probe PS, the permanent magnets and the extraction electrode, connected to the extraction power supply.

N° 1.3: The RF enclosure is at the extraction high voltage and contains the RF oscillator and antenna. On one side, we have a cooling fan and on the other side a large opening allowing the public to see the hydrogen plasma.

N° 1.4: The Einzel lens is made of an inlet flange, at the extraction potential, a first ceramic ring, a focalization electrode at the focalization potential, a second ceramic ring and an outlet flange which is grounded.

N° 1.5: The connection bellow insures the vacuum connection between the Einzel lens and the RFQ.

N° 1.6: The HV deck is at the extraction potential and support the gas system, the oscillator power supply and the other electrical components connected to the source or to the RF enclosure.

N° 1.7: The gas system is at high voltage (extraction voltage) and is composed of a hydrogen source (TiH cartridge), a mass flow controller, vacuum and pressure gauges and operating valves.

N° 1.8: The probe power supply, connected to the source, is a model Power Glassman FR30P10.0F22, 30 kV, 10 mA.

N° 1.9: The source RF power supply is connected to the RF oscillator inside the RF enclosure. The model is xxx

1.6.1.3 Documents

Nr.	Document	EDMS Number
1.1	Source offer (NEC)	
1.2	Einzel lens offer (NEC)	
1.3	Source data sheet	
1.4	Electrical schematics	
1.5	Power supply manual	
1.6	HV transformer manual	
1.7	Gas system schematic	
1.8	Mass flow controller manual	
1.9	Hydrogen source	
1.10		

1.6.1.4 Hazard identification

Hazard	Description of the hazard (quantity, voltage rank, gaz type, field level ...)	Mitigation measures (Standard, norm, rules compliancy, Technical measures, procedures, interlock system, fail safe, maintenance program...)
External Hazard to Facility		
Climate and weather		
Earthquake		
Fire, external		
Flooding		
Ground Pressure		
Landslide		
Wildlife		
Hazard to the Environment		
Activation of ground		
Additional Traffic		

Physical Hazards	
Field, electrical	
Field, magnetic	
Noise (Workplace)	
Oxygen deficiency	
Temperature: cold gas/liquid	
Temperature: Heat radiation	
Temperature: Surface, cold	
Temperature: Surface, hot	
Ultrasound, Infrasound	
Under- or overpressure	
Radiation, ionising	
Activated air or gases	
Activated dispersed solids	
Activated or contaminated liquids	
Activated solids	
Naturally occuring radioactive materials	
Particle beam	
Radiation damage, electronics (R2E)	
Radiation damage, mechanical	
Radioactive aerosols	
Radioactive surface contamination	
Radioactive test sources	
X-ray (parasitic)	
X-ray generators	
Radiation, non-ionising	
Laser	
Microwaves	
Radiofrequency	
UV	

1.7 : Provisions for dismantling the facility and for disposing of its components.

This …

2. Part 2 - Demonstrative part:

2.1 Conformity reports

- 2.1.1 Machine
- 2.1.2 Electricity
- 2.1.3 Pressure

2.2 Risk assessment for the interlock system

2.3 Risk assessment for public exhibition

2.4 Commissioning report

2.5 Beam permit

3. Part 3 - Operational part:

3.1 ELISA operation modes

3.2 Procedures of operation

3.3 Procedures of maintenance

3.4 Troubleshooting procedures – piquet intervention

3.5 Emergency procedures – degraded mode

4. Part 4 – Records, experience and monitoring (REM) PART:

Link to Infor, EDMS … database for component lifecycle.

3: ELISA – *Vacuum system*

→ Chiara Pasquino