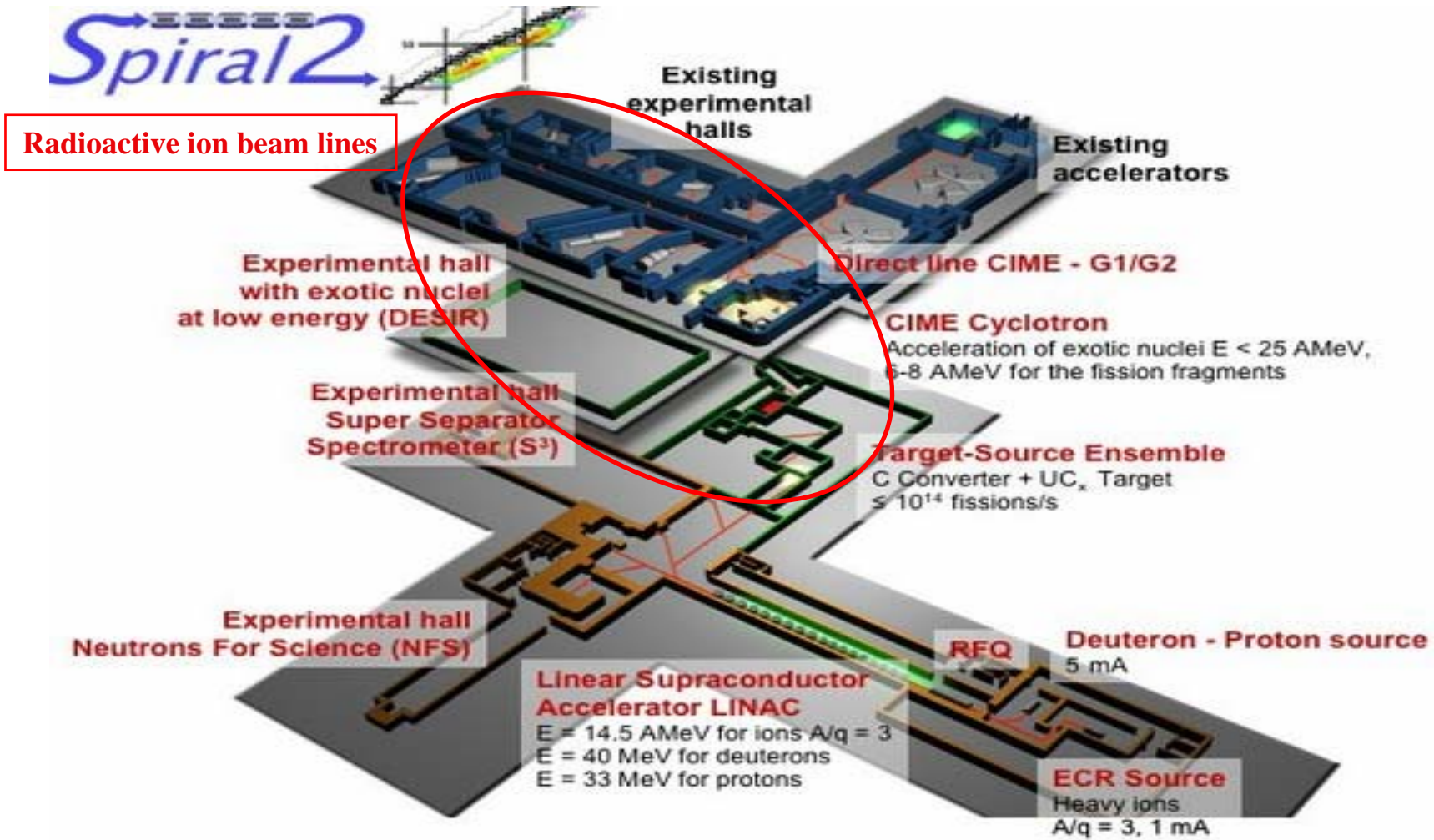
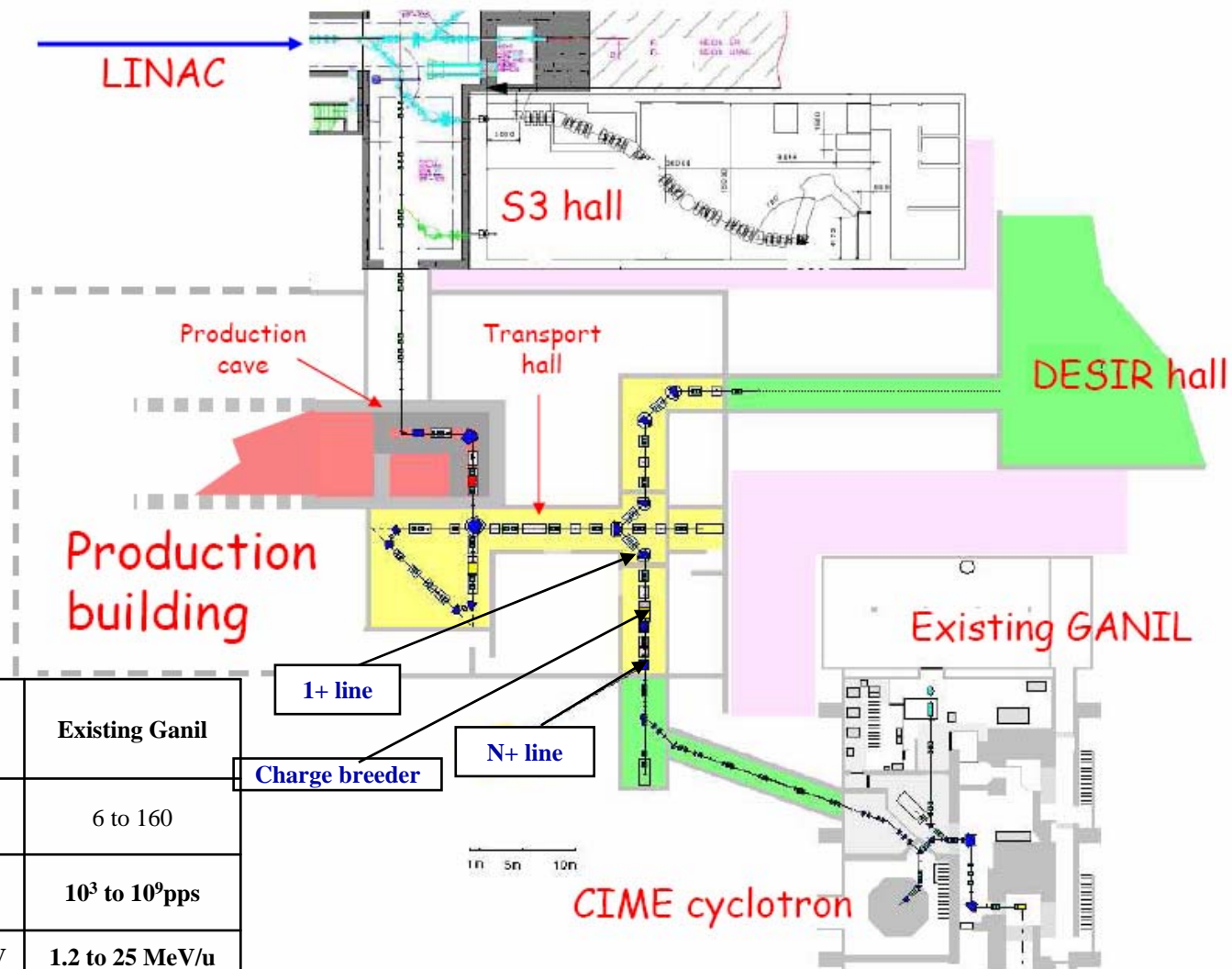


- contents
- SPIRAL 2 installation overview
- RIB lines description
- Radioactive Ion Beam profilers
  - Low Pressure Gas Monitor (LPGM)
  - Emissive Foil Monitor (EFM)
  - Very Low intensity Monitor (VLIM)
- Associated electronic



# Radioactive Ions Beams description



	Line 1+	Line n+	Existing Ganil
<b>Ion mass range</b>	6 to 240	6 to 160	6 to 160
<b>Intensity range</b>	$10^3$ to $10^{11}$ pps	$10^3$ to $10^{10}$ pps	$10^3$ to $10^9$ pps
<b>Beam energy</b>	10 to 60 keV	10 to 45 keV	1.2 to 25 MeV/u
<b>Example of RIB</b>	132 Sn <sup>1+</sup>	132 Sn <sup>20+</sup>	132 Sn <sup>20+</sup>
	20 keV	400 keV	792 MeV

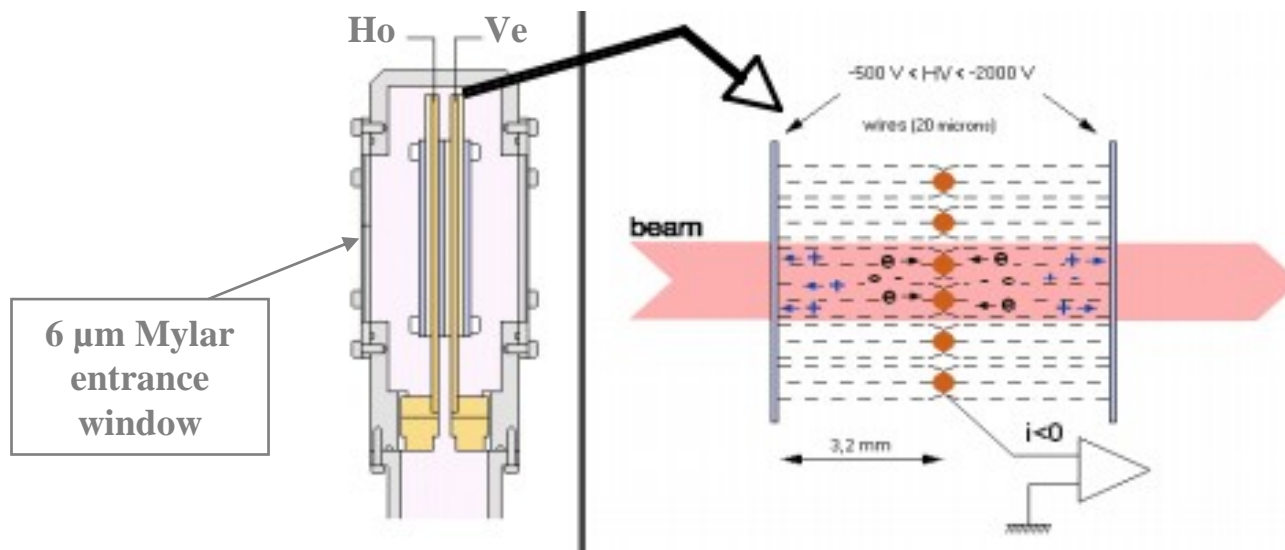
- **Low Pressure Gas Monitor (LPGM)**

**Principle** : ionization chamber with two wire planes in 10 mBar of C3F8 gas

**Energy range** : from 0.5 MeV/u to 25 MeV/u

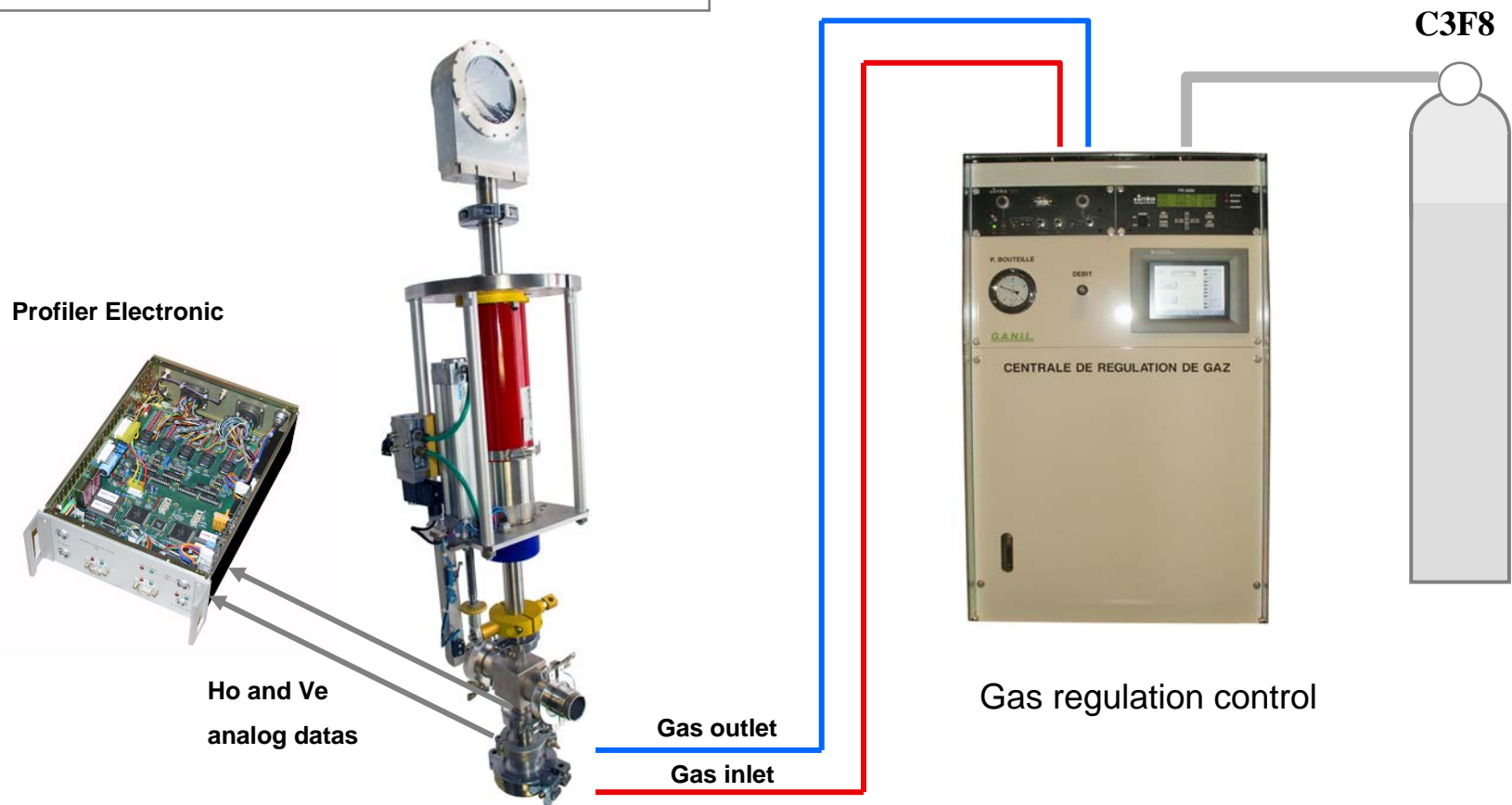
**Intensity range** : from  $10^2$  pps to  $10^7$  pps

**Location lines** : from CIME to GANIL Experimental rooms



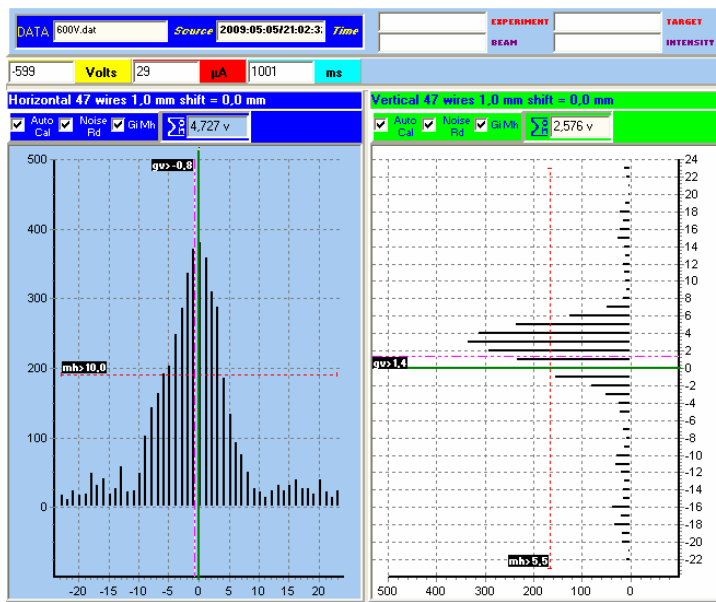
- **Low Pressure Gas Monitor (LPGM)**

**Pressure** : gas regulation between 5 to 50 mbar  
(usually 10 mbar)  
**High voltage** : from -300V to -1000 V



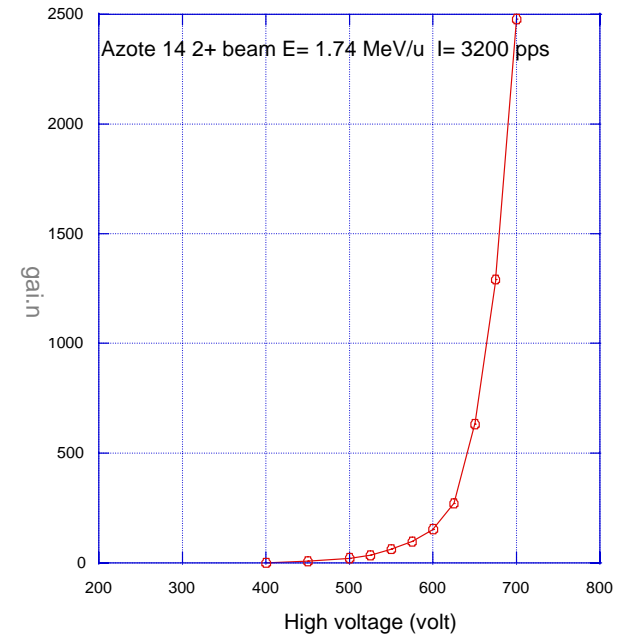
- Low Pressure Gas Monitor (LPGM)**

Experimental result : Azote14 2+ beam profile E= 1.74 MeV/u, I= 3200 pps



Horizontal profile

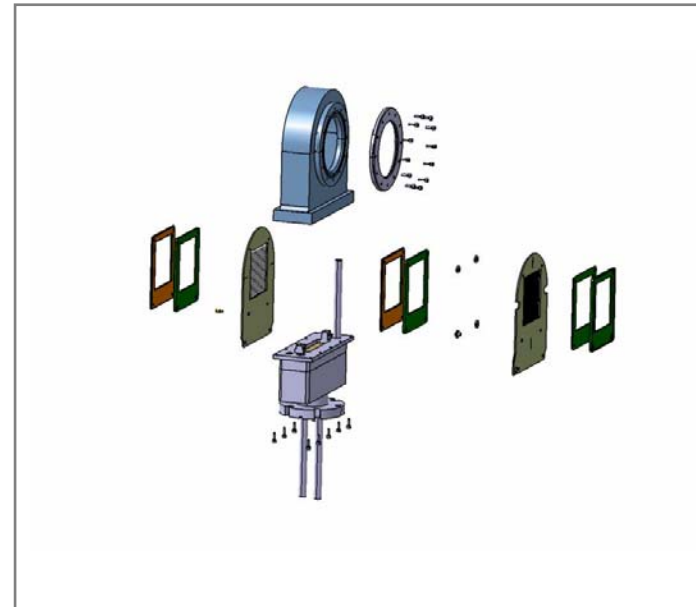
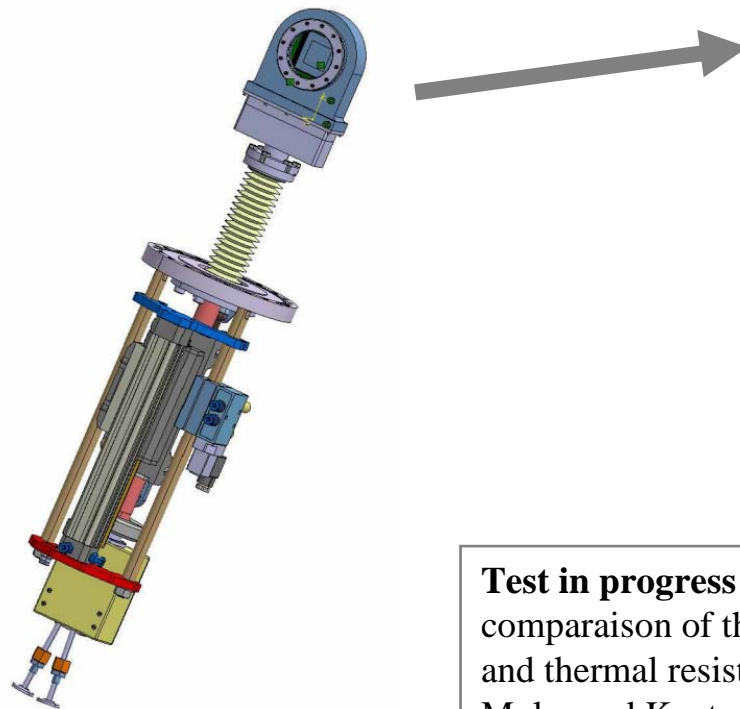
Vertical profile



amplification signal versus high voltage variation

- **Low Pressure Gas Monitor (LPGM)**

**Further improvements** : new design to increase the high voltage limitation, to limit the outgazing and to improve the gas circulation



**Test in progress (JINR DUBNA):**  
comparaison of the irradiation flux  
and thermal resistance between  
Mylar and Kapton foils

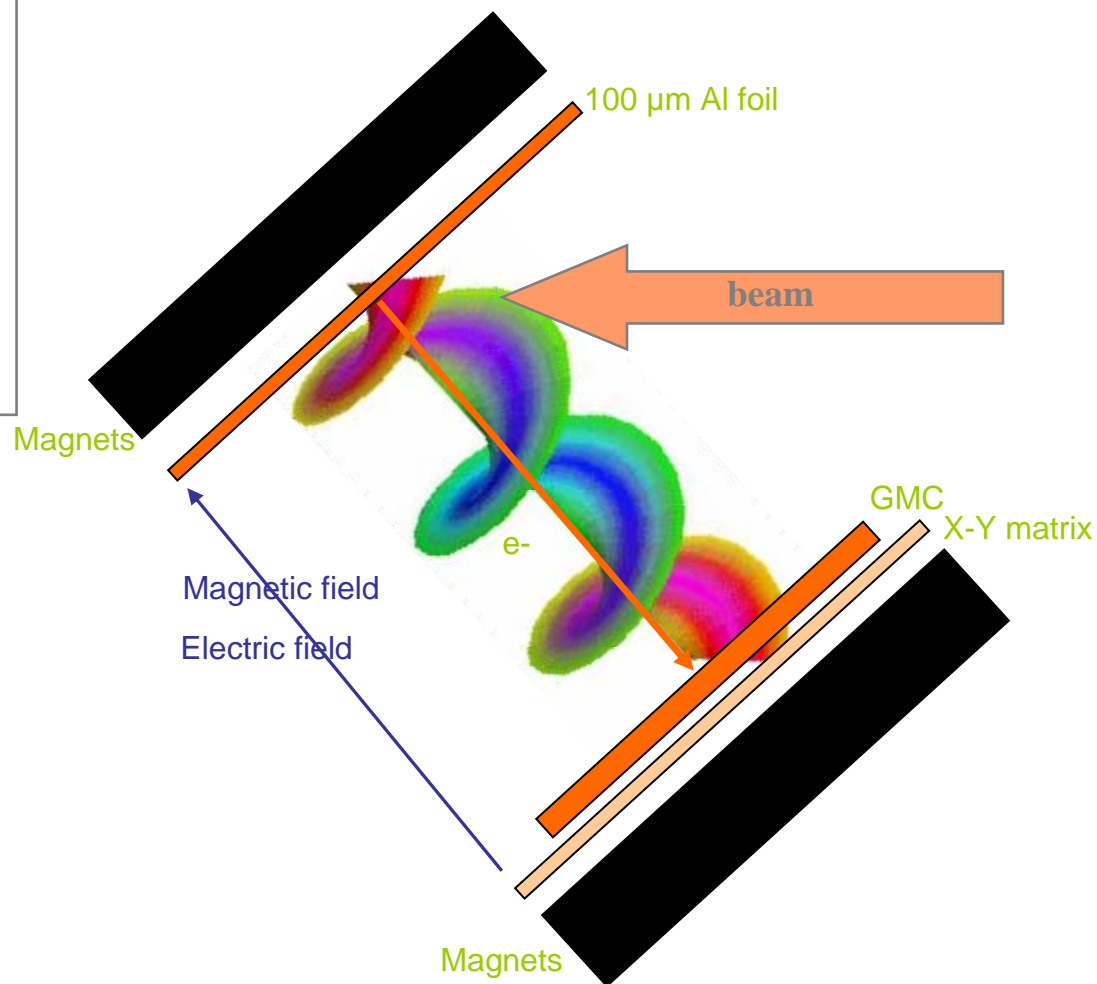
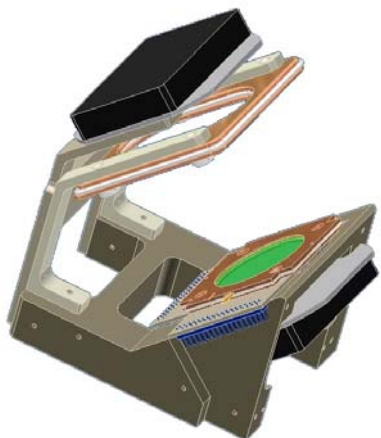
- **Emissive Foil Monitor**

**Principle** : secondary emission on Al foil, amplification by microchannel plates, reading informations on X-Y matrix

**Energy range** : up to 10 KeV

**Intensity range** : from 10 pps to  $10^9$  pps

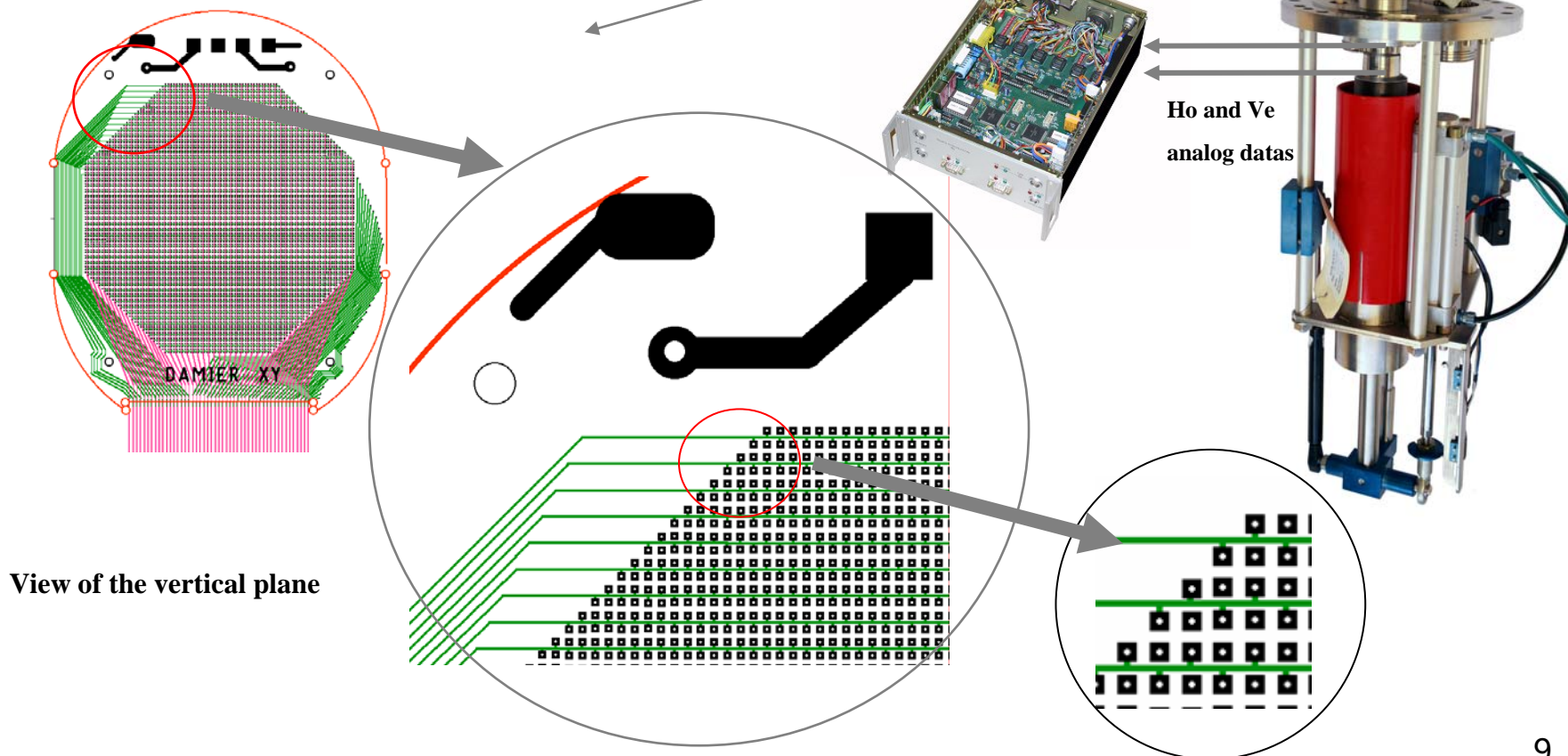
**Location lines** : from 1+ line to GANIL Experimental rooms





- Emissive Foil Monitor

**Magnetic field** : ~150 G  
**Electric field** : ~ 15V/mm  
**Amplification** : 2 microchannel plates Ø 50 mm  
**Matrix** : 42 x 42 strips (resolution 1 mm)



# Radioactive ion beam profileurs

- Emissive Foil Monitor**

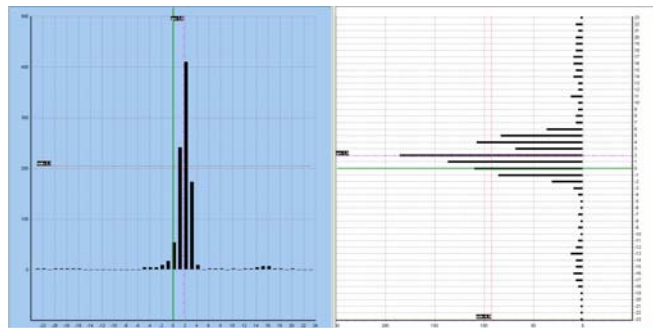
**Two Experimental results**

**C12 2<sup>+</sup> beam at 5 MeV/u**

**Intensity : 10<sup>4</sup> pps**

**Xe132 15<sup>+</sup> beam at 15 KeV/u**

**Intensity : 2.5 10<sup>10</sup> pps**

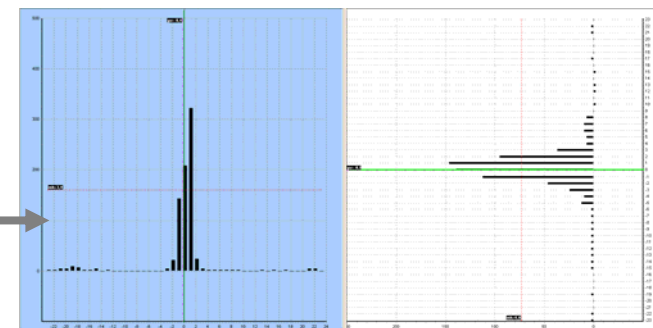


Horizontal profile

Vertical profile

Reference Profiler :  
gas profiler

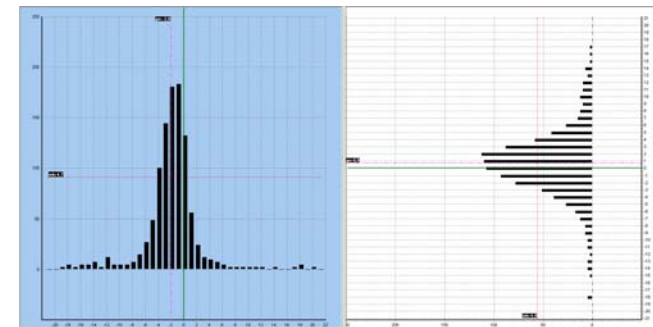
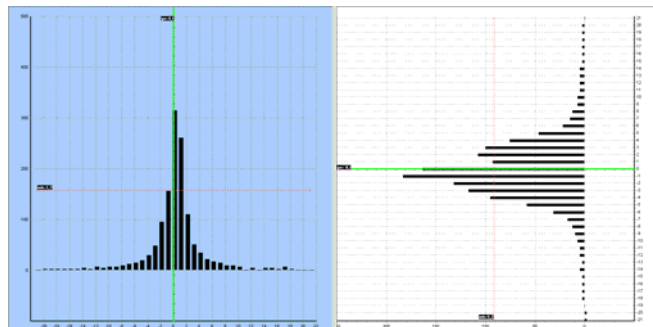
SEM profiler



Horizontal profile

Vertical profile

Emissive foil  
monitor profile

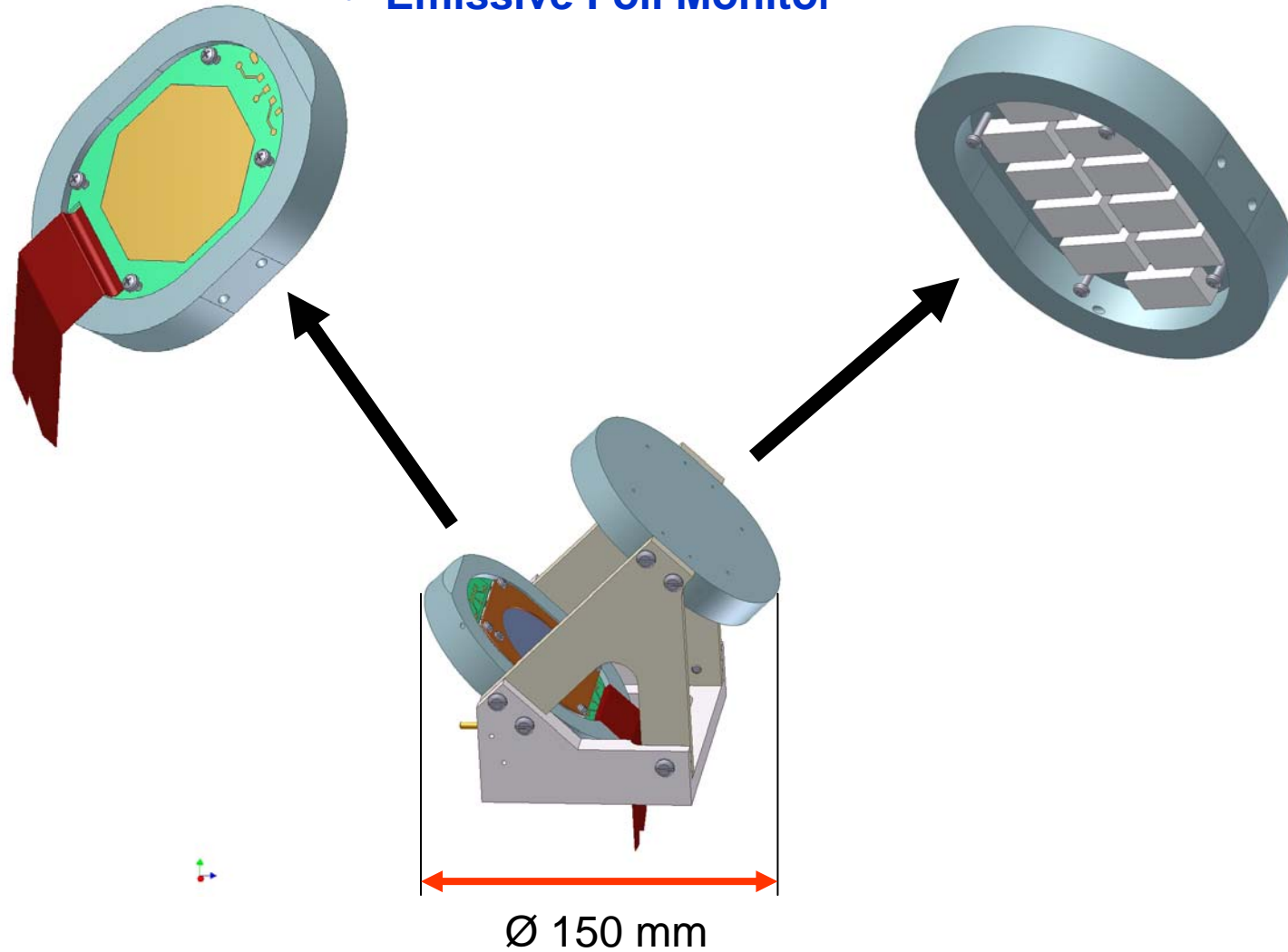


**increase of the profile size**



**Needing to perform the resolution**

- Emissive Foil Monitor



New design of magnets pole : beam test in 2010

# Radioactive ion beam profileurs

- Very Low Intensity Monitor (VLIM)

**Principle** : direct low intensity beam on MCP and matrix reading

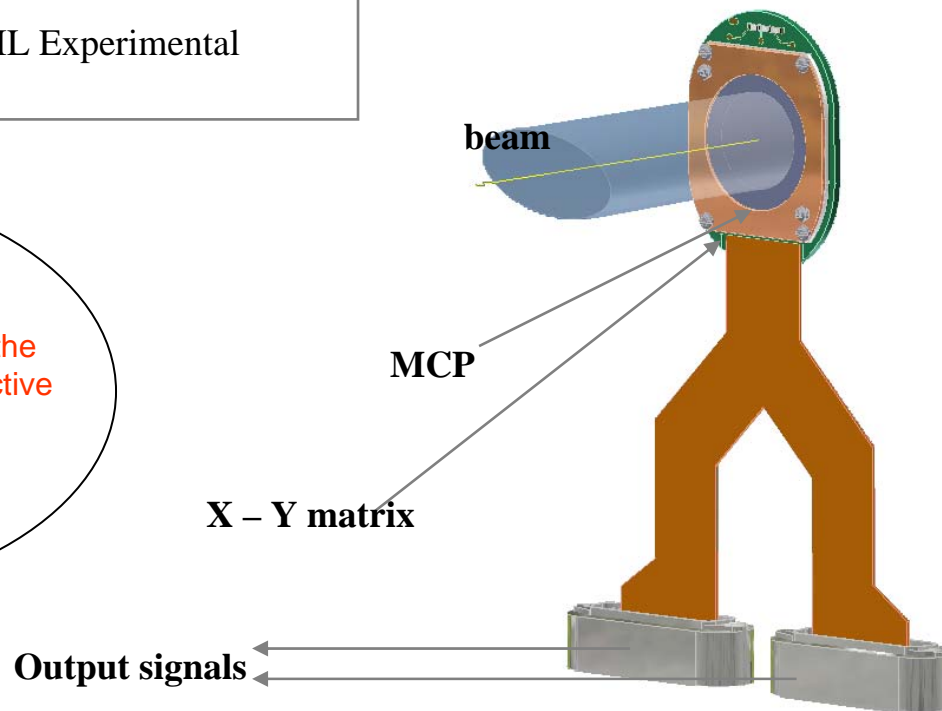
**Energy range** : from 10 keV/u to 25 MeV/u

**Intensity range** : from 10 pps to  $10^5$  pps

**Location lines** : from 1<sup>+</sup> line to GANIL Experimental rooms

**Under development : first test in 2010**

? Unknown aspect : effect of the microchannel plates radioactive activation, life expectancy...



# Radioactive ion beam profileurs

- **Associated electronics  
( for all beam profile monitors)**

**Principle** : 94 channels in a parallel system ( 2 x 47 ).

**Two conversion possibilities:** passive system for high intensity beams  
active system for low intensity beams

**Front end** : constituted by 12 daughter boards of 8 channels

**A/D conversion** : about 4  $\mu$ s

**Acquisition** : FPGA (Altera cyclone 3)

For more informations :  
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Thank you for your attention

