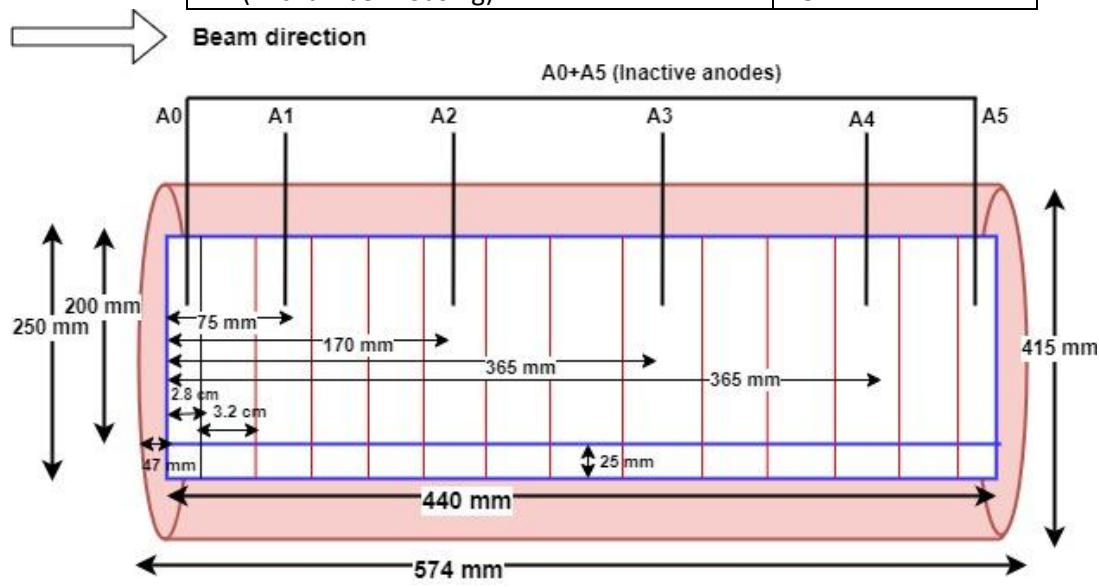


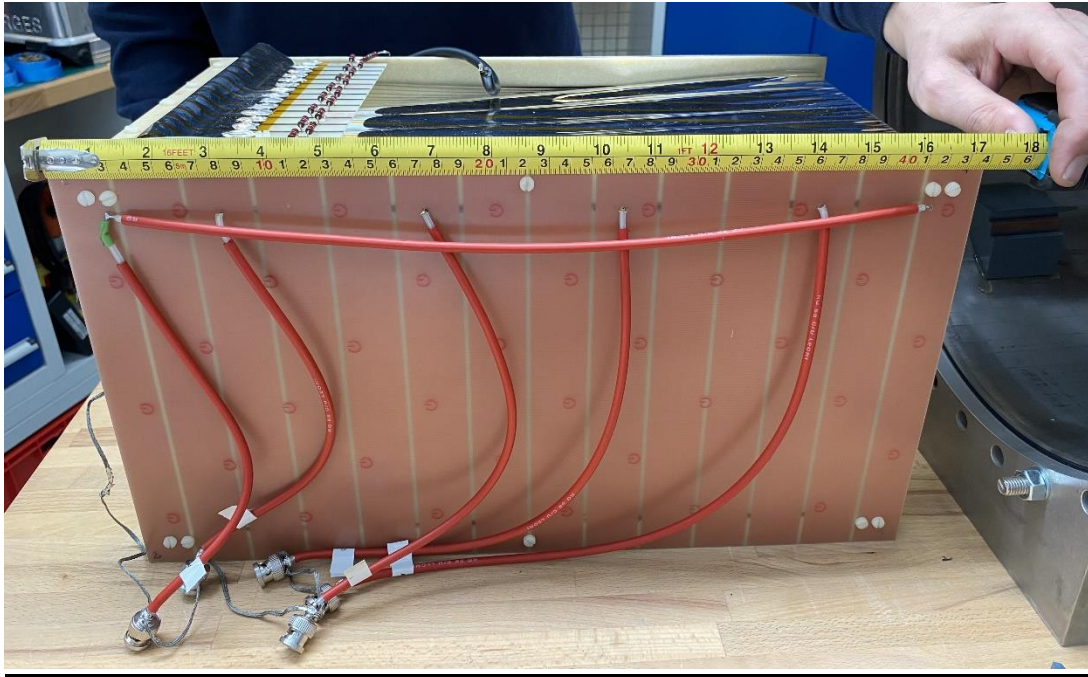
## Old and prototype MUSICs test-2023

The cylindrical MUSICs are old multisampling ionization chambers with 4 anodes, operated with P10 gas at room temperature and atmospheric pressure as a counting gas. The field homogenization is similar to TUM MUSIC. The readout of anode signals was through the charge-sensitive preamplifiers (tested and documented in another pdf file). The other testing details are as follows:

Material	length
Protection for MUSIC	3.14
Air	16.86 mm
Mylar foil, aluminium coated	27 $\mu\text{m}$
Air (in chamber housing)	15 mm



**Figure 1:** Different geometrical measurements of old MUSIC.



**Figure 2:** View of all the anode connections.

### **Geometry:**

Size of the cylindrical MUSIC: 574 mm x 415 mm

Active area: 440 mm x 200 mm

Anode wire thickness: 48  $\mu\text{m}$

### **Testing with alpha-source:**

Alpha source for testing; source details are as follows:

Am-241, Cm-244, and Pu-239 (weak source)

Activity: a few tens decay per second

Source diameter (circular) = 25 mm, thickness = 0.5 mm

### **High voltage for MUSIC:**

High voltage for the anode: +650 V

High voltage of the cathode: -4000 V

Control inside massute (PC with white keyboard):

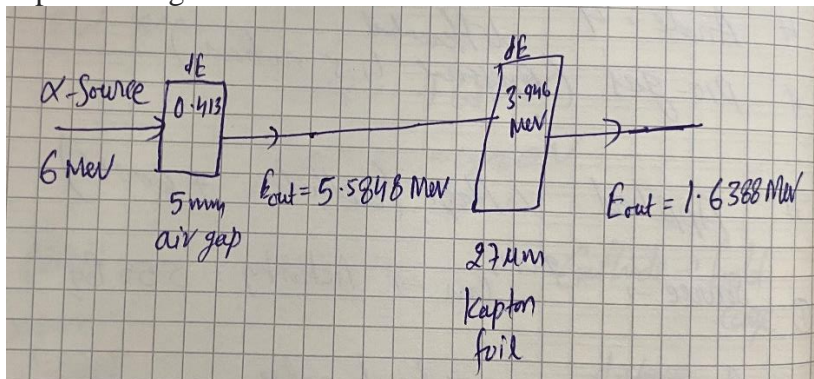
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Password: admin

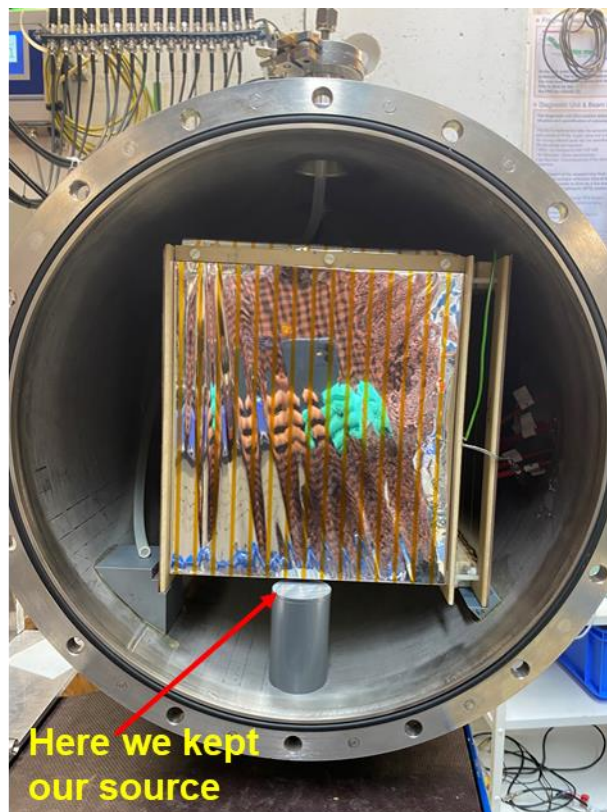
### **Testing steps:**

- Used the arrangement as shown in figure 3.
- We kept the alpha source on the solid cylinder (shown in figure 3), just 5 mm from the mylar or kapton foil, and placed the source on active anode 1.
- Since alpha particles have 6 MeV of energy, the energy loss in 5 mm of air is 0.413 MeV, the  $E_{\text{out}} = 5.5848$  MeV, which goes into kapton foil (27  $\mu\text{m}$ ), and energy loss in

kapton foil is 3.946 MeV. After that, the energy out is 1.6388 MeV, which is deposited in gas on anode 1.

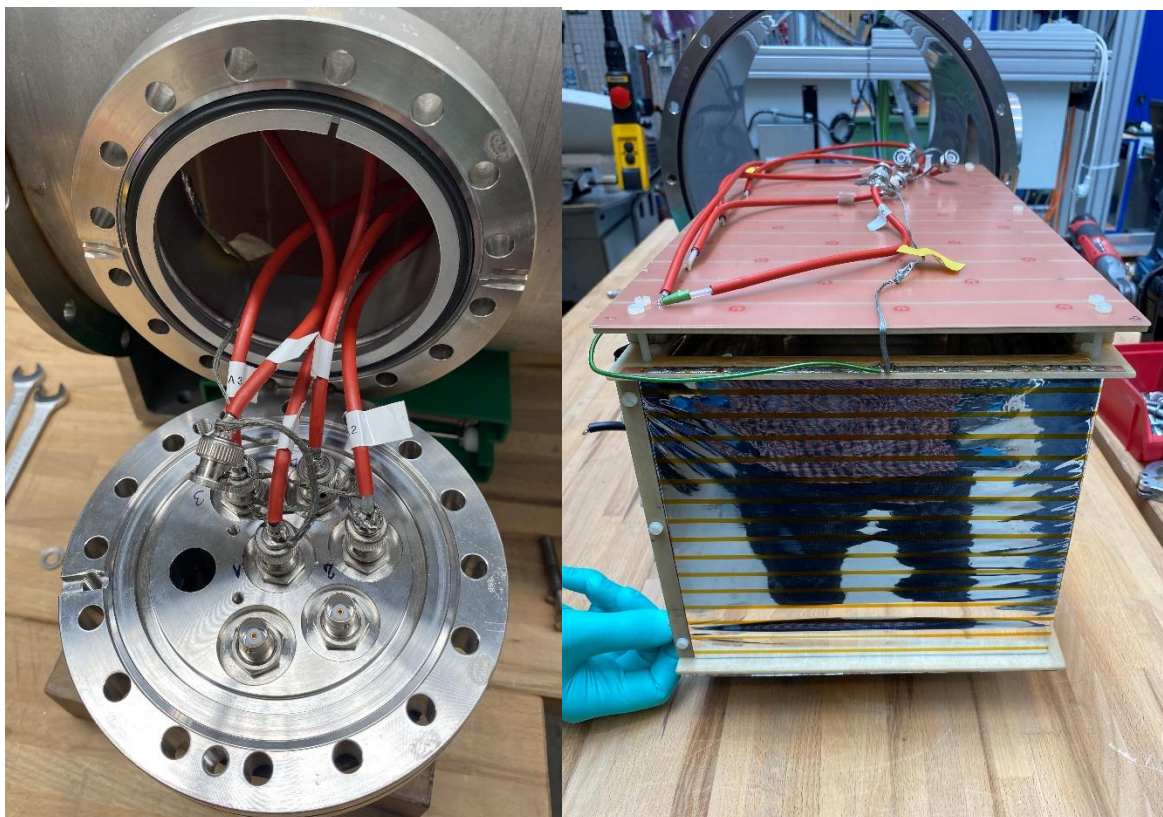


- 
- After that, we closed the MUSIC chamber and connected anode 1 to the preamplifier (detector).
- Provided the power supply to the preamplifier as well.
- Energy out of the preamplifier was seen in the oscilloscope, but we couldn't see any signal.
- Since the energy deposition is low in P10 gas, there may be no signal in the pre-amplifier.



**Figure 3:** Inside view of the old cylindrical MUSIC with alpha source arrangement.





**Figure 4:** Four anodes of the old music (left side) and the active area of the music (right side).



**Figure 5:** Gas supply control for MUSICs.



**Figure 6:** High voltage control (in massute) for MUSICs.

**Prototype MUSIC:**

Active area: 225 mm x 45 mm

Operating voltage: 600 V (Cathode), no anode voltage externally

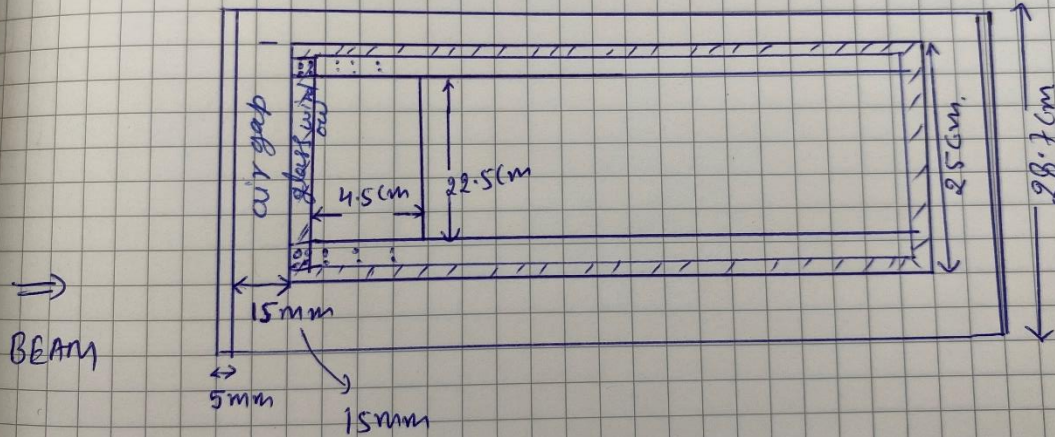
No of anodes: 4



length = 22.5 cm = 225 mm

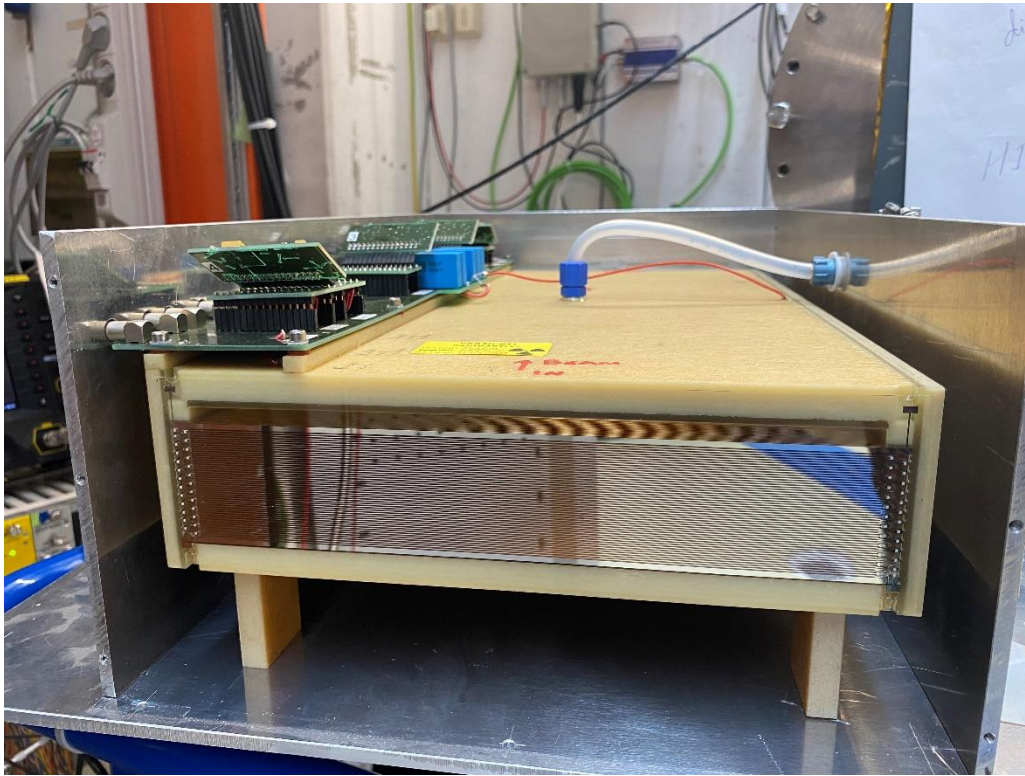
width = 4.5/4.4 cm = 45 mm

Operating voltage = 600 Volt (cathode)  
No anode voltage externally.

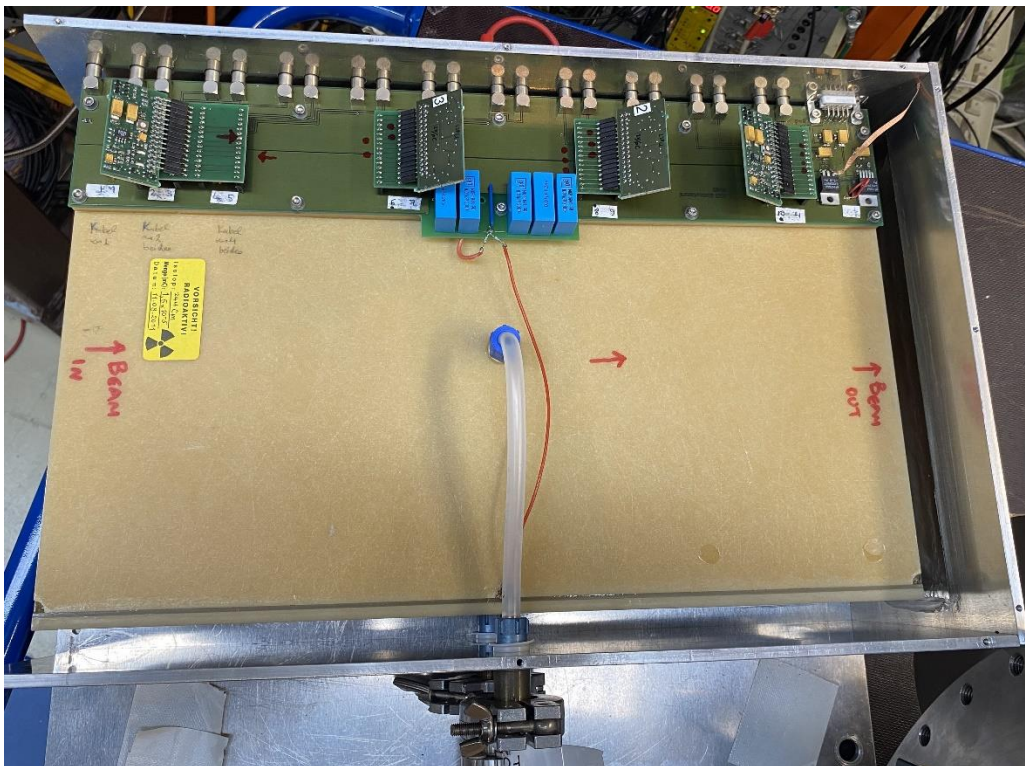


**Figure 1:** Different dimensions for prototype MUSIC.

(a)



(b)



**Figure: 2** (a) Front and (b) top view (inside) of the prototype MUSIC.



Observed signals in oscilloscope from different anodes after pre-amplifiers:

Signal amplitude = 26 mV







Note: We will check the energy resolution in the upcoming engineering run.

**Miscellaneous:** Different pictures of old and prototype MUSIC:



