A MICROMEGAS detector for ²²²Rn emanations measurements



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Motivation

• Measure Radon emanations of materials with a high sensitivity detector.

• Electrostatic collection of Radon daughters in the detector cathode.

• MICROMEGAS detectors are intrinsically



radiopure.

• Track reconstruction of α and event discrimination.



Results

Good energy resolution and stable gain; first measurements with a ²²²Rn source



Detection efficiency:

Activity of ²¹⁸Po : $A'_{218Po} = \epsilon_D \times \epsilon_{218Po} \times A_{222}Rn$ Activity of ²¹⁴Po: $A'_{214Po} = A'_{218Po} + \epsilon_D \times \epsilon_{214Po} \times (1 - \epsilon_{218Po}) \times A_{222Rn}$ Efficiency of ²¹⁸Po : ϵ_{218} Po Detector efficiency : $\epsilon_D \simeq 0.5$ Efficiency of ²¹⁴Po : $\epsilon_{214}Po$ Activity of ²²²Rn source : $A_{222}Rn = 72 \pm 5Bq$

Diffusion of ²²²Rn in the detection volume, measuring the efficiency with different cathode voltages.

Conclusions and prospects

• The ²²²Rn detector has been characterized with different cathode voltages obtaining a good performance.

• The detection efficiency



Cuts • Energy proportional to the α length. • All α's inside the detector, starting in the center (mylar cathode) and without pixels activated in the border





has been measured obtaining good results $\varepsilon_{218Po} \geq 0.20$

• Measure the background to calculate the sensitivity of the detector with the aim of a minimum detectable activity of 100 µBq.

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