Measurement of the β-delayed α spectrum of ^{16}N with a new technique (2)

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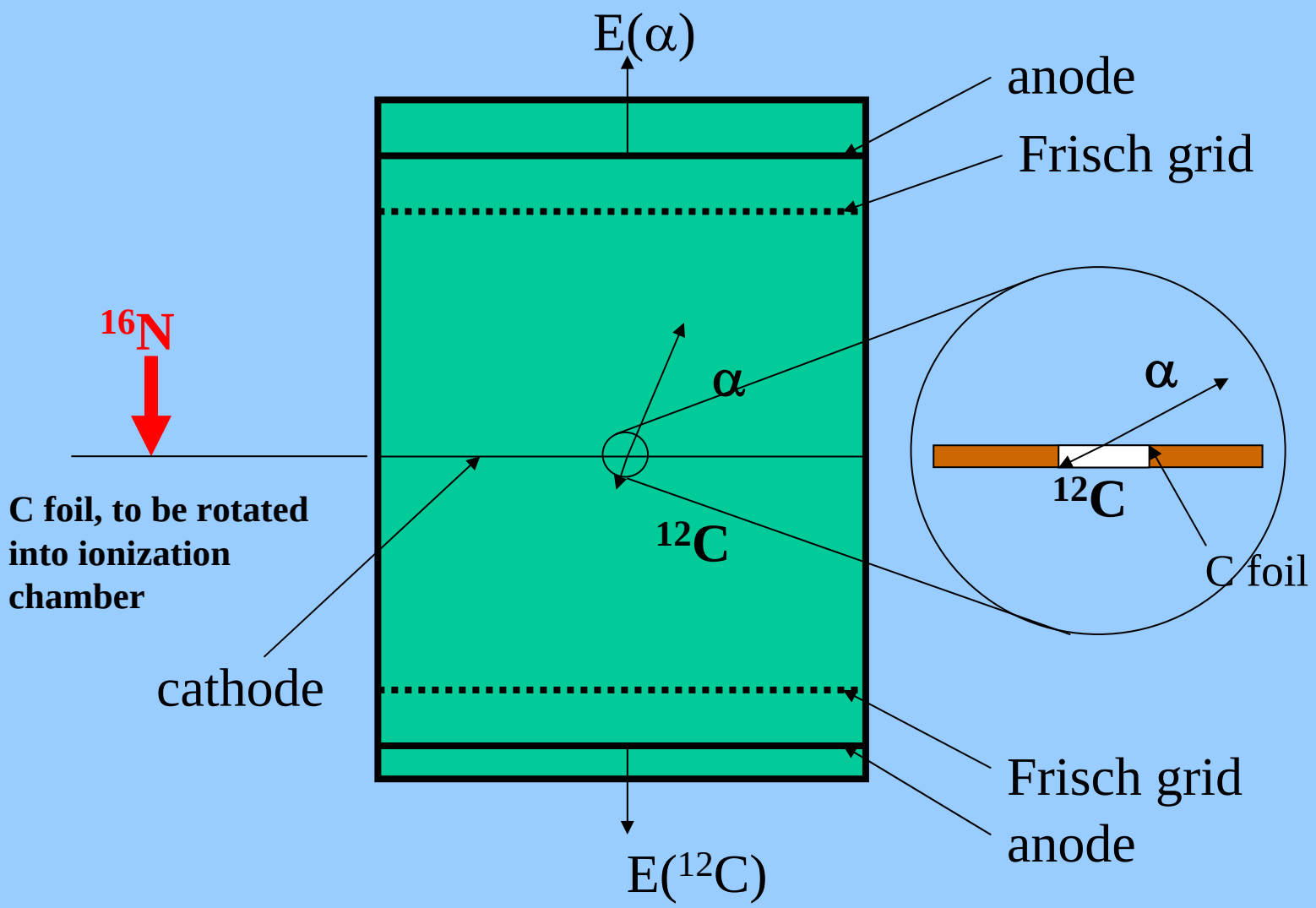
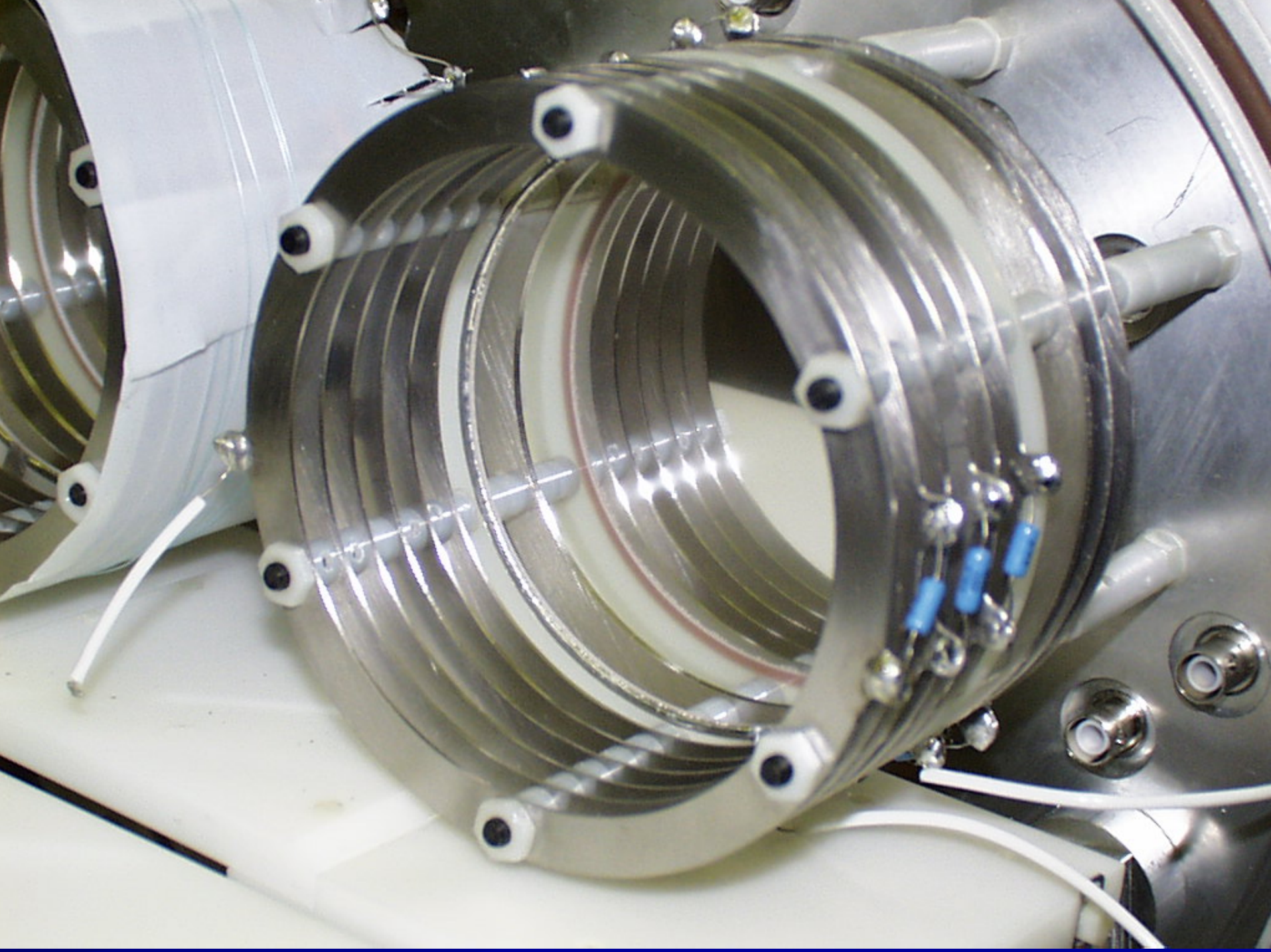
Outline

- Twin-Ionization Chamber
- Data analysis of ^{16}N β-delayed α decay
- Preliminary results

Twin-Ionization Chamber

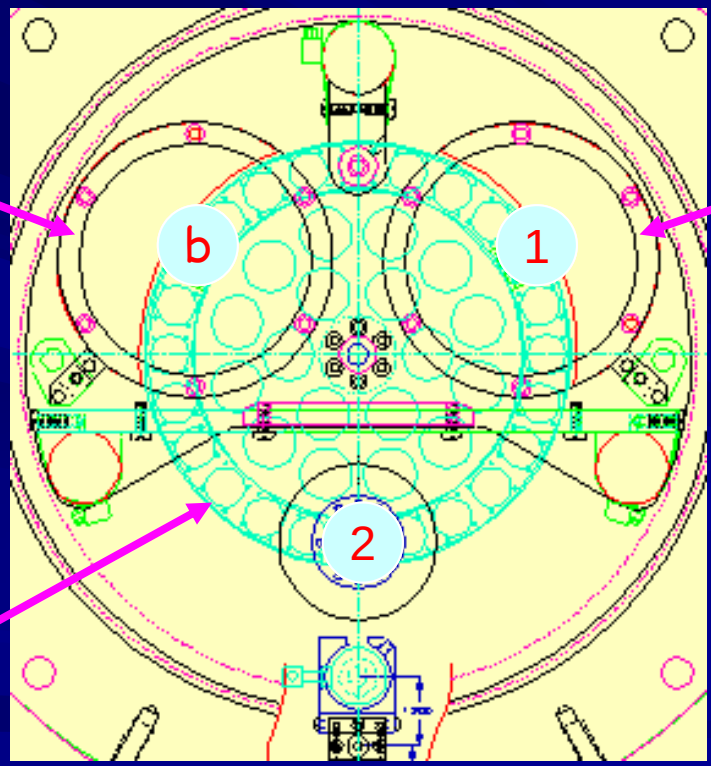




Measure the α spectrum

Left Ion Chamber pair

Right Ion Chamber pair

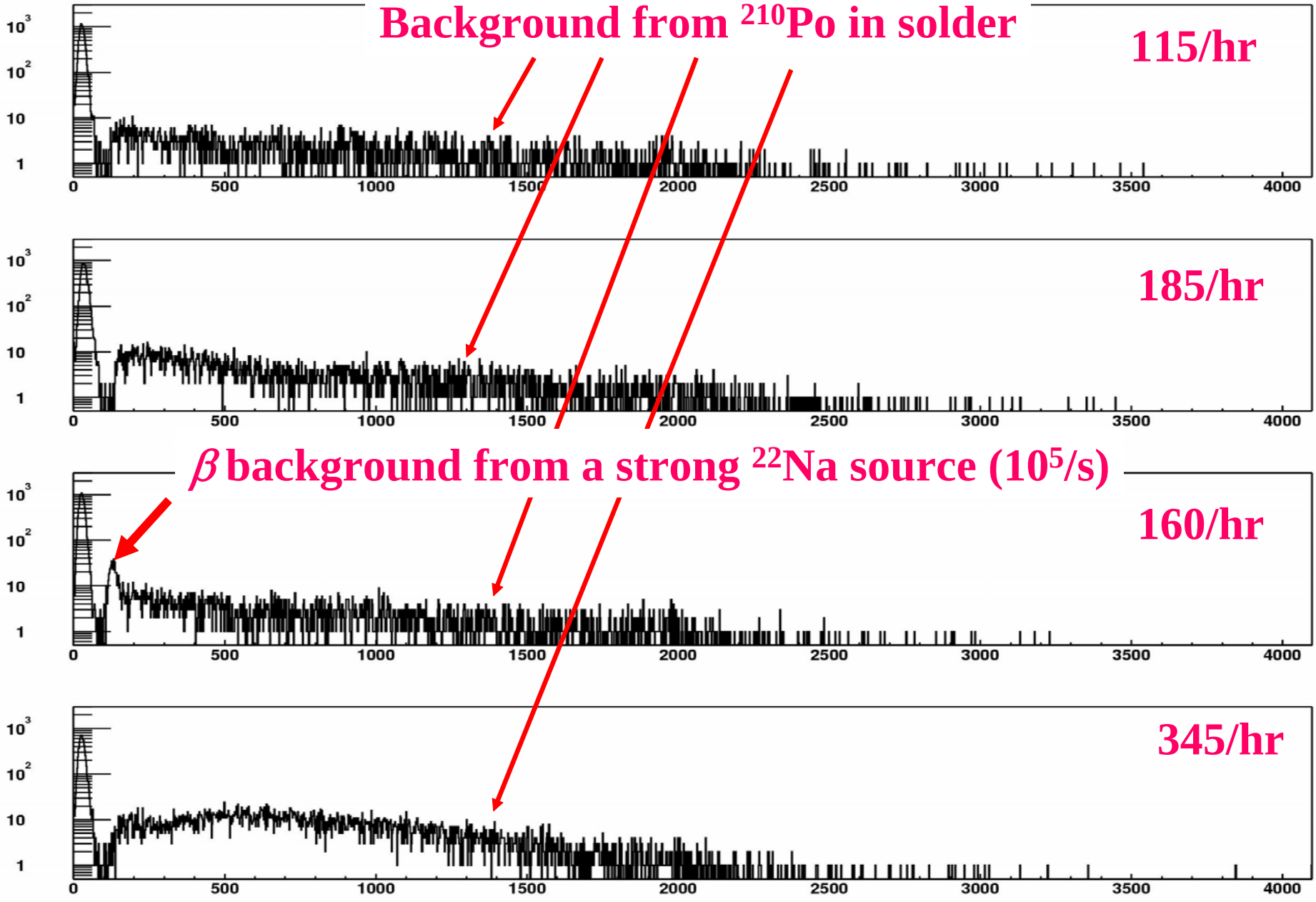


Wheel

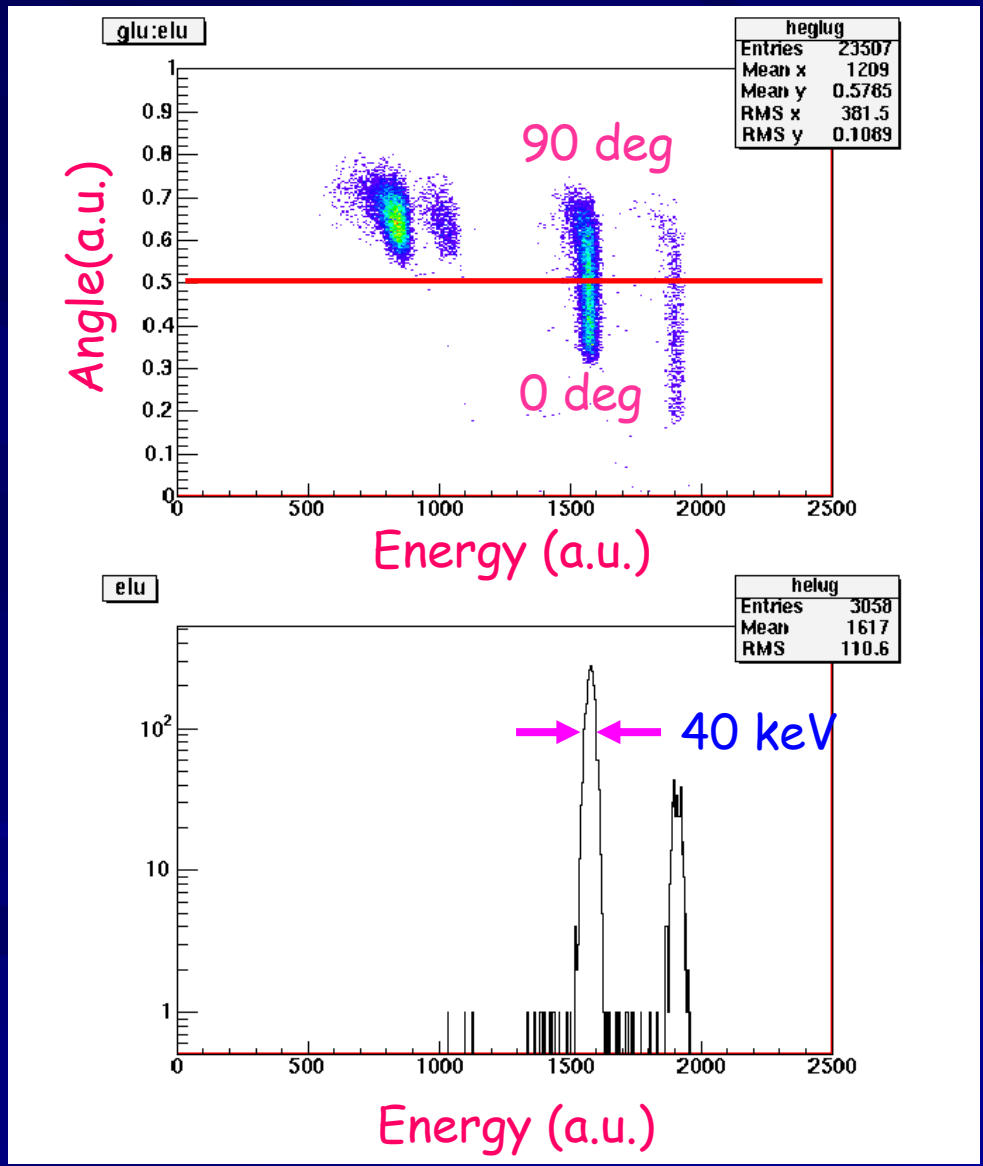
Advantages of our experiment

- No contamination from ^{17,18}N
- Choose the thickness exactly as needed.
- This limits β sensitivity to minimum.
- No radiation damage
- Available with large areas
- Improved homogeneity
- No dead layer
- Smaller pulse height defects

Different technique, different systematic uncertainty, similar statistics


Background from ^{210}Po in solder
115/hr
185/hr
β background from a strong ^{22}Na source (10^5/s)
160/hr
345/hr
10^3
10^2
10
1
0
500
1000
1500
2000
2500
3000
3500
4000

Detector Calibration

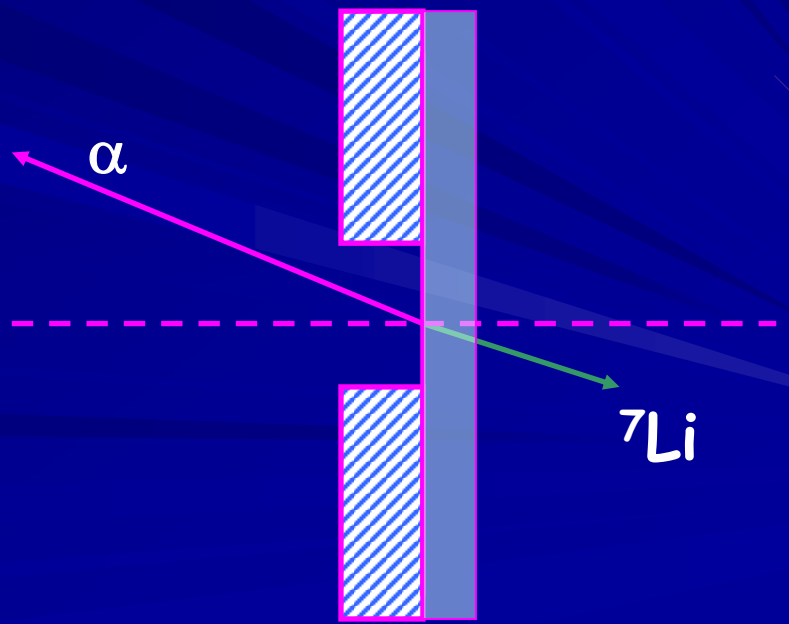


$^{10}B(n,\alpha)^{7}Li$

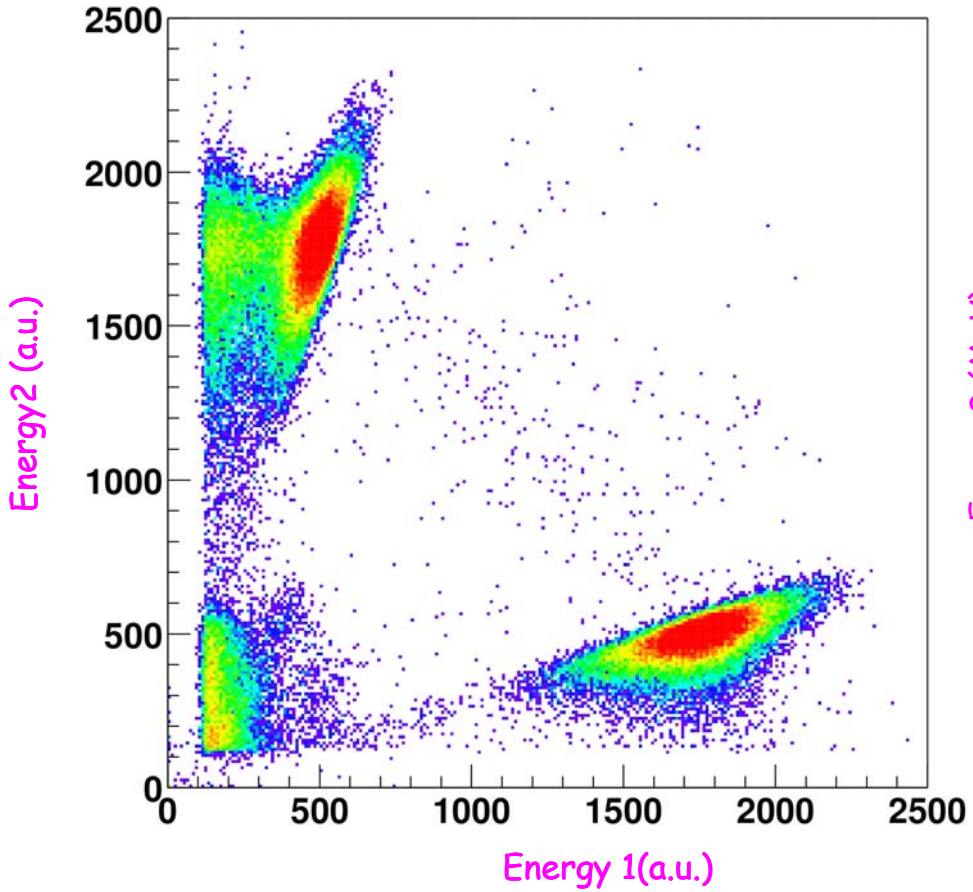
($10\mu g/cm^2$ ^{10}B on $10\mu g/cm^2$ ^{12}C)

$E\alpha 0 = 1.7891$ MeV

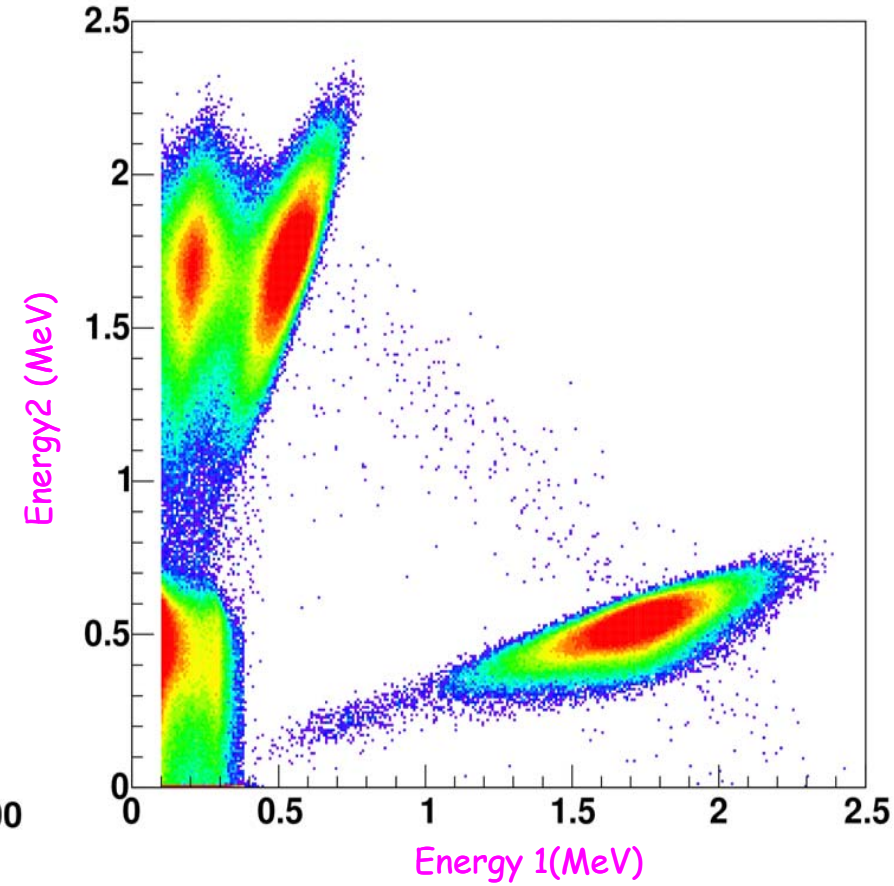
$E\alpha 1 = 1.4832$ MeV

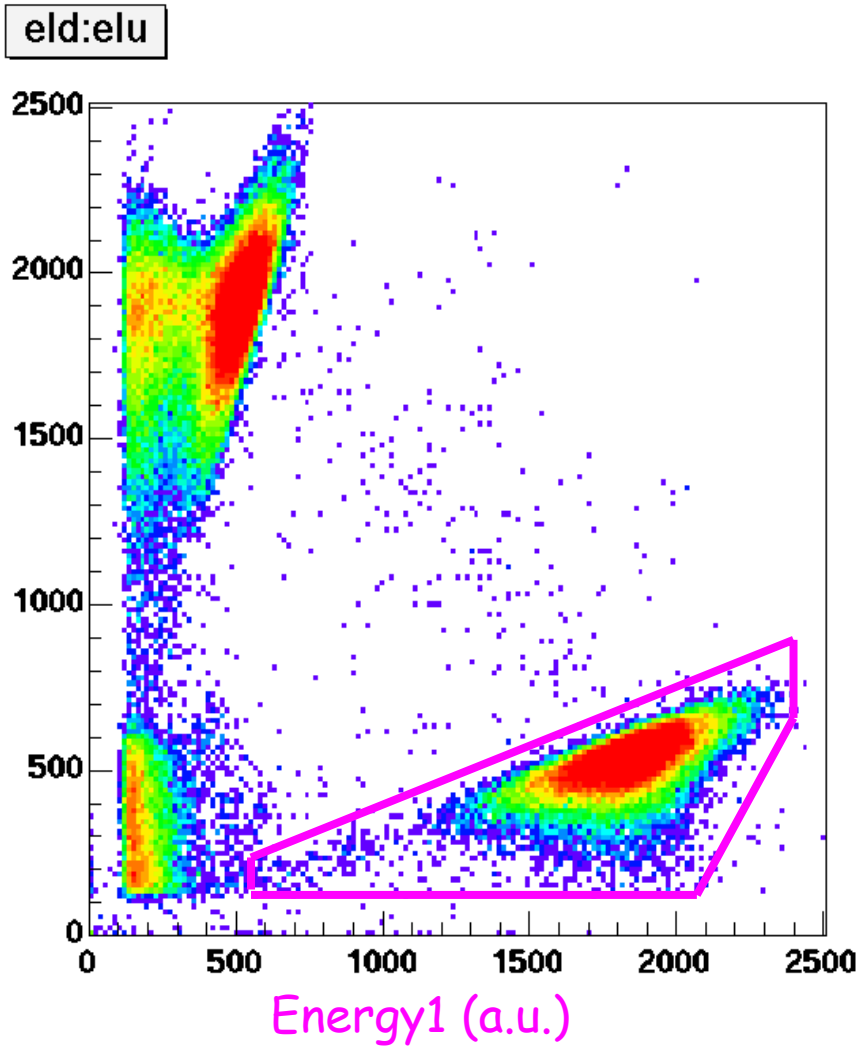


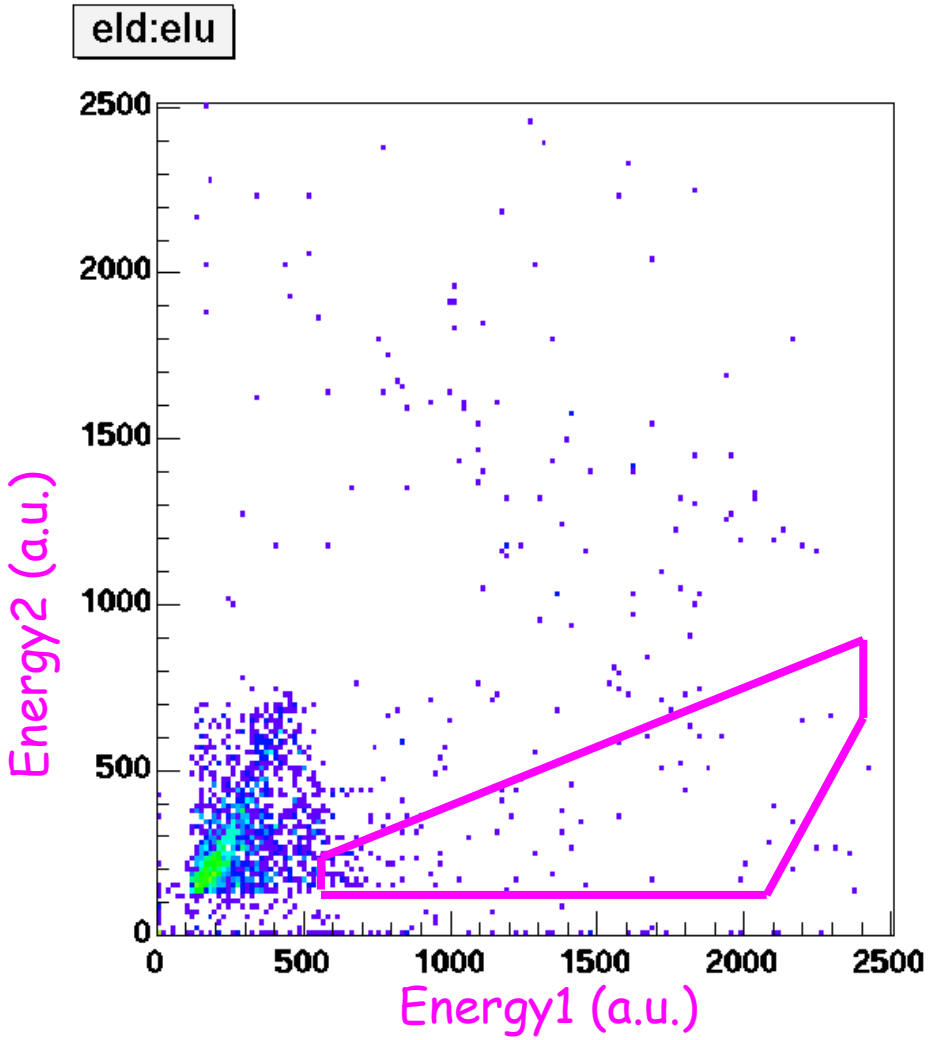
^{12}C-α coincidence



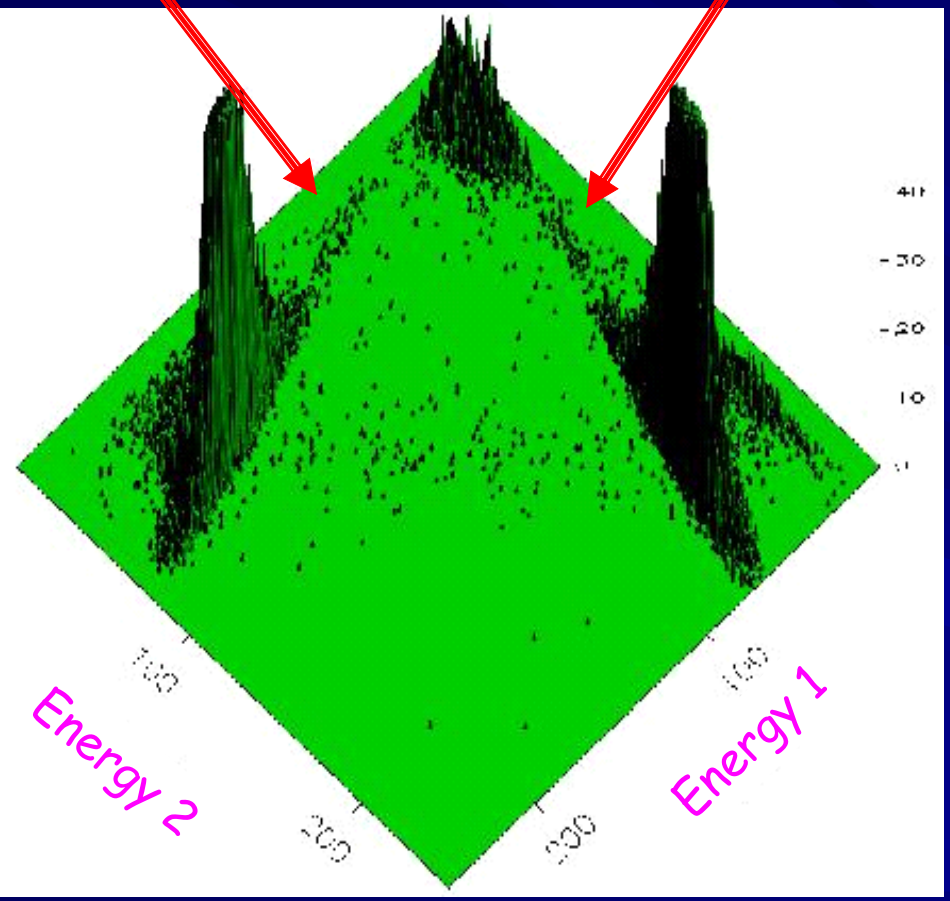
simulation

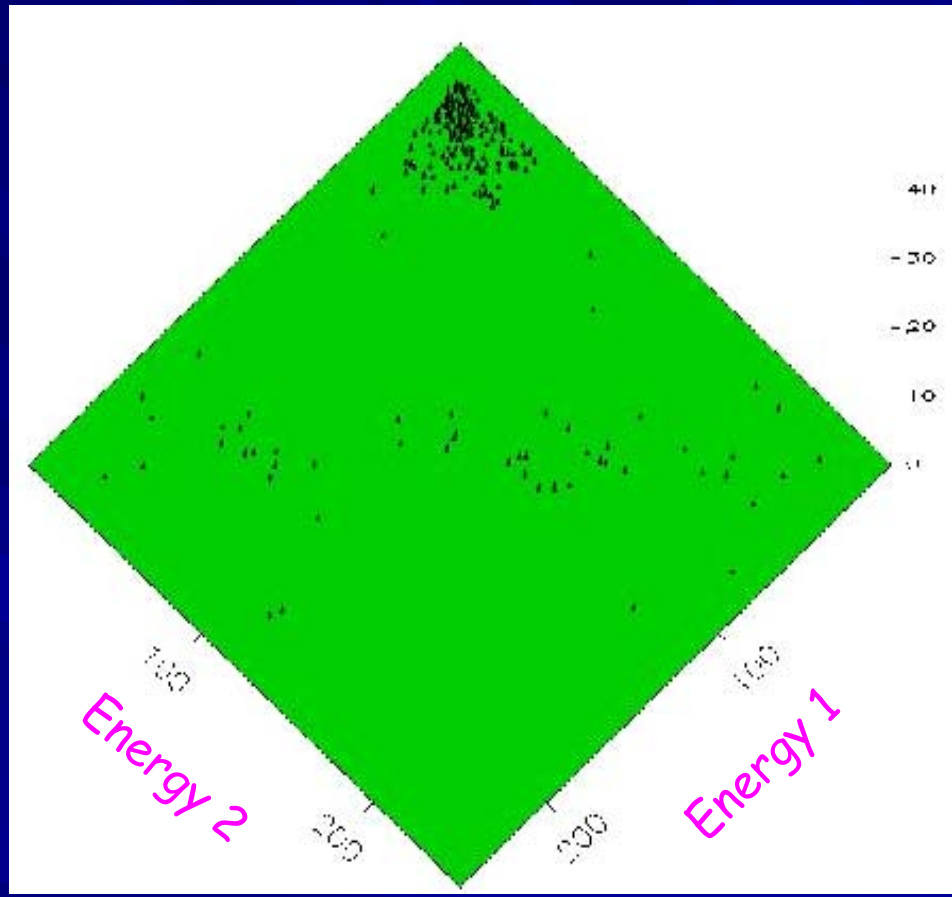




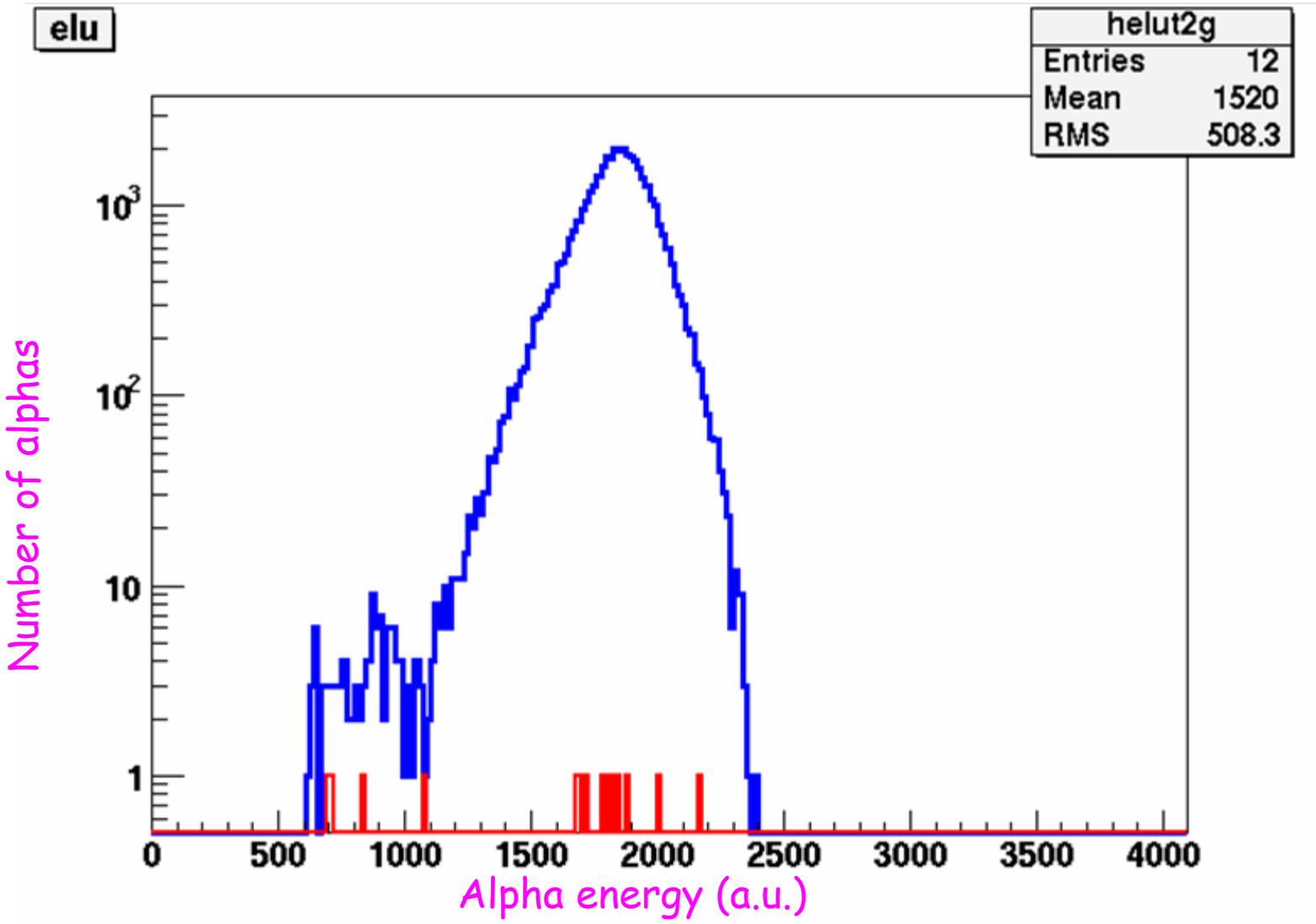


E(alpha) = 3 *E(^{12}C)





After cutting in energy vs. angle,


elu
helut2g
Entries 12
Mean 1520
RMS 508.3
Number of alphas
10^3
10^2
10
1
0
500
1000
1500
2000
2500
3000
3500
4000
Alpha energy (a.u.)

Future Plan

- Improve the beam intensity and capture efficiency to reach 1 million events.

- R-matrix analysis with our alpha spectrum and other latest experimental data from elastic scattering and radiative capture experiments.

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