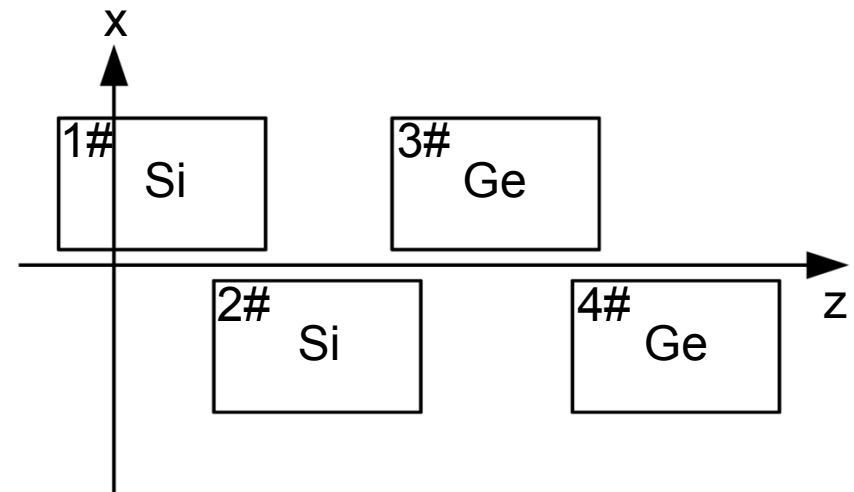
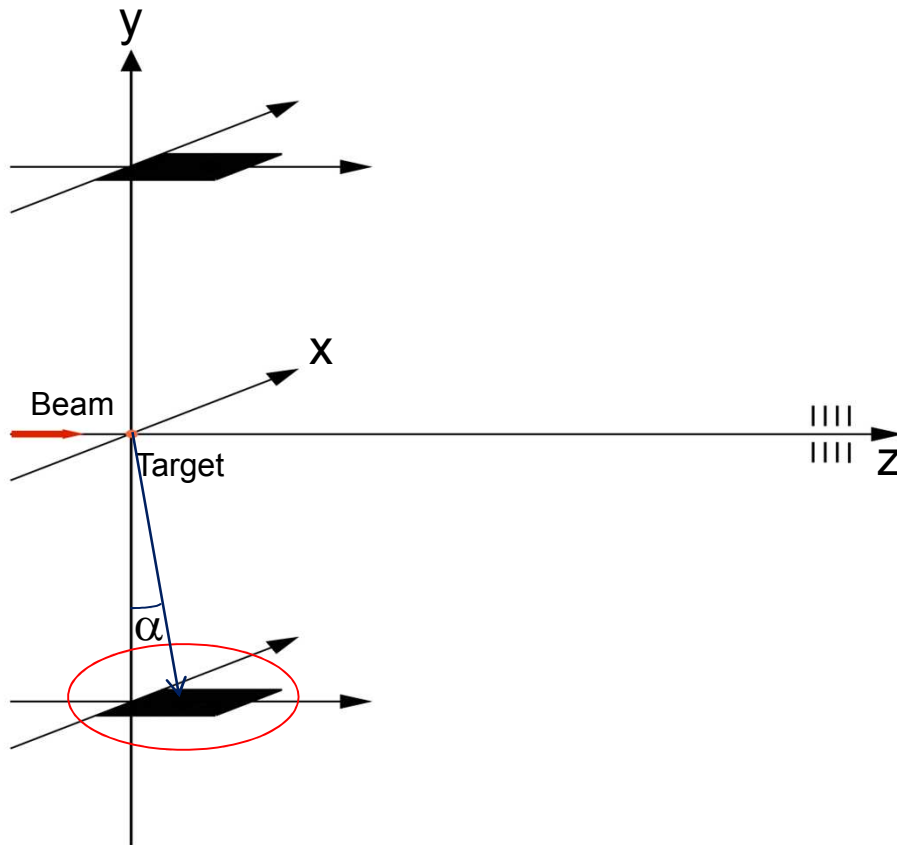




Si Detectors Test of Day-one Experiment Setup

Q.Hu, J. Ritman, H. Xu

Introduction of day-one experiment setup

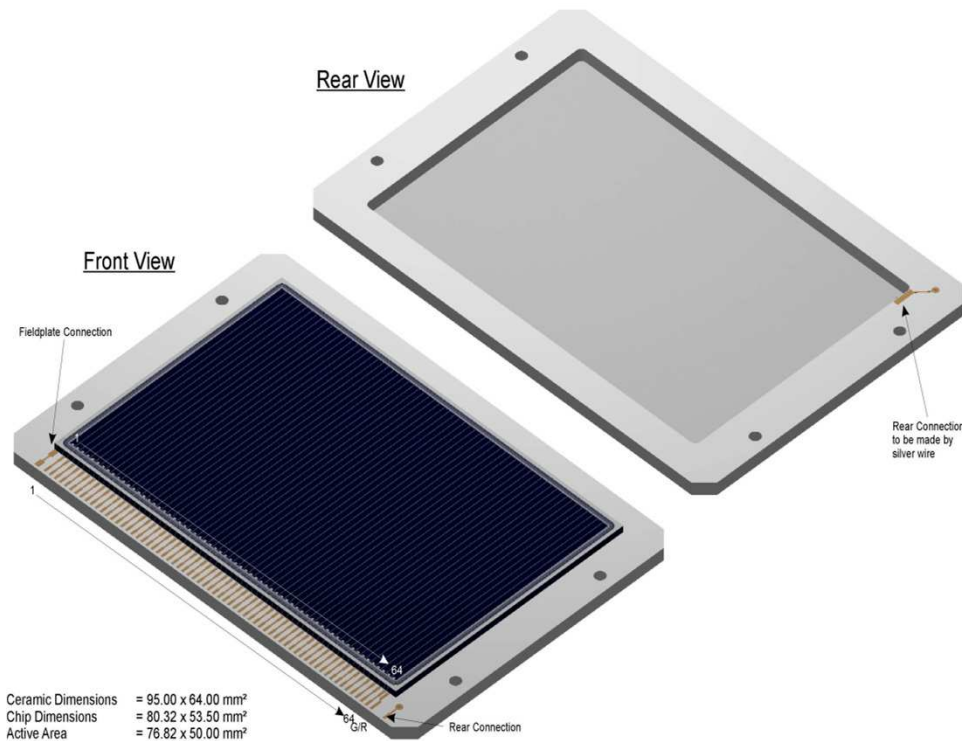


1#, 2#: 76.8 mm*50.0 mm*1.0 mm
 3#, 4#: 80.4 mm*50.0 mm*5.0 (11.0) mm

Single sided
 Pitch:1.2 mm
 Si:400 keV ~ 12 MeV
 Ge:12 MeV ~ 60 MeV

Expected energy resolution: ~ 22.5 keV

Structure of the Si detectors



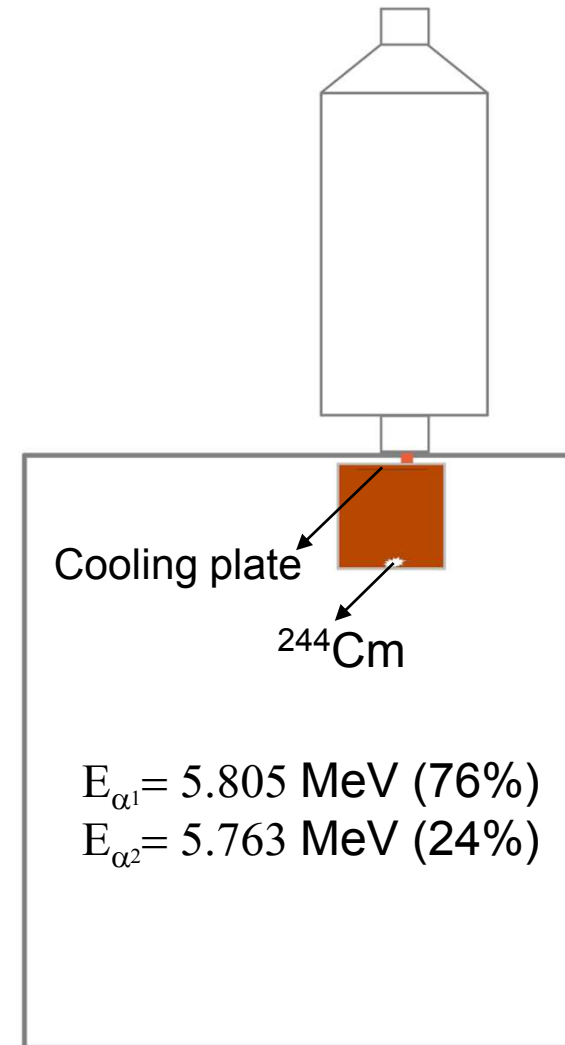
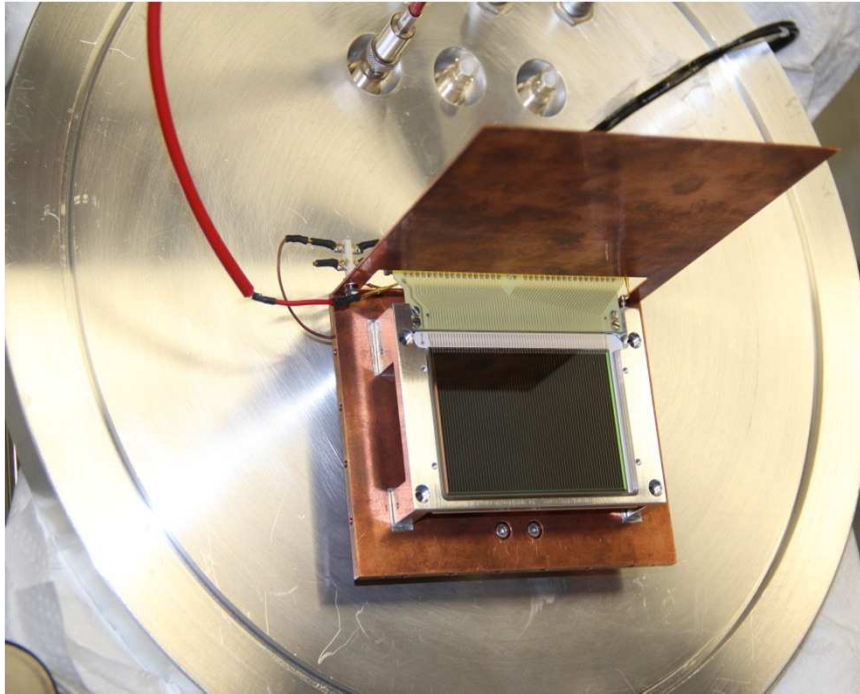
Ceramic Dimensions: 95.00*64.00 mm²
 Chip Dimensions: 80.32*53.50 mm²
 Active Area: 76.82*50.00 mm²

Si_1 (Si_2591-13)
 Thickness: 1043 μm
 Depletion: 65 V

Si_2 (Si_2591-15)
 Thickness: 1045 μm
 Depletion: 52 V

Operating voltage: 200 V (max)
 Dead layer: < 0.1 μm

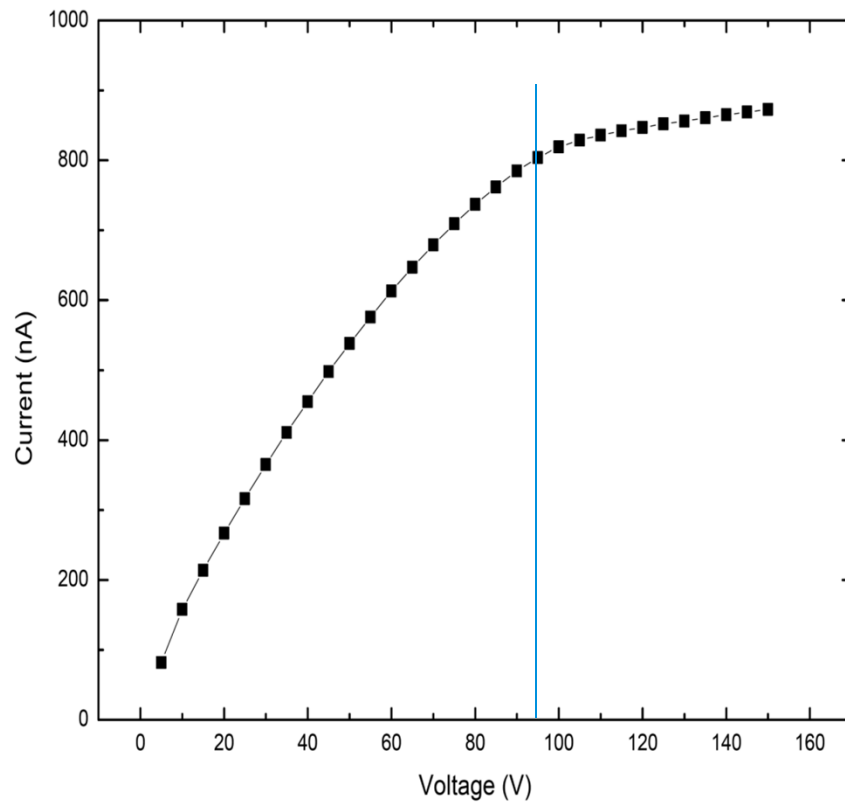
Test setup & conditions



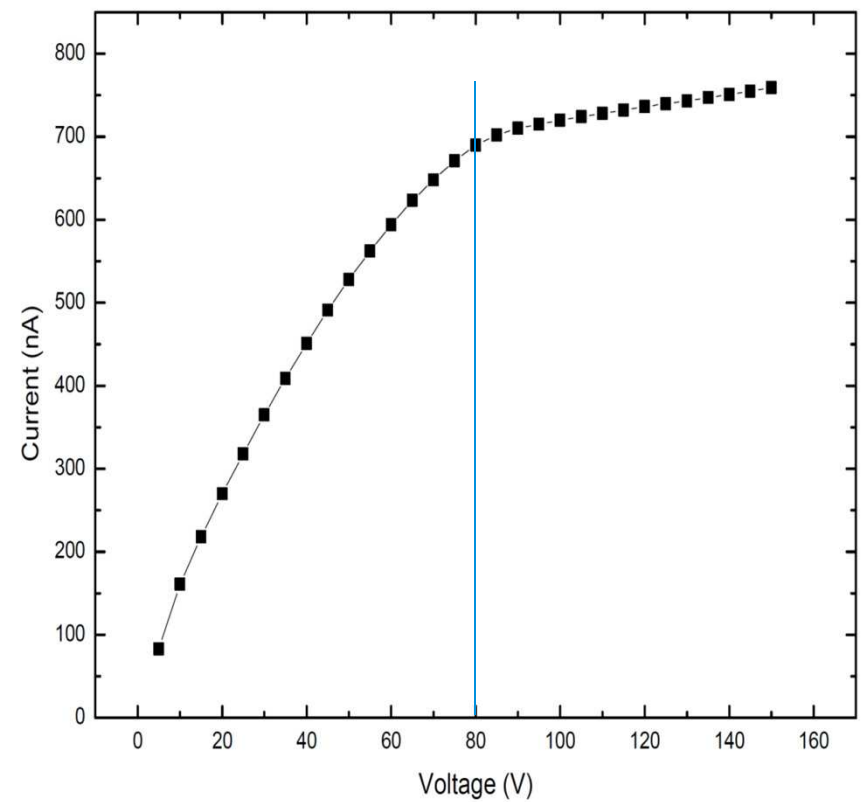
Cooling method: LN_2
Vacuum: $\sim 10^{-7} \text{ mbar}$

V – I curve @ 299 K

Si_1

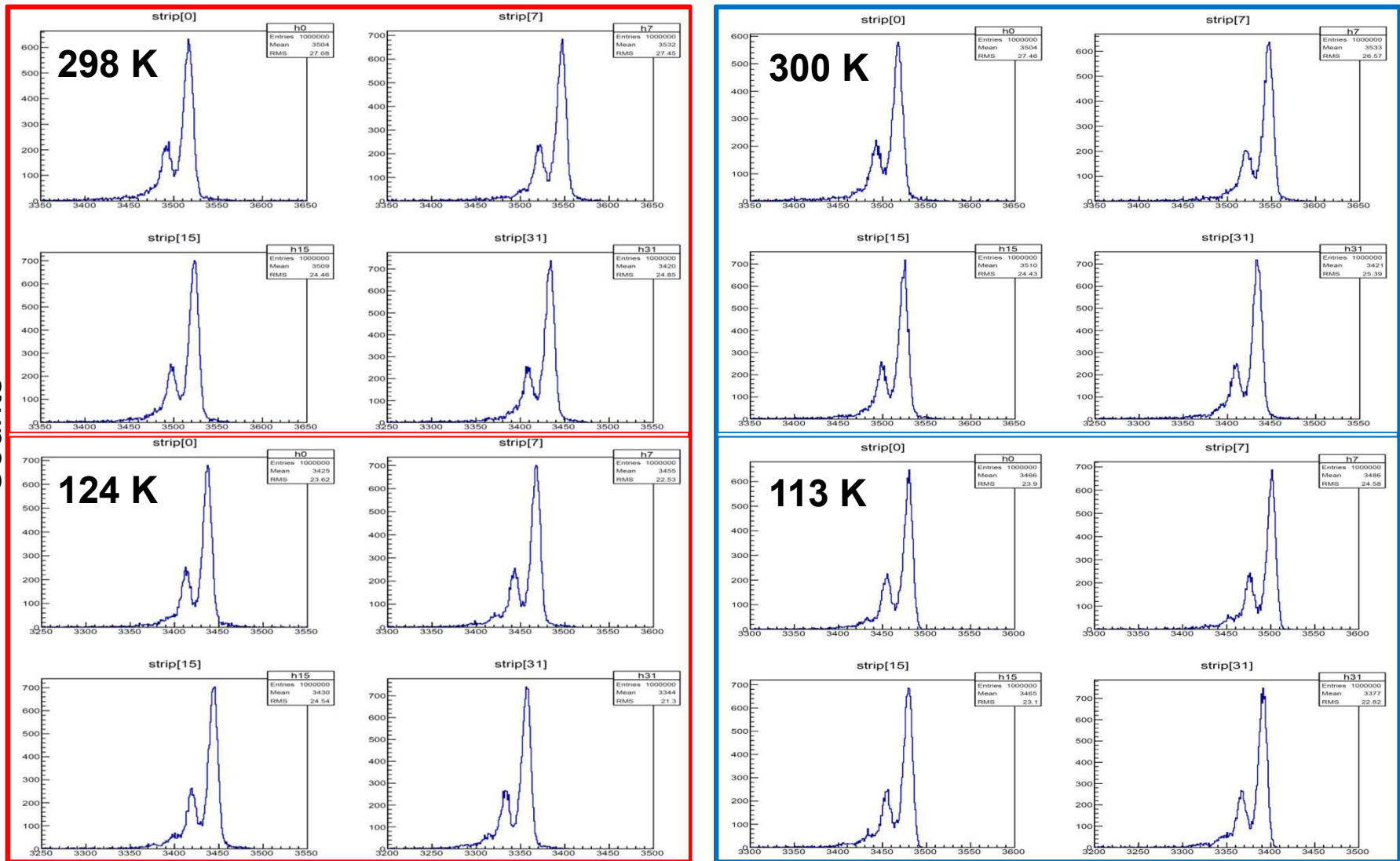


Si_2



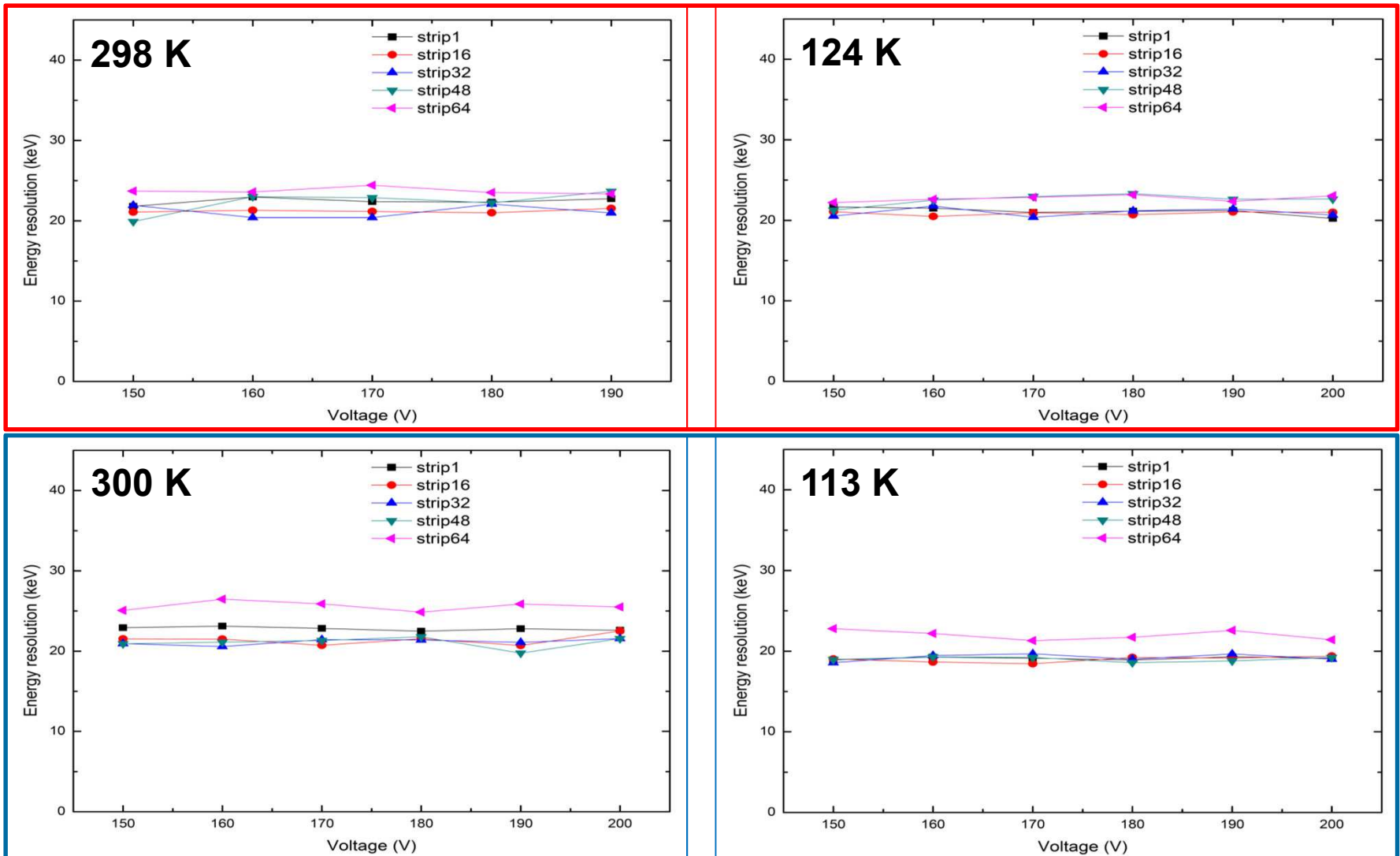
Energy spectra of the front side (Si_1 & Si_2) @ 180 V

Counts



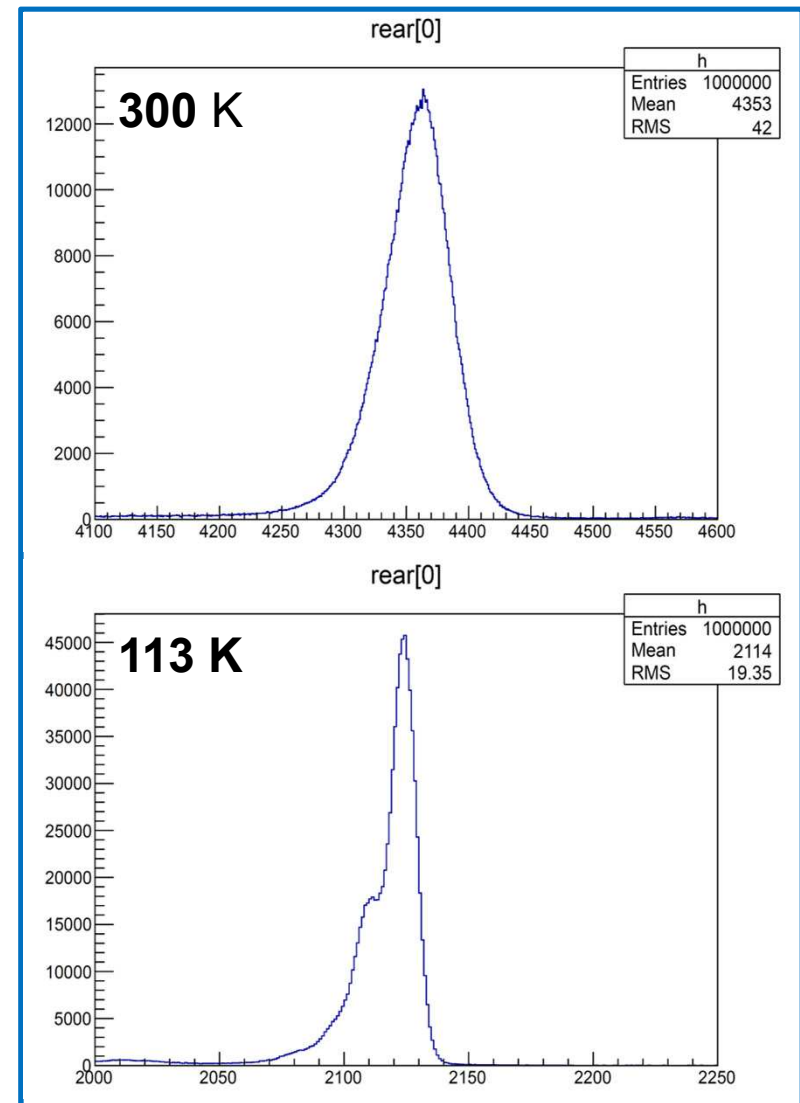
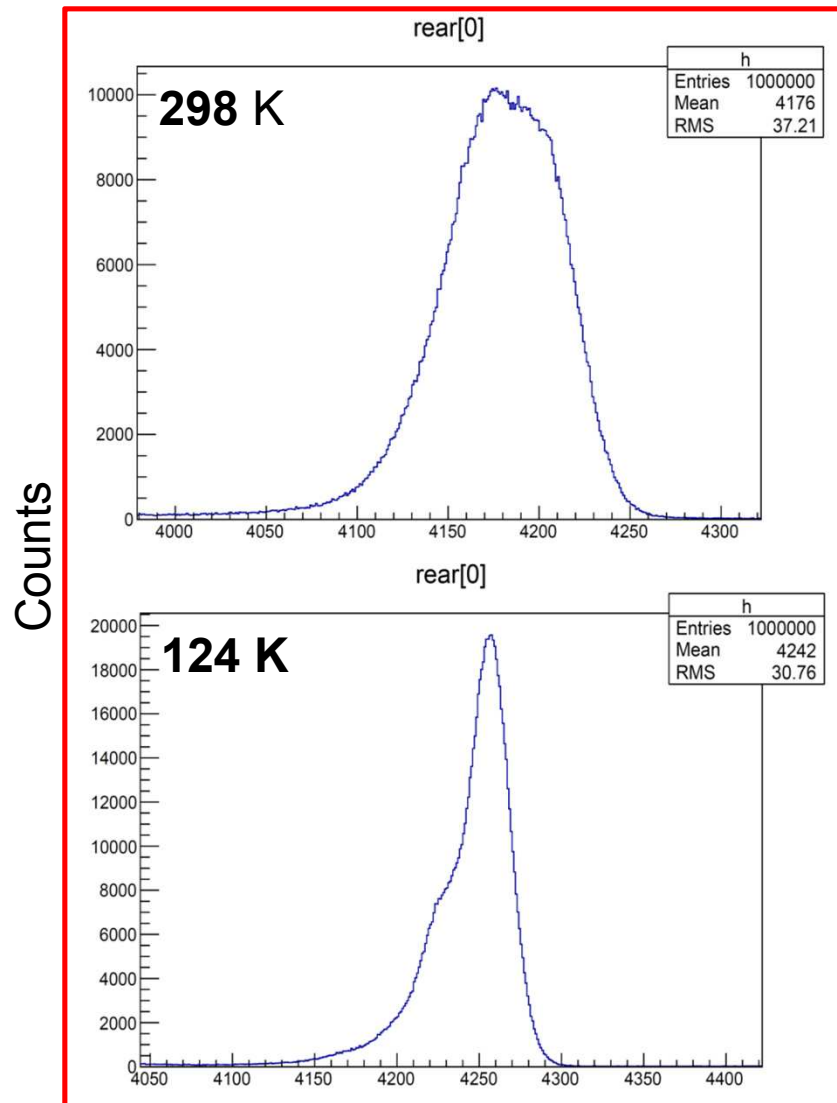
Channel

Energy resolution (FWHM) vs. Voltage (Si_1 & Si_2)



The dead layer has been taken into account.

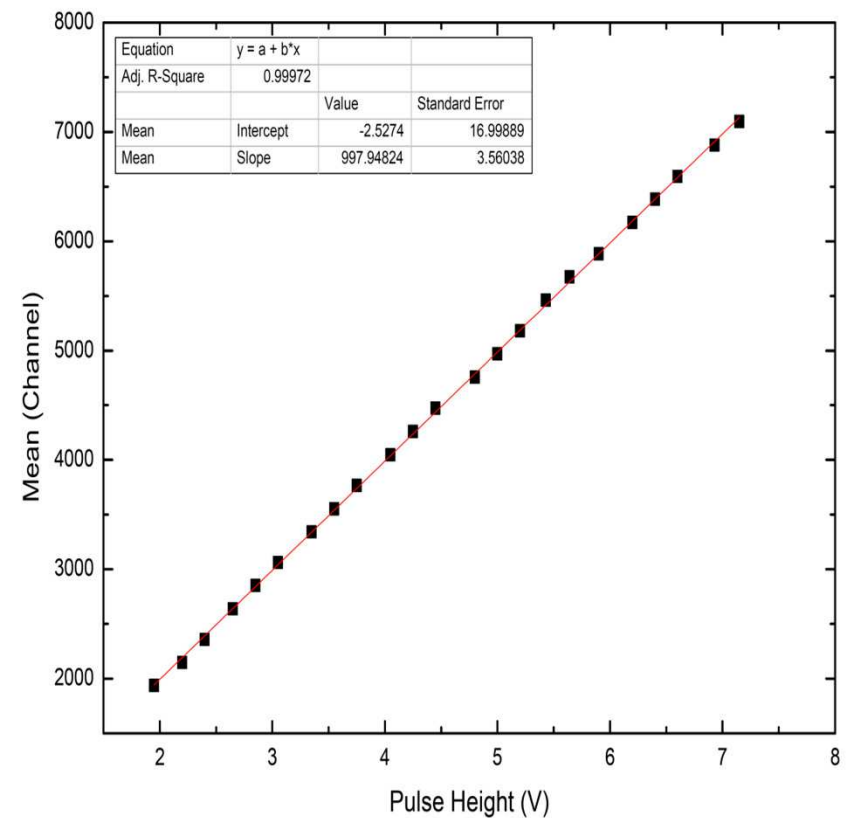
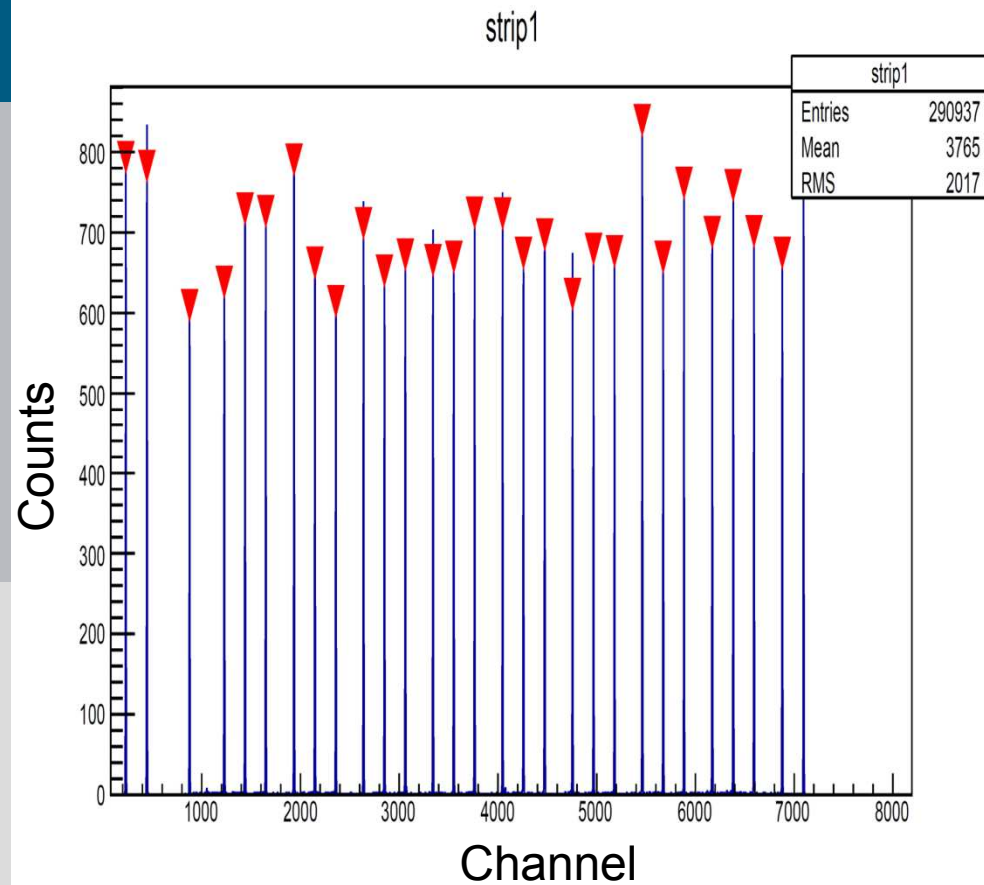
Energy spectra of the rear side (Si_1 & Si_2) @ 180 V



Channel

Calibration study

Pulse Generator: ORTEC Model 419



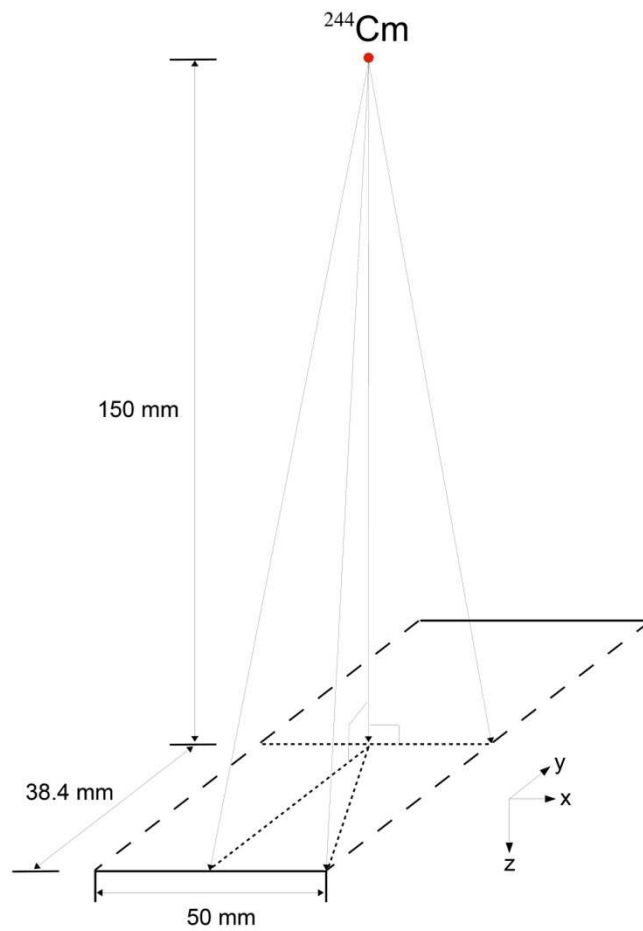
1. Linearity; 2. Pedestal.

Summary

1. The electronics runs well;
2. Si detectors meet our requirement.

Next step

1. Further test for Ge detectors;
2. Energy calibration;
3. Development of temperature controller.



$$E'_{\alpha 1} = E_{\alpha 1} - E_{1_loss}$$

$$E'_{\alpha 2} = E_{\alpha 2} - E_{2_loss}$$

$$FWHM = 2.355 \cdot \sigma \cdot (E'_{\alpha 1} - E'_{\alpha 2}) / (\text{Mean}_1 - \text{Mean}_2)$$