

Weekly meeting

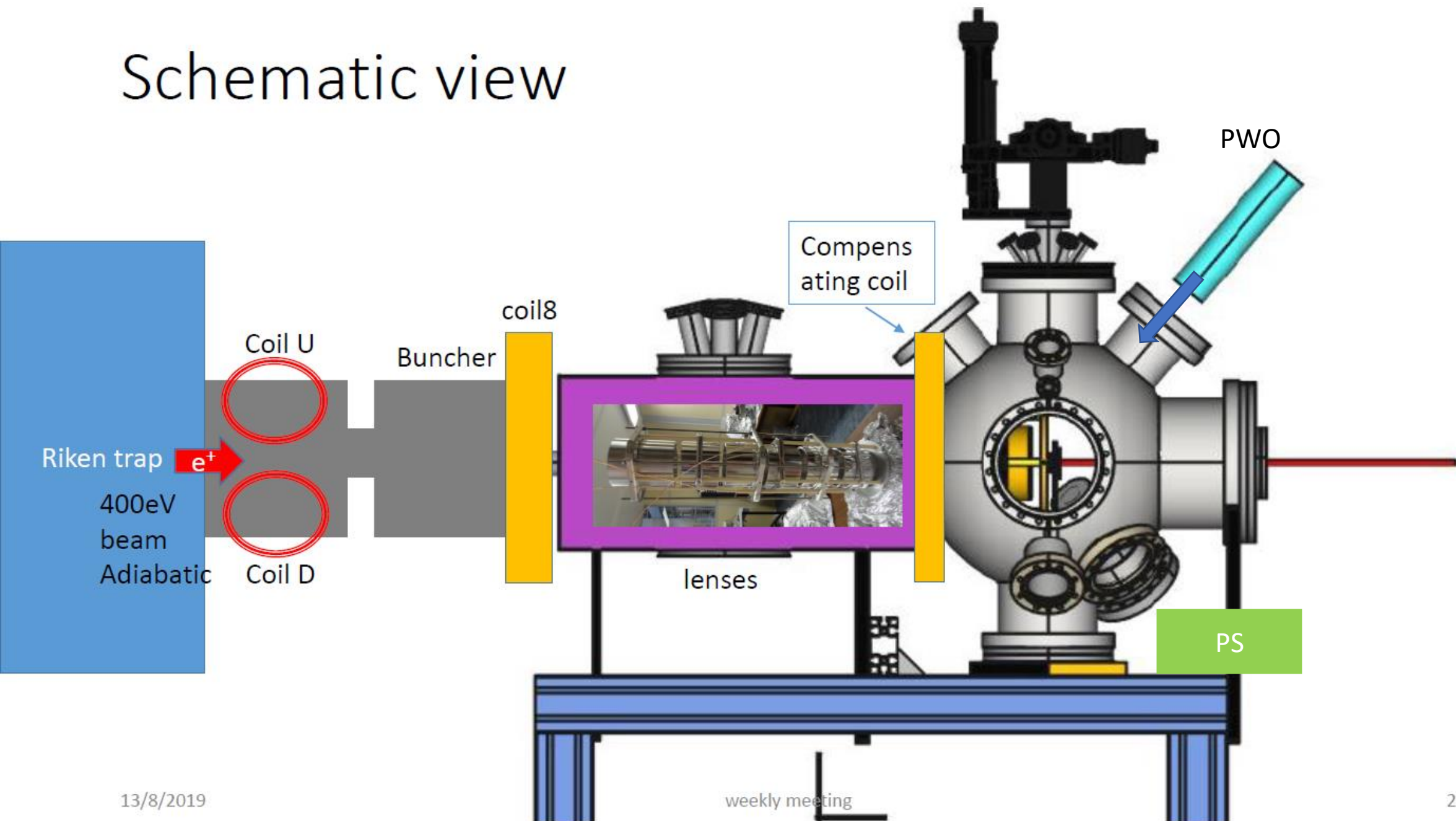
SNU

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Status and to-do-list of the positronium detector

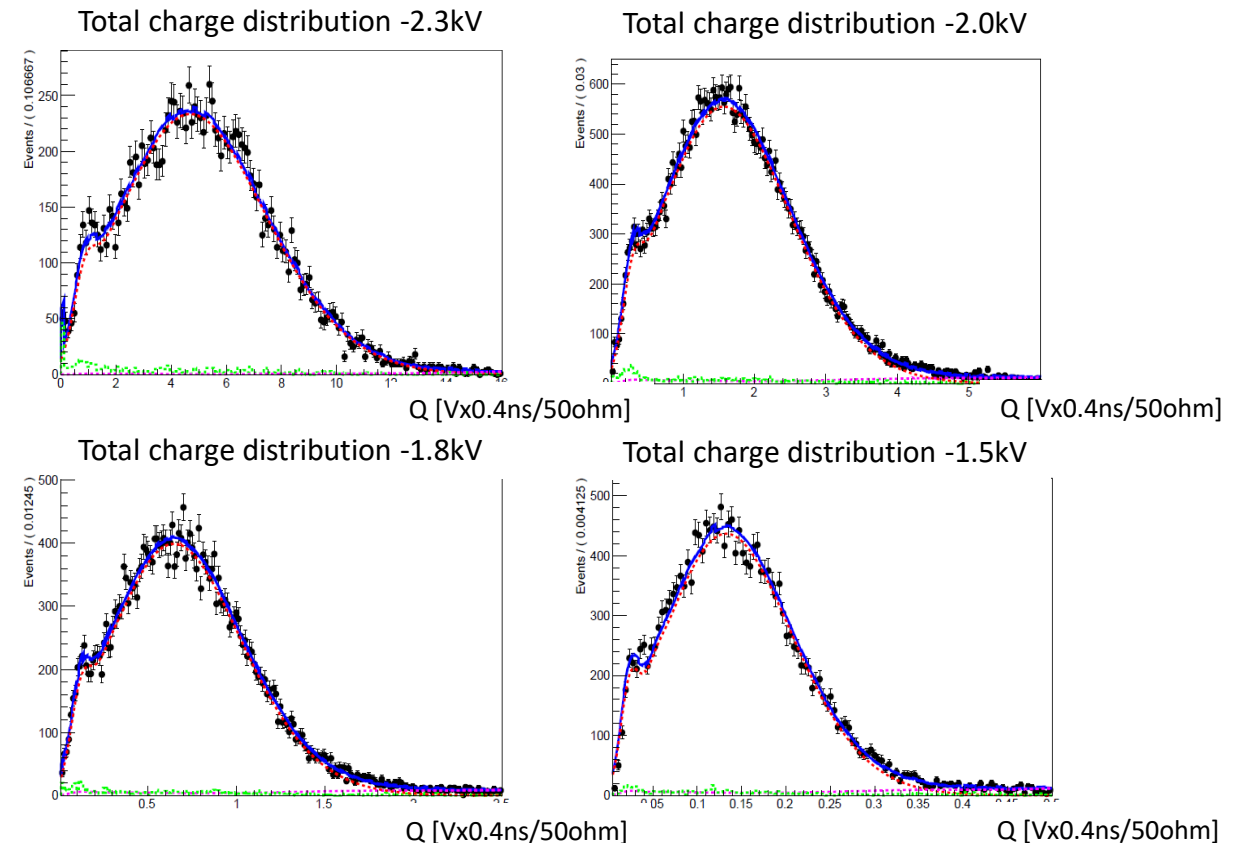
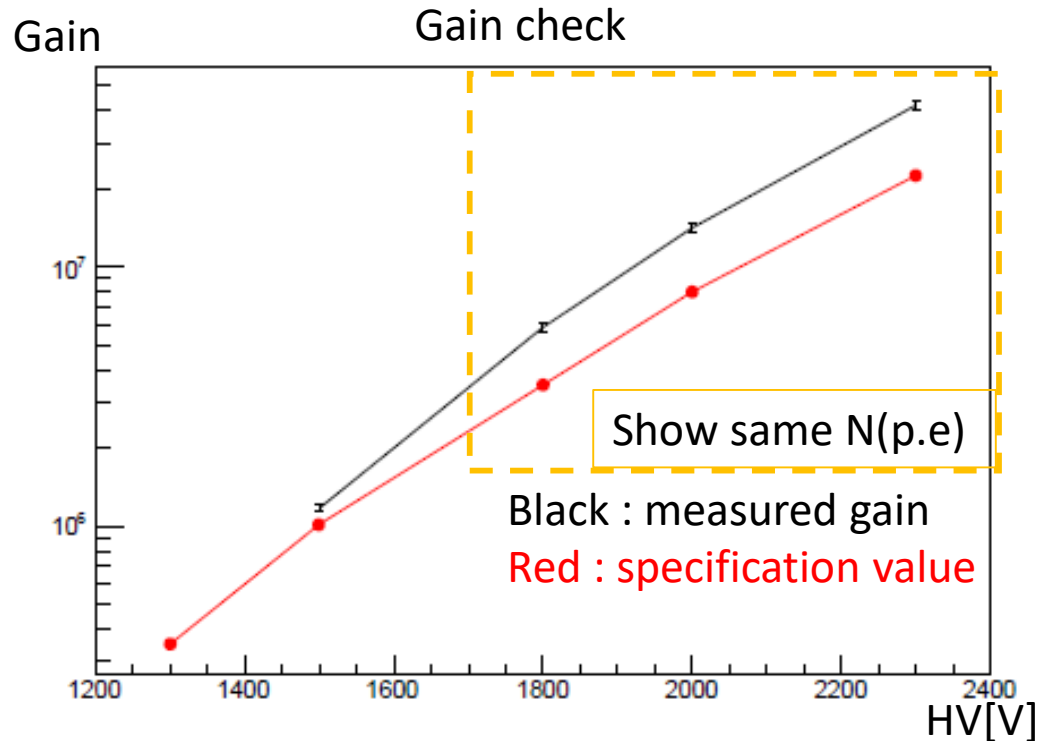
- Gain calibration : 1.5k~2.3k (by ^{22}Na), 1.3k~1.8k (by beam)
← Need more beam test for current data and for less HV values.

Schematic view



Positronium detector calibration

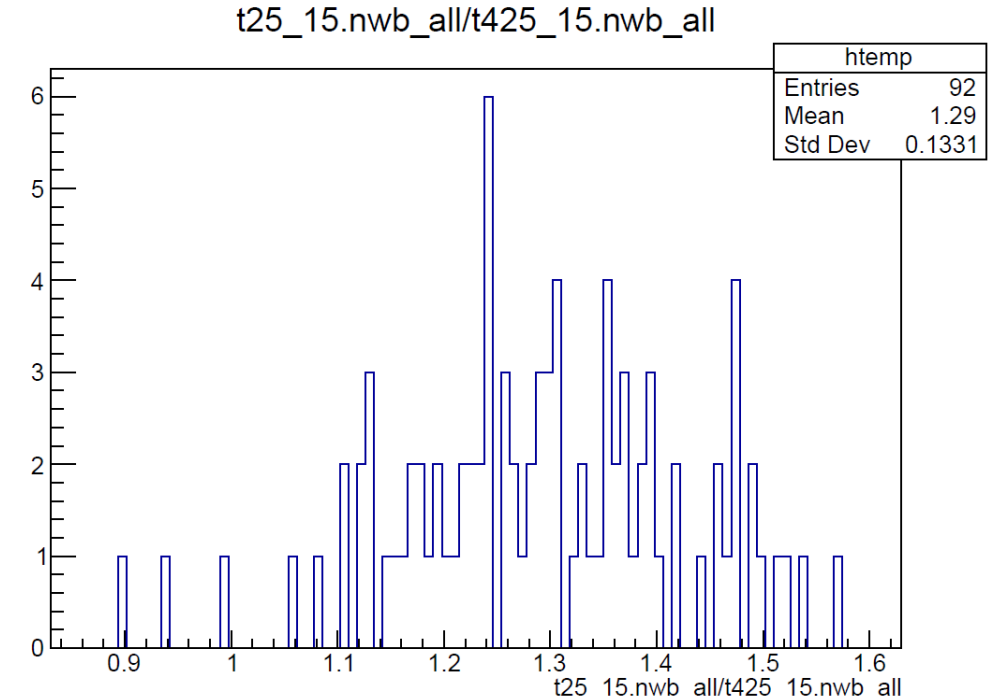
- gain tuning test



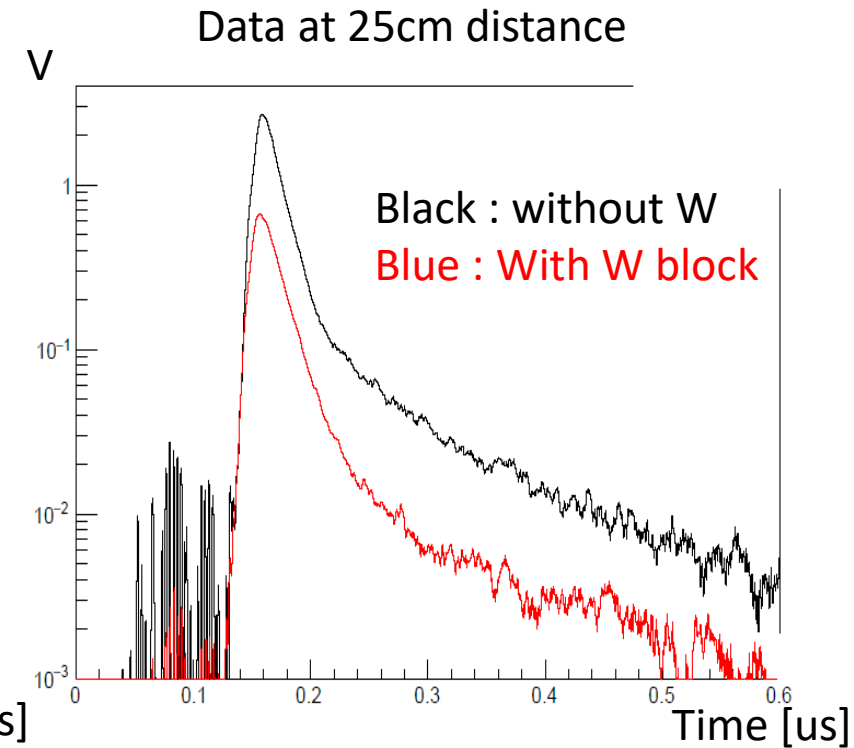
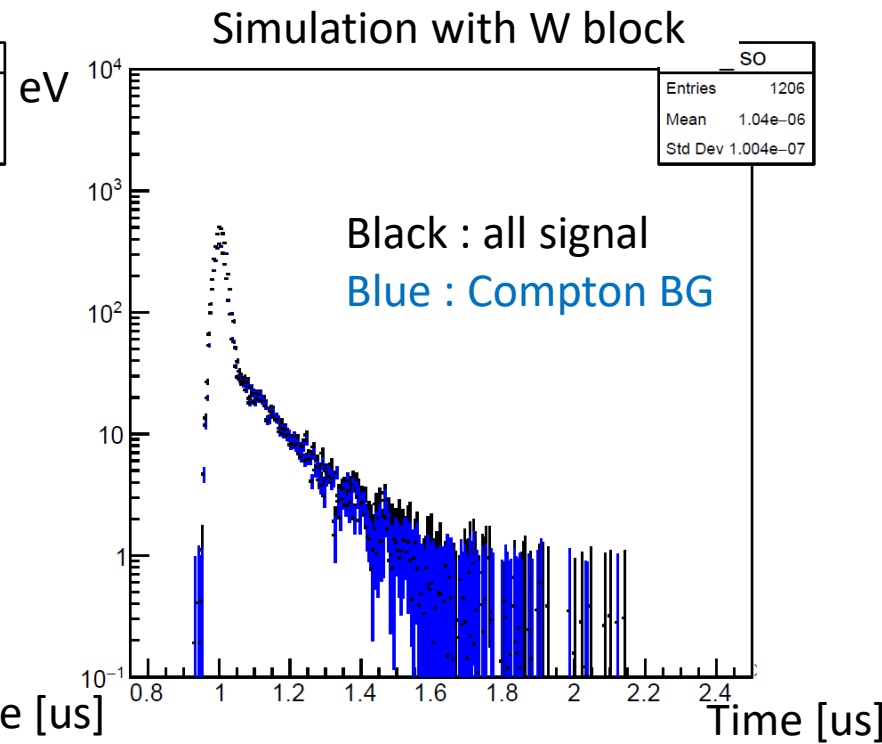
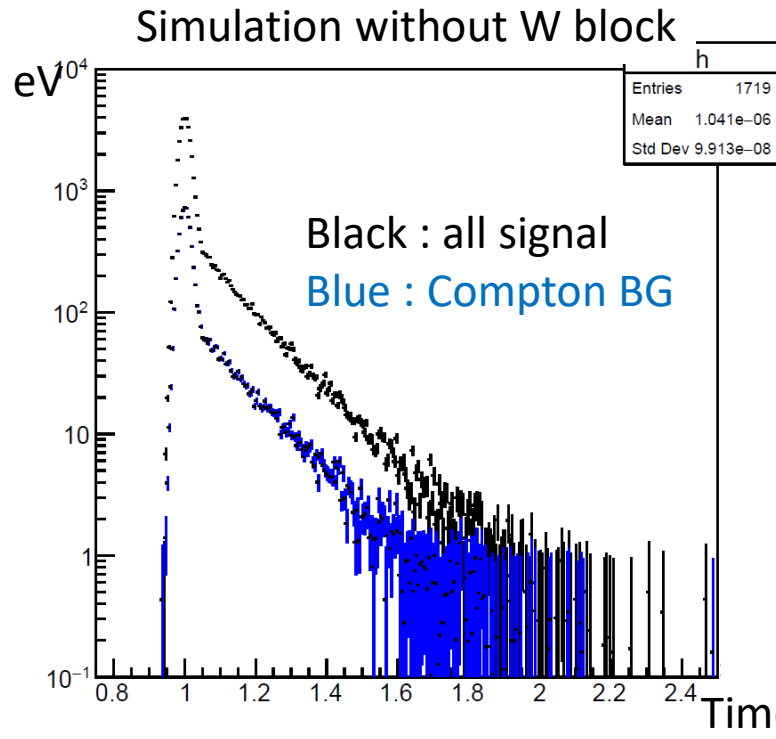
- The modeling is done by high gain and the measurement of o-Ps density should be done with lower gain
- Because the PDF of total charge distribution is fixed for different gain, the efficiency would be independent of HV at PMT.

| HV | 22Na test [nWb/γ] | 22Na gain [#of e-] | Catalog gain (rough) [#of e-] | Beam test [arb] |
|--------|-------------------|--------------------|-------------------------------|--------------------|
| -2.3kV | 1.135 | 4.198E+7 | 2.25E+7 | |
| -2.0kV | 0.382 | 1.413E+7 | 8.E+6 | |
| -1.8kV | 0.158 | 5.84E+6 | 3.5e+6 | 6.277+-0.657 |
| -1.5kV | 0.0317 | 1.17E+6 | 1.e+6 | 1.29+-0.133 |
| -1.3kV | | | 3.5e+5 | 0.354 (other data) |
| -1.0kV | | | 5.5e+4 | |

- To get the correct gain for the low HV values which can't be checked by 22Na source, beam test was performed but these data have too small amount of sample and show about 10% resolution.. (because of integral area, etc...(?))
- Need to test with -1.0kV and -0.8kV for future measurements.
- Beam data was taken with plastic scintillator as reference behind the reaction chamber and the values in the table is ratio btw PWO and PS.



Compton background study



- Simulated Compton BG fraction : 12%(16cm distance between target and detector), 16%(21cm), 18%(26cm) without W block
- Simulated ratio of intensity with W block and one without W block : 19% (16cm, 21cm, 26cm)
- Measure intensity ratio between with and without W block = $21 \pm 1\%$ (measured at 21cm, 26cm)
- More study is required but possible uncertainty is expected below 3%