

Nal-031 Experiment (Temperature Dependence)

19/03/04

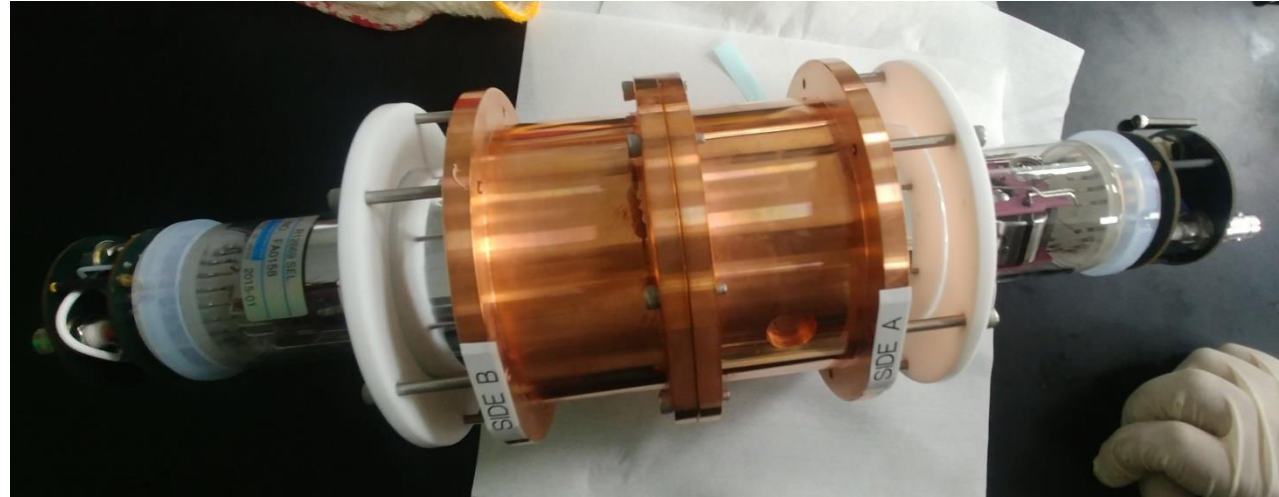
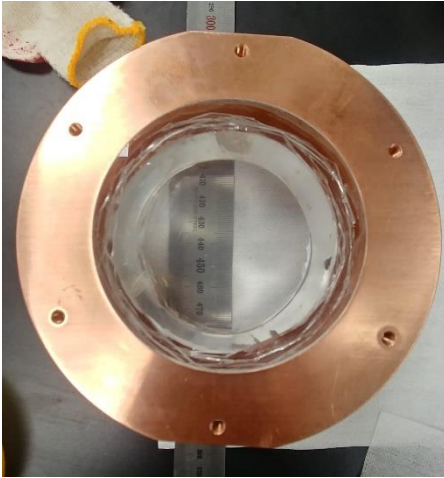
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Purpose of Low Temperature Experiment

- To check light yield according to temperature change
- To observe PSD(alpha, beta/gamma deposited energy)
when temperature goes down
- To measure PMT noise which it follows temperature

NaI-031

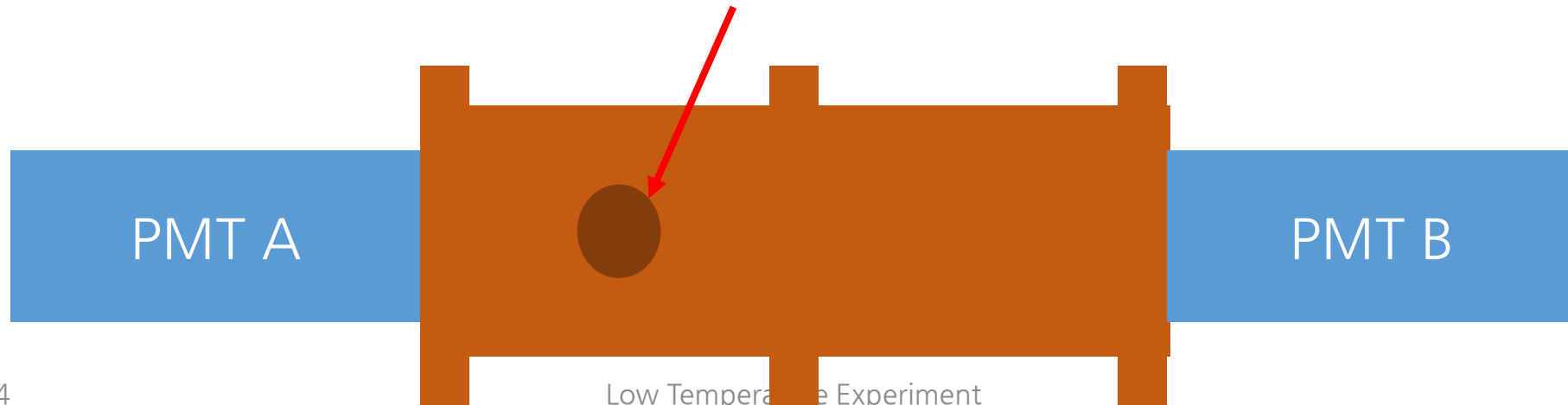


- NaI-031 (SICCAS)
 - diameter : 75mm, height : 75mm
 - Weight(expected) : 1.2 ± 0.12 kg
 - Alpha Activity : 0.73 ± 0.16 mBq/kg
- PMT(SIDE A) : FA0056
- PMT(SIDE B) : FA0158

Experiment Setup



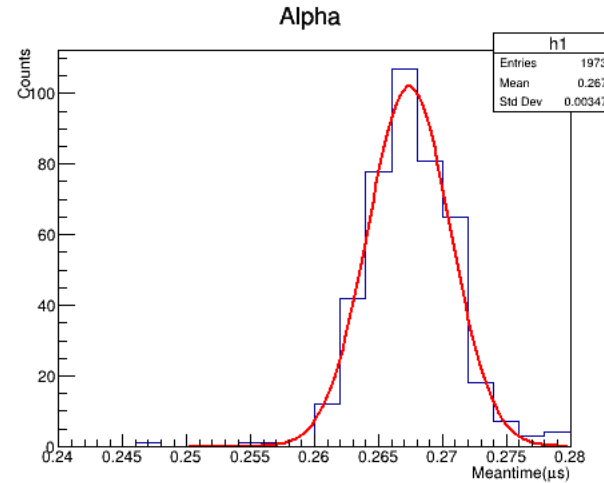
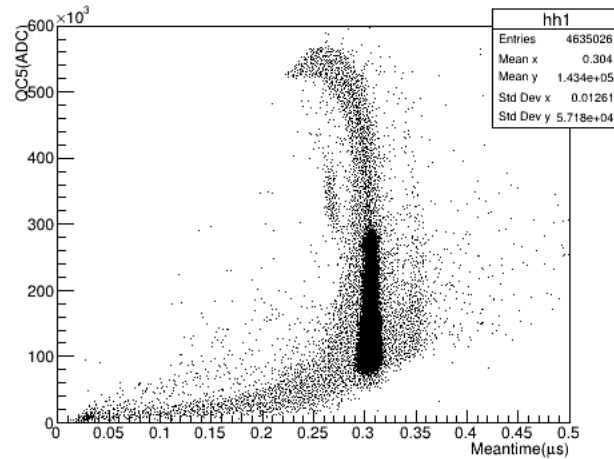
Source spot



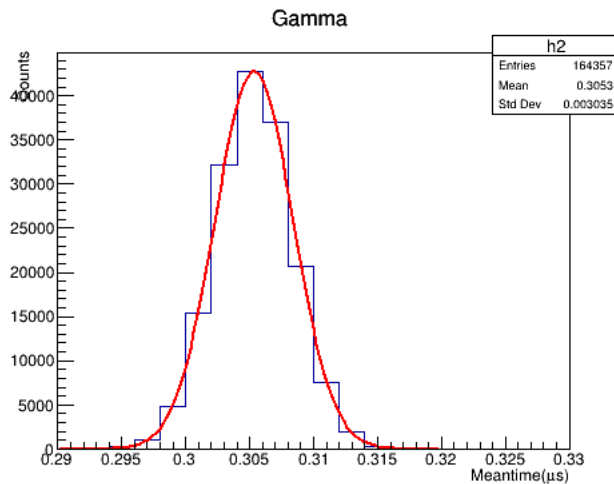
Setup(HV, Temperature)

temp	Light yield using Am-241				PSD in background			
	PMT 1 HV[V]	PMT 2 HV[V]	Thresho ld[ch]	Preamp	PMT 1 HV[V]	PMT 2 HV[V]	Thresho ld[ch]	Preamp
20°C	1125	1125	20	× 10	940	1150	200	No
-33°C	1400	1400	20	× 10	940	1150	200	No

Alpha Separation check with FOM : nmt 1000(-33 °C)



Alpha qc range
2.6e5 ~ 2.9e5



Gamma peak of TI 208

alph mean : 0.267395 +- 0.000164

alph sig : 0.003222 +- 0.000136

gamma mean : 0.305341 +- 0.000008

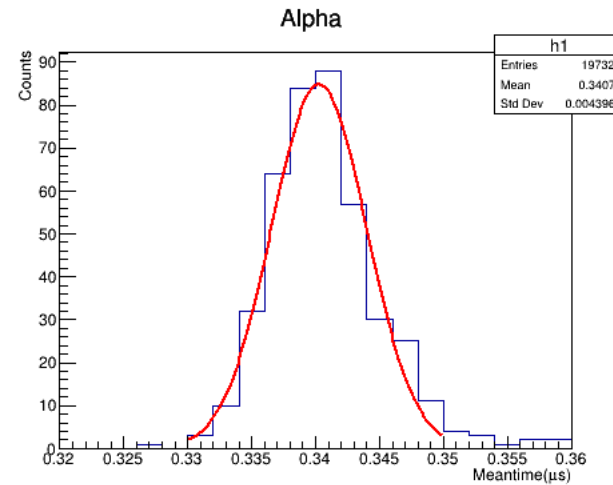
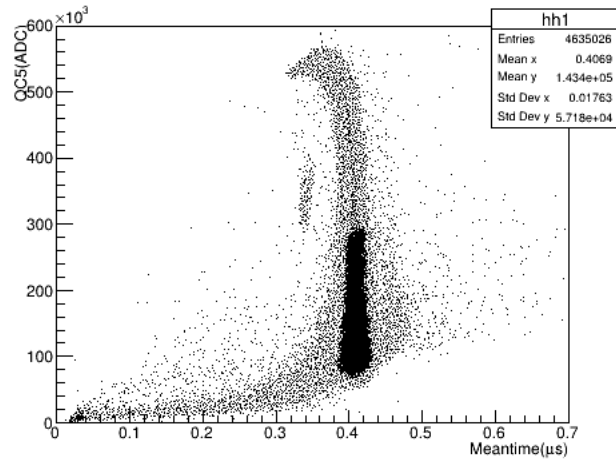
gamma sig : 0.003061 +- 0.000006

FOM : 6.038887 +- 0.254002

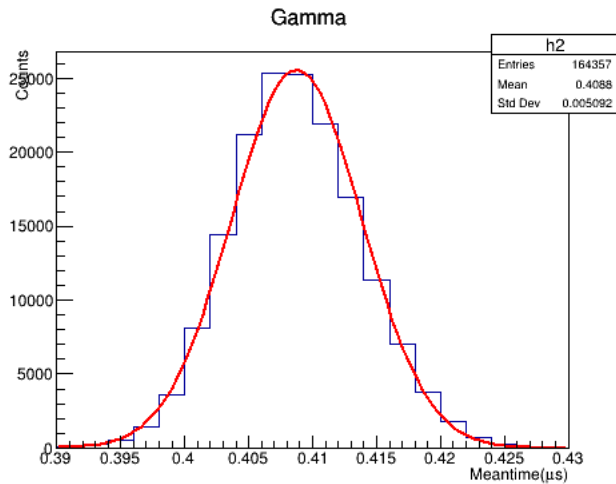
FOM formula

$$\frac{Mean_{gamma} - Mean_{alpha}}{\sqrt{\sigma_{alpha}^2 + \sigma_{gamma}^2}}$$

Alpha Separation check with FOM : nmt 1500 (-33 °C)



Alpha qc range
 $3.0e5 \sim 4.0e5$



alphah mean : 0.340270 +- 0.000174

alphah sig : 0.003725 +- 0.000174

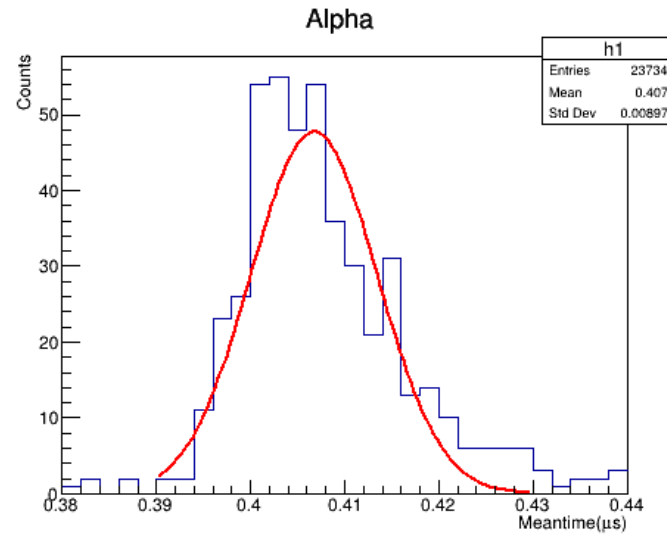
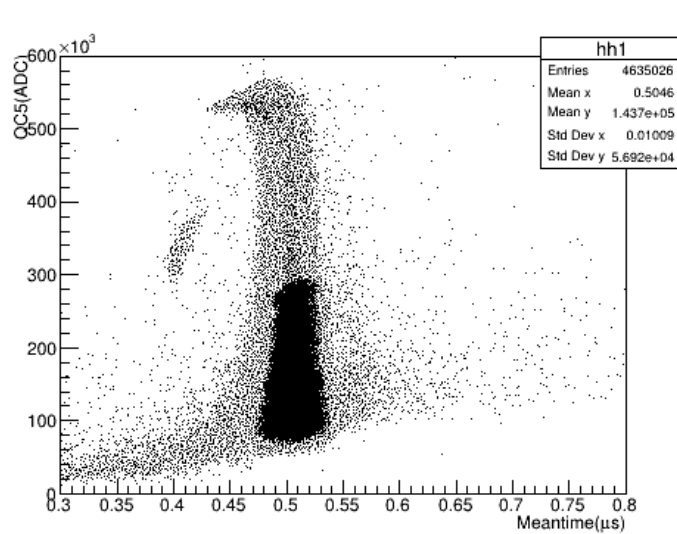
gamma mean : 0.408756 +- 0.000013

gamma sig : 0.005090 +- 0.000009

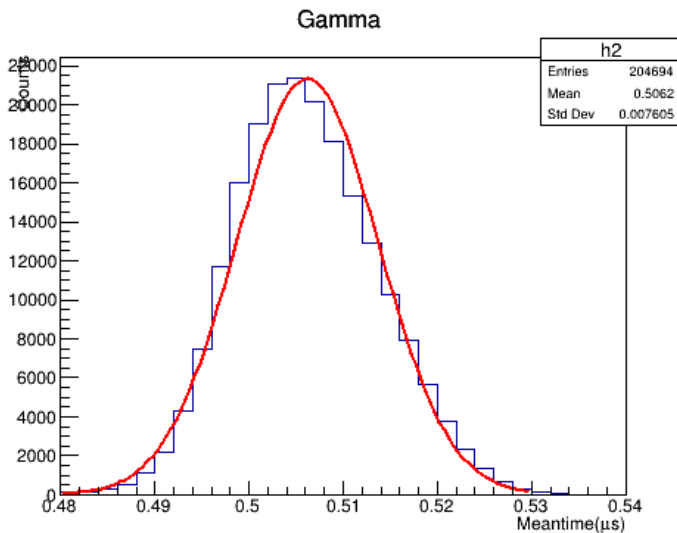
FOM : 7.769529 +- 0.363386

Gamma peak of Tl 208

Alpha Separation check with FOM : nmt2000 (-33 °C)



Alpha qc range
 $2.5e5 \sim 4.5e5$



alphah mean : 0.406724 +- 0.000462

alphah sig : 0.006702 +- 0.000371

gamma mean : 0.506185 +- 0.000018

gamma sig : 0.007529 +- 0.000012

FOM : 6.988593 +- 0.386497