INGRID MC Work

A.Murakami

Horn current dependence

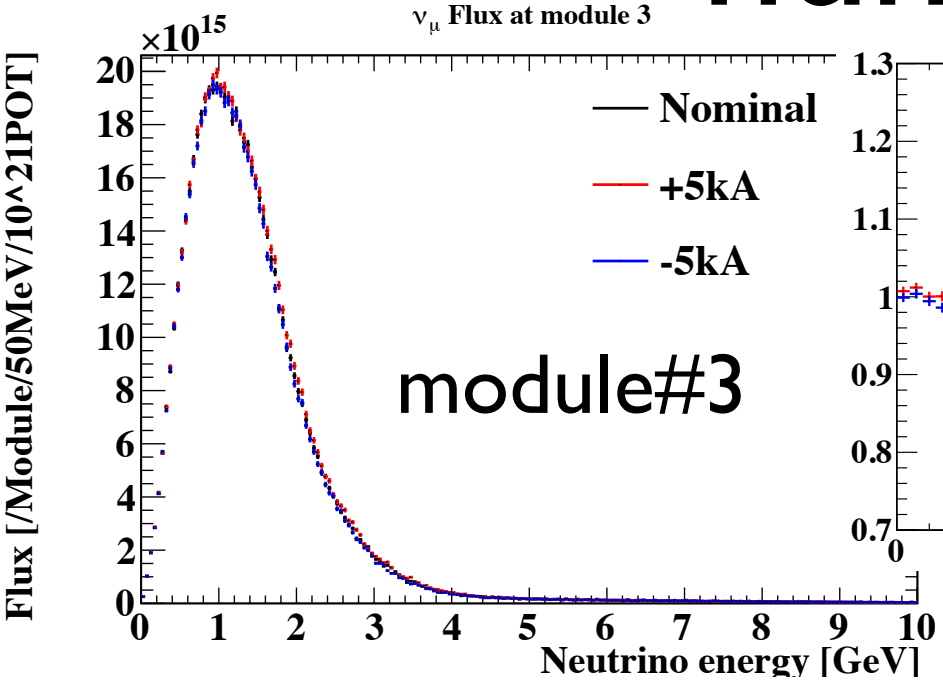
- How dose # of observation of INGRID change when the horn current change.
- Check the following set:
  - All horn current +- 5kA from 2010a average value.
  - All horn current : 0kA

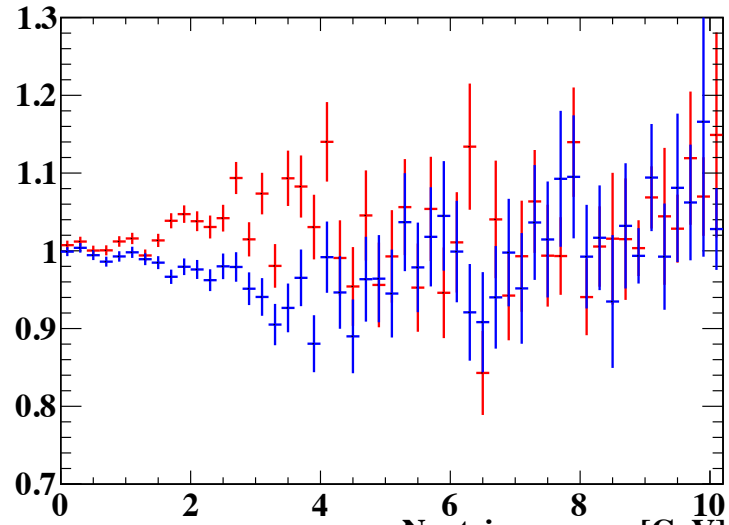
All horn current ±5kA

MC set

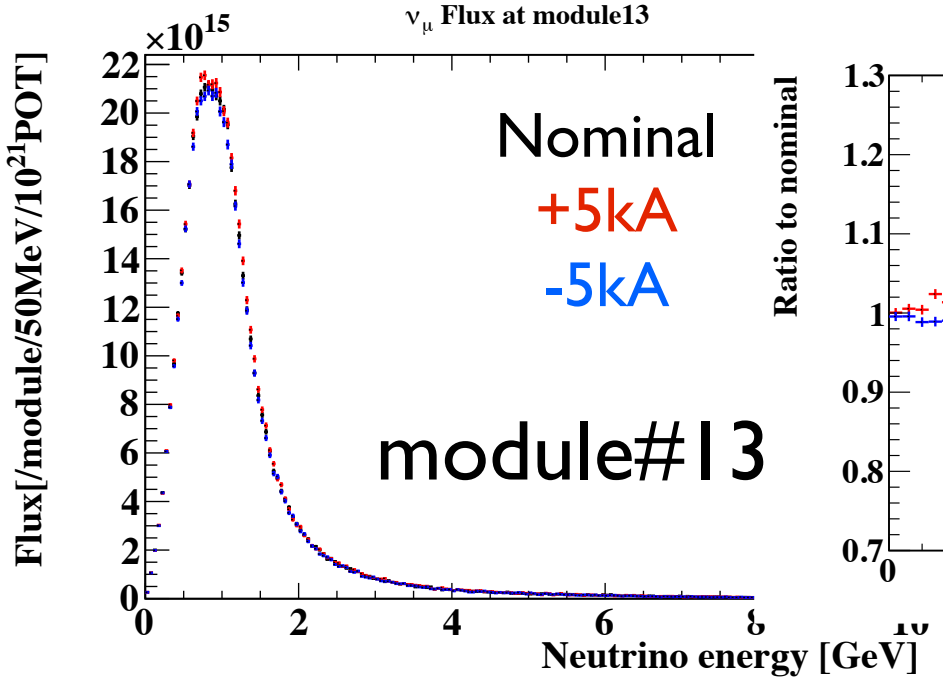
- Jnubeam : 10d (**FLUKA input**), **no tuned**
  - beam parameta : 2010a average value
  - **nominal horn current = { 250.71, 248.96, 248.09 } kA (2010a average value)**
- Neutrino cross-section : NEUT(5.0.6.)
  - Use Fe target cross-section
  - Target mass = Iron+scintillator (whole tracking volume)
- Detector MC : Kyoto Code (not ND280 package).
  - Use the efficiency curve reported at last collabo. meeting

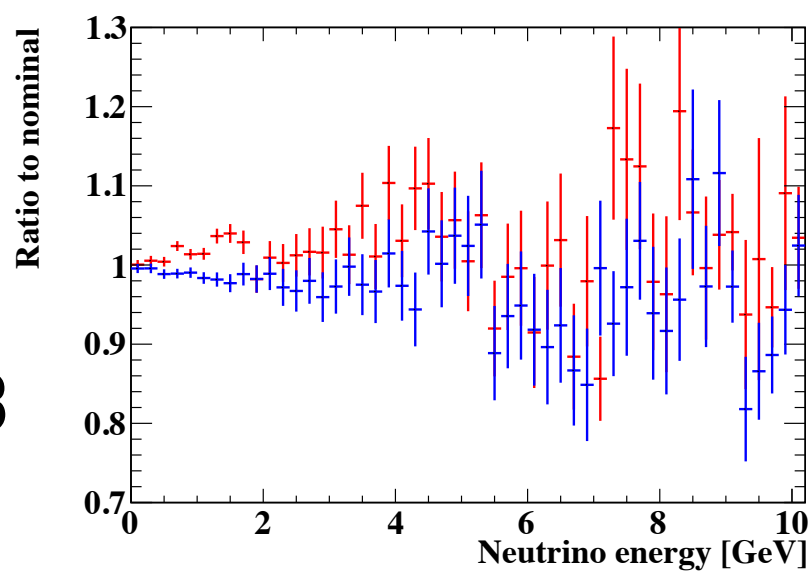
numu Flux





nomi	6.424e17 (1)
+5kA	6.536e17 (1.017)
-5kA	6.321e17 (0.984)

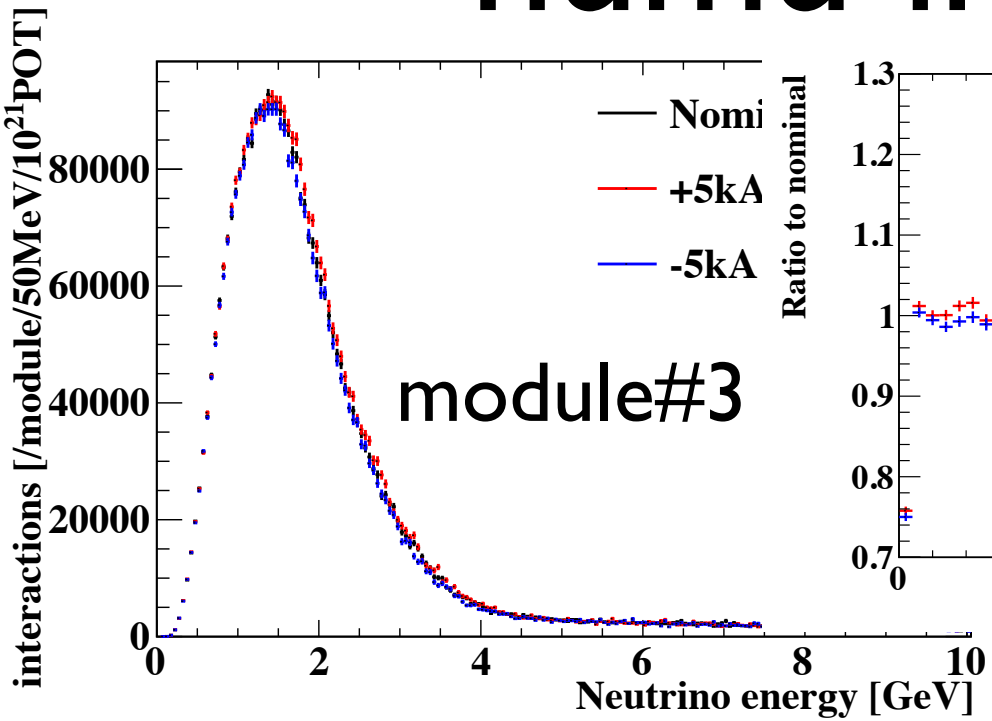


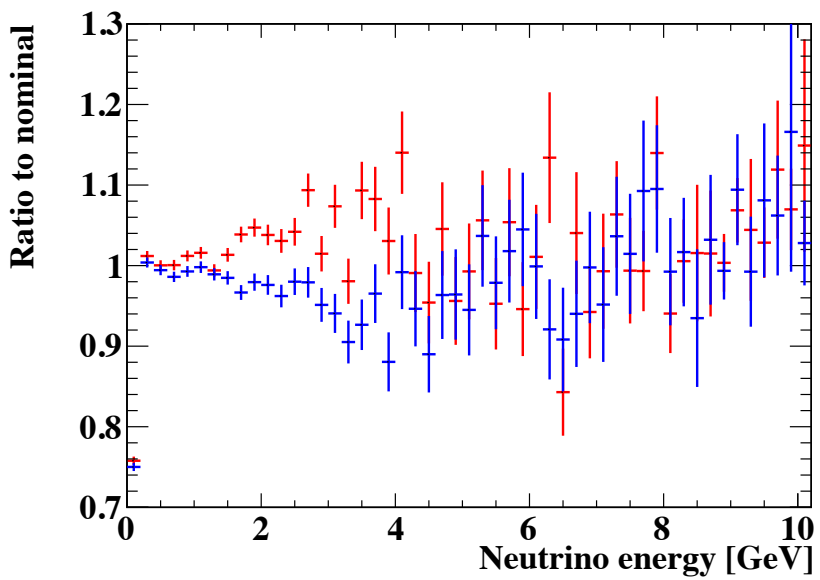


nomi	5.056e17 (1)
+5kA	5.147e17 (1.018)
-5kA	4.981E+17 (0.985)

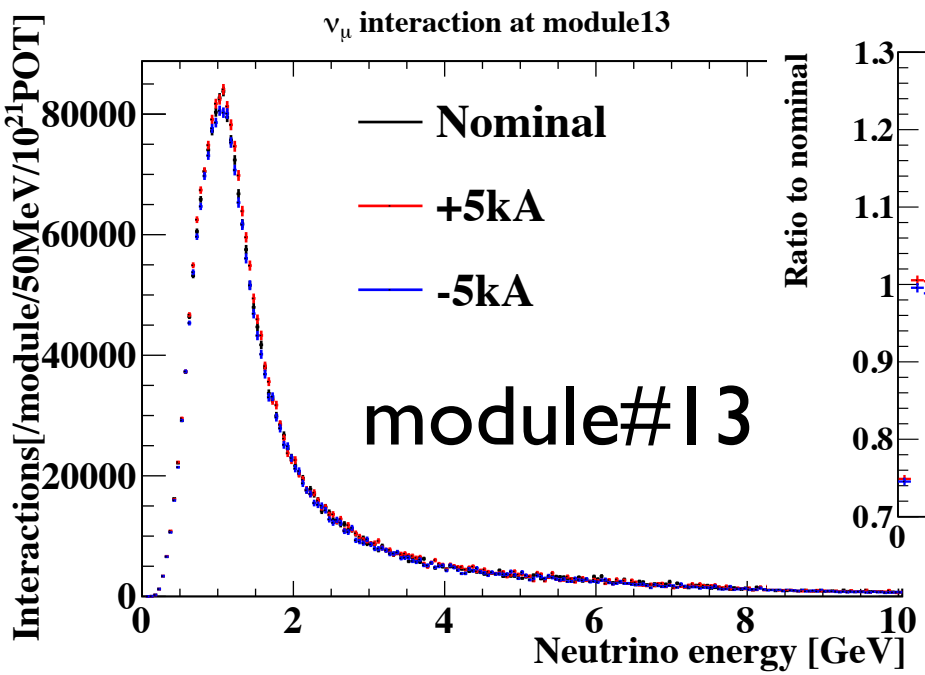
→ small difference at each energy bin

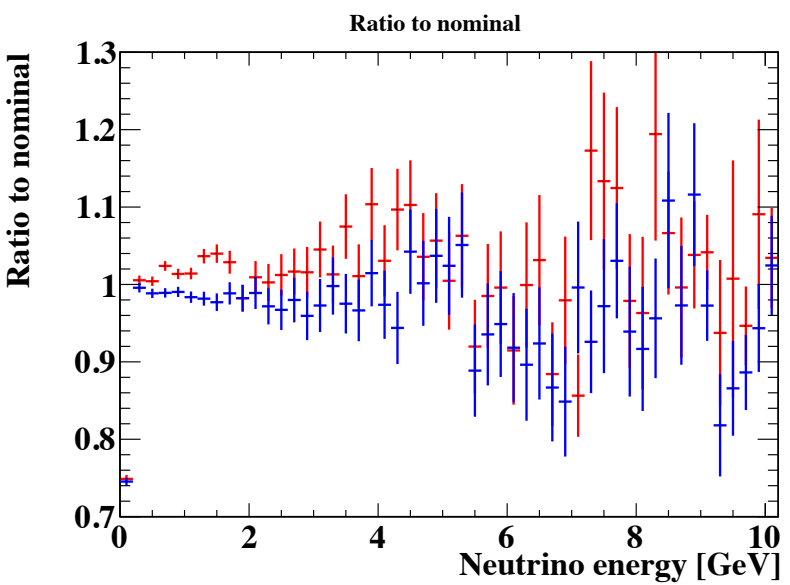
numu interaction





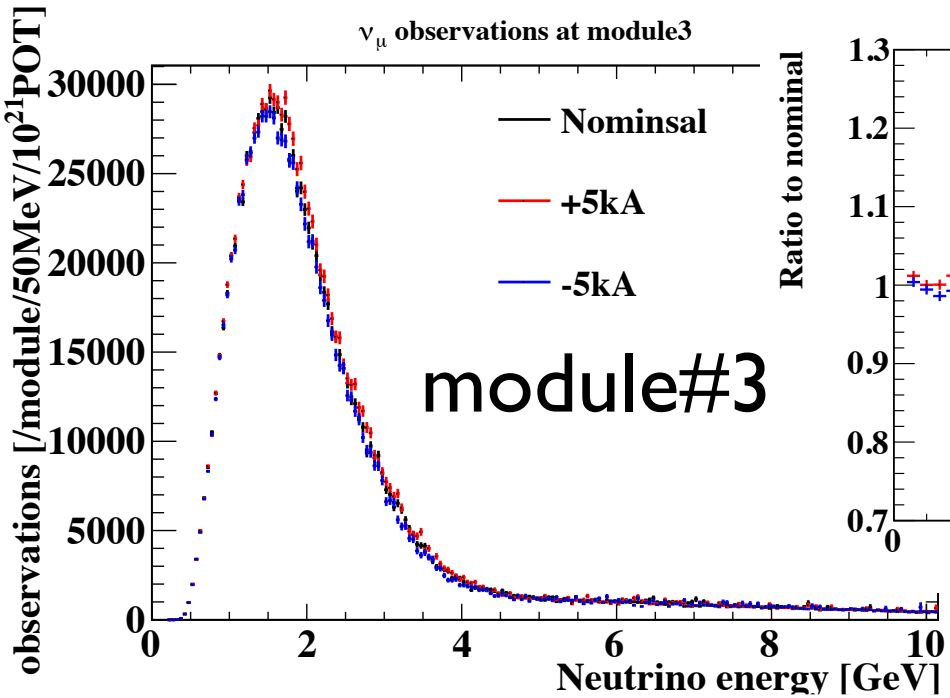
nomi	3.506e6 (1)
+5kA	3.590e6 (1.024)
-5kA	3.430e6 (0.978)

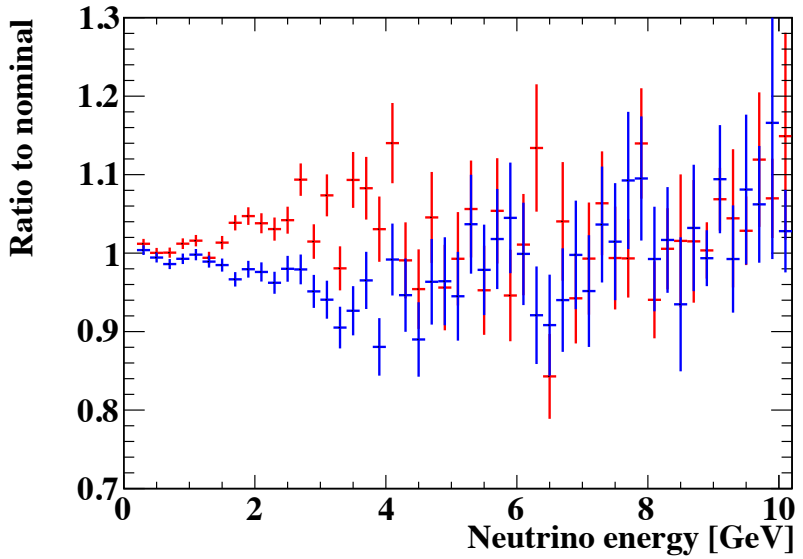




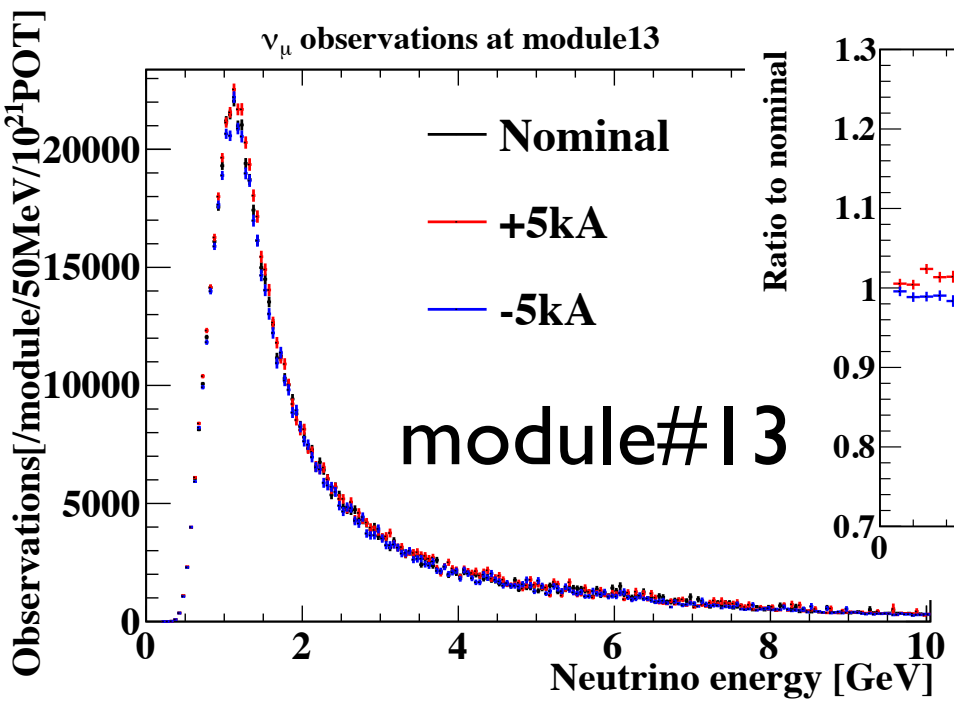
nomi	2.373e6 (1)
+5kA	2.421e6 (1.020)
-5kA	2.327e6 (0.981)

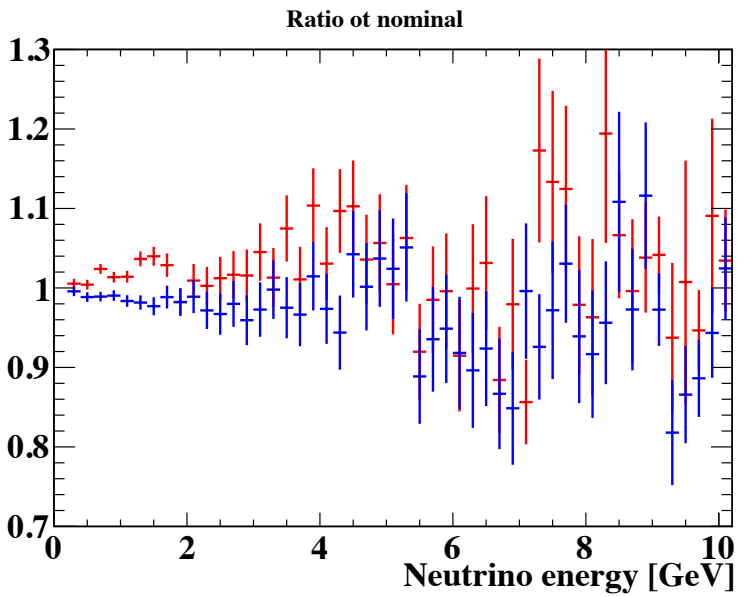
numu observation





nomi	1.125e6 (1)
+5kA	1.155e6 (1.027)
-5kA	1.097e6 (0.975)



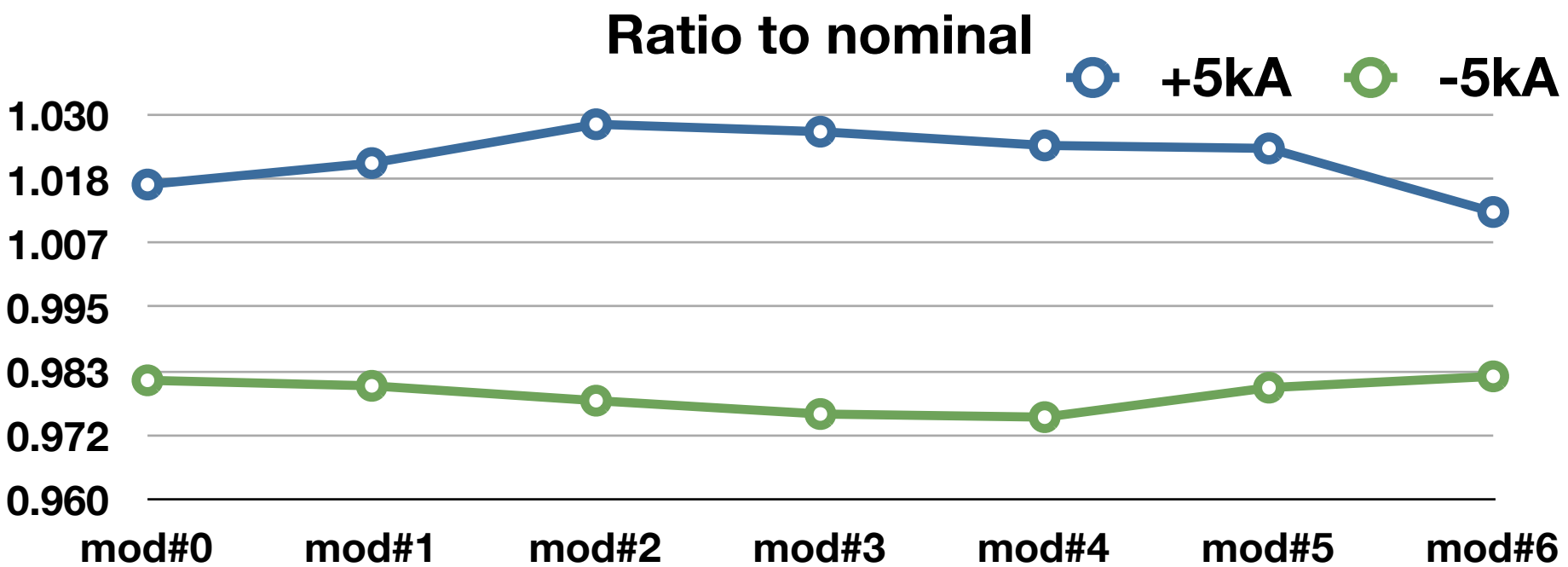


nomi	7.077e5 (1)
+5kA	7.219e5 (1.020)
-5kA	6.915e5 (0.977)

Horizontal observation (MC)

[/module/10^21POT]

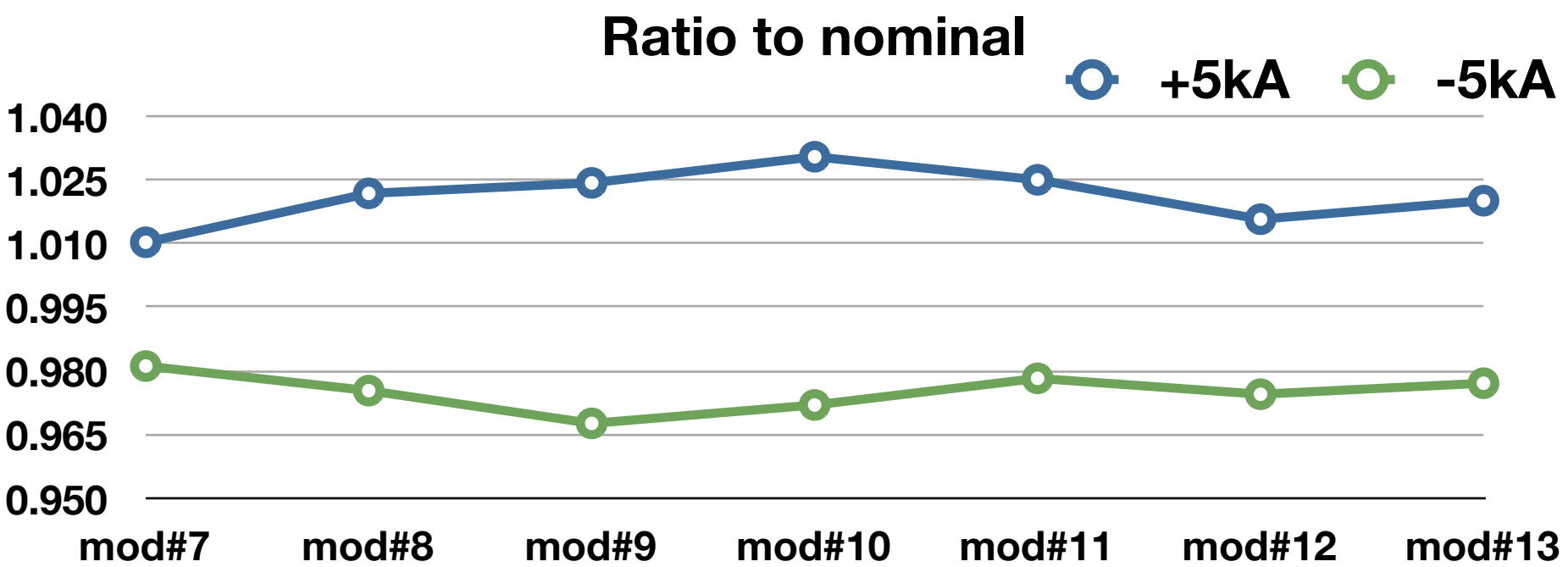
	mod0	1	2	3	4	5	6
nomi	6.587E+05	8.784E+05	1.051E+06	1.125E+06	1.060E+06	8.876E+05	6.666E+05
+5kA	6.702E+05	8.971E+05	1.081E+06	1.155E+06	1.086E+06	9.088E+05	6.749E+05
-5kA	6.467E+05	8.614E+05	1.028E+06	1.097E+06	1.034E+06	8.701E+05	6.549E+05



Vertical observation (MC)

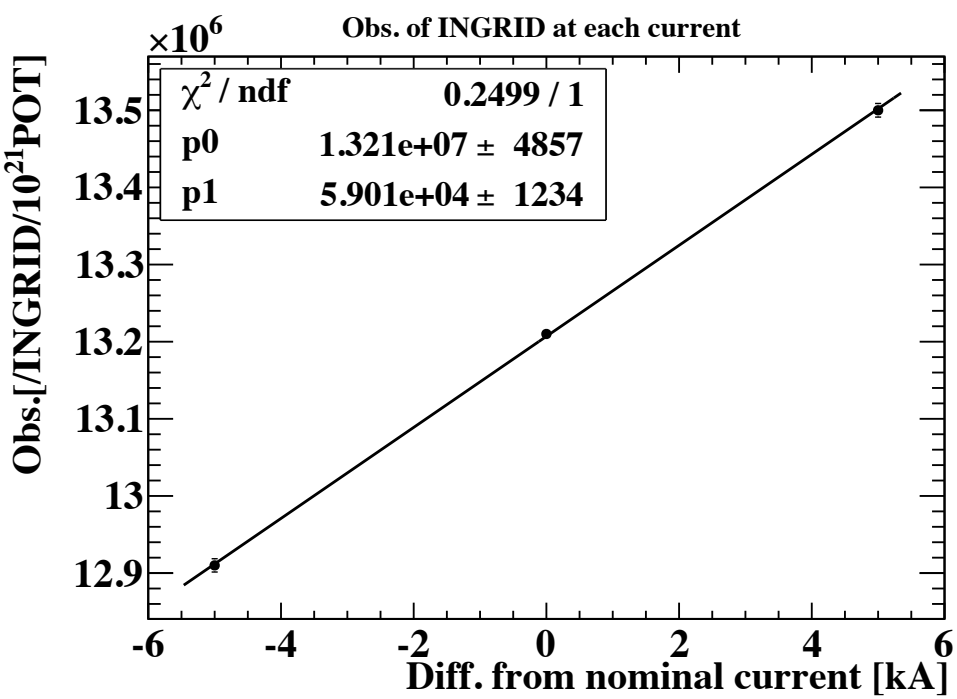
[/module/10^21POT]

	mod7	8	9	10	11	12	13
nomi	7.205E+05	9.304E+05	1.101E+06	1.162E+06	1.089E+06	9.216E+05	7.077E+05
+5kA	7.279E+05	9.507E+05	1.128E+06	1.198E+06	1.116E+06	9.361E+05	7.219E+05
-5kA	7.069E+05	9.075E+05	1.065E+06	1.130E+06	1.065E+06	8.981E+05	6.915E+05



Observation at INGRID

[/10^21POT]	numu	numubar	numu +numubar
nominal	1.296E+07	2.512E+05	1.321E+07
+5kA	1.325E+07	2.494E+05	1.350E+07
-5kA	1.266E+07	2.522E+05	1.291E+07



MC: divergence
= 5.90e4 [10^{21}POT/kA]
→ 0.45 [%/kA] (ratio to Nobs at diff=0kA)

- Horn current dependence of # of observations of INGRID = 5.90e4 [10^{21}POT/kA] → 0.45 [%/kA] around 2010a average value (250.71, 248.96, 248.09 kA).
- The ratio of Nobs (±5kA) to nominal at each module is almost same.
  - This ratio seems not to depend with neutrino position so much.

MC set

- Jnubeam : 10d (**FLUKA input**), **no tuned**
  - beam parameta : 2010a average value
  - **all horn current = 0kA.**
- Neutrino cross-section : NEUT(5.0.6.)
  - Use Fe target cross-section
  - Target mass = Iron+scintillator (whole tracking volume)
- Detector MC : Not ND280 package.
  - Use the efficiency curve reported at last collabo. meeting

All horn current 0kA

- Calculate # of observations of INGRID at horn current 0kA.
  - Earlier I calculated it with old Flux, old MC. Again calculate with latest MC set.

Data vs MC

- Nobs comparison between data and MC.