

INGRID MC Work

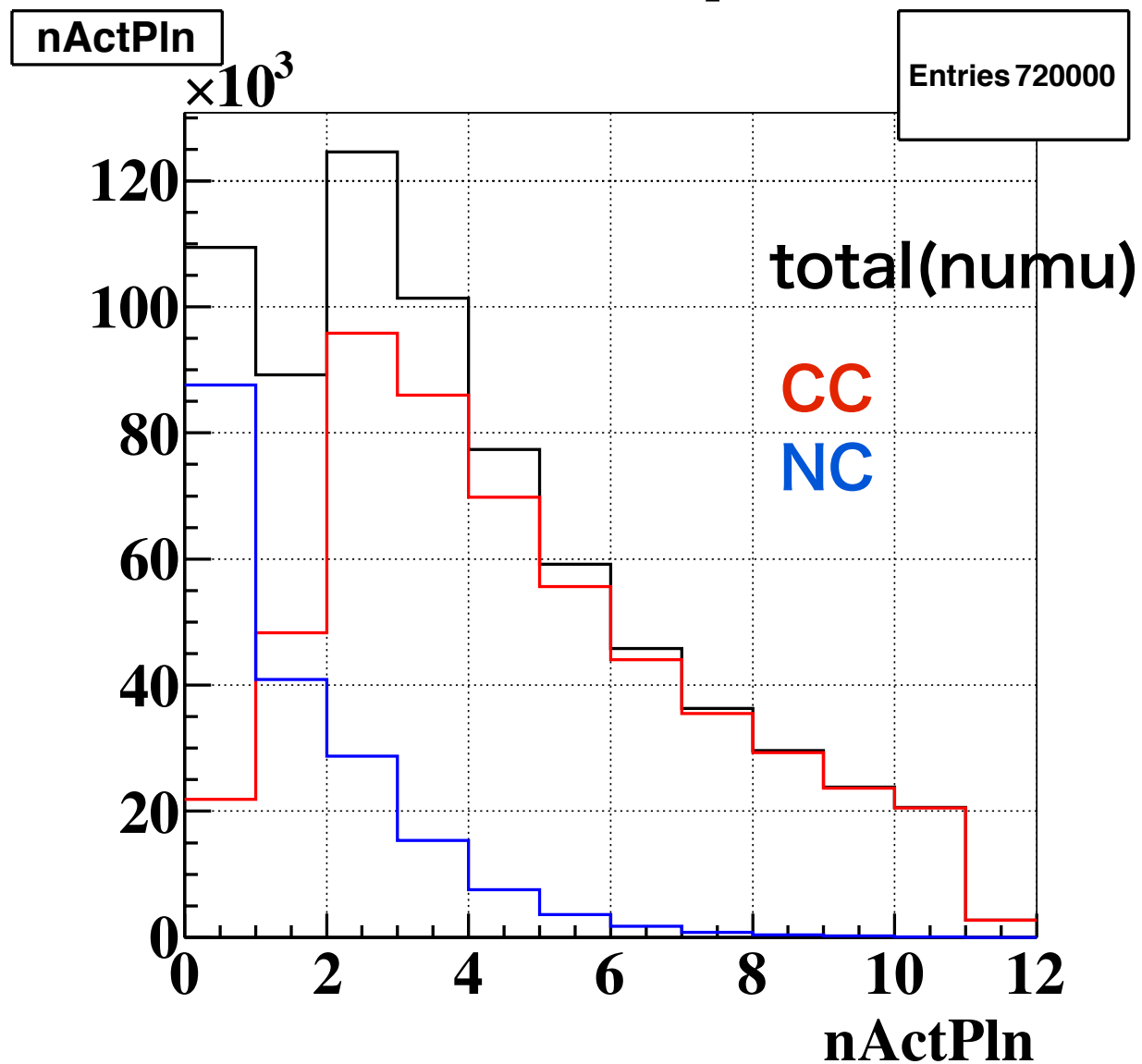
Akira Murakami

MC setting

- 期待されるニュートリノ反応数(by 南野さん)を元に、events/
7modules/ 10^{19} POT相当の統計量を用いた。
- all horn current = 0kA, jnubeam09c :
 - 4.67×10^4 numu events + 1.29×10^4 numubar events
- all horn current = 320kA, jnubeam07a :
 - 3.6×10^4 numu events
 - ちなみにこの時、 6.7×10^2 numubar events

今回はホーンありのみ

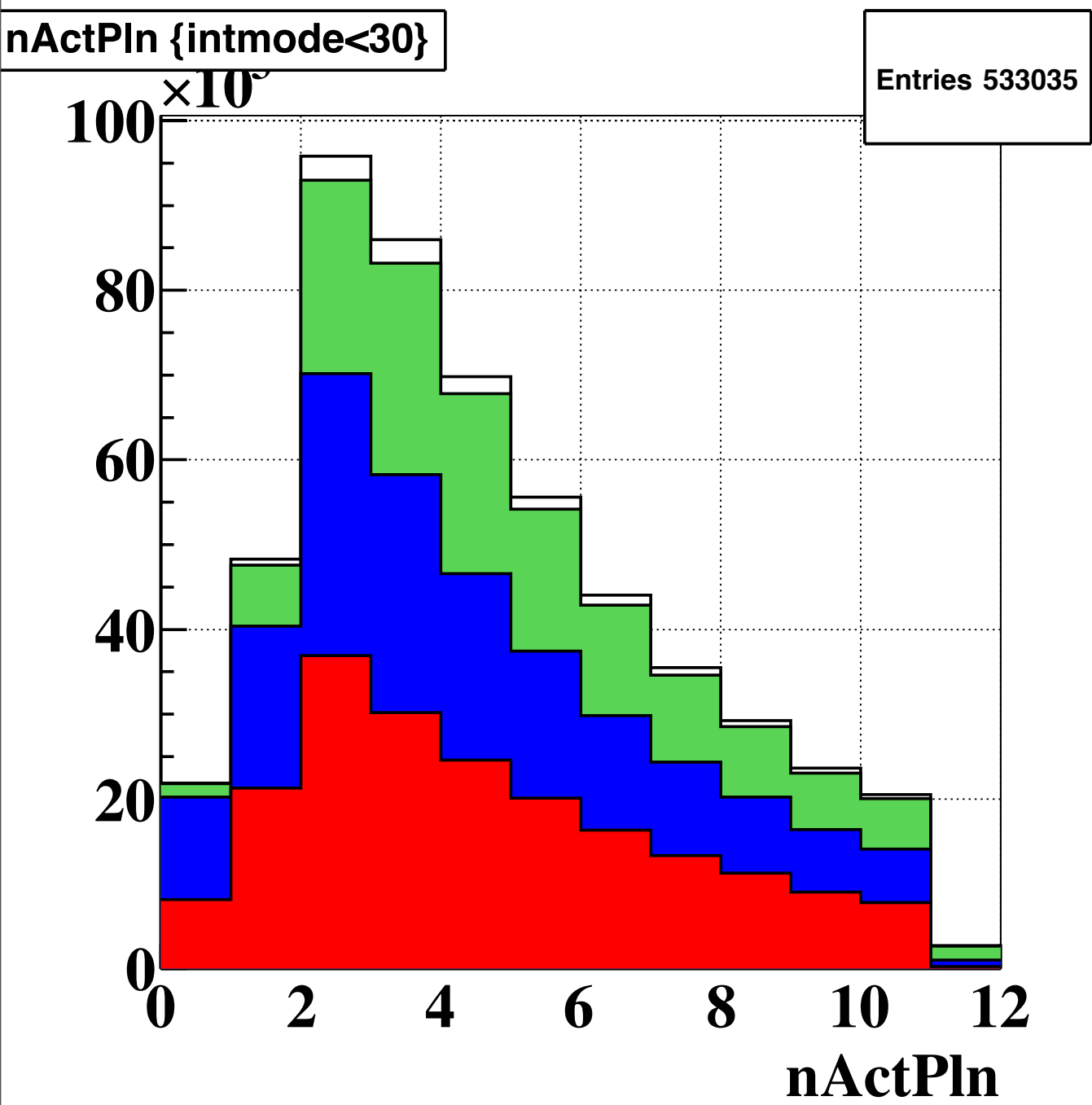
active plane 分布 (w/ horn)



- horizontal & vertical modules
- low active plane 領域はNC反応が支配的

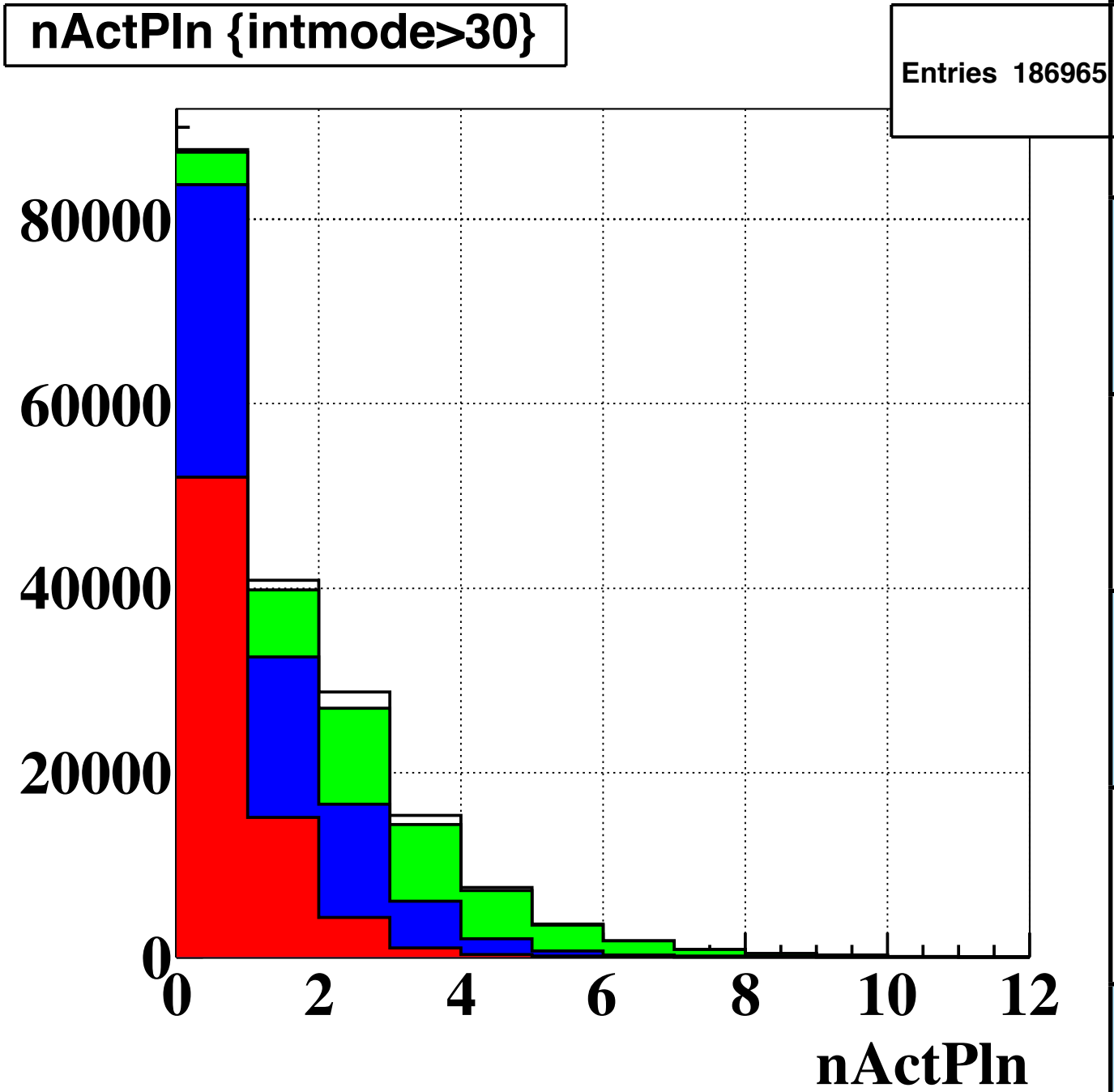
	nocut	active plane > 1	active plane > 2
All	720000	521370(72%)	396814(55%)
CC	533035	462857(87%)	367047(69%)
NC	186965	58513(31%)	29767(16%)

Interaction mode 分布



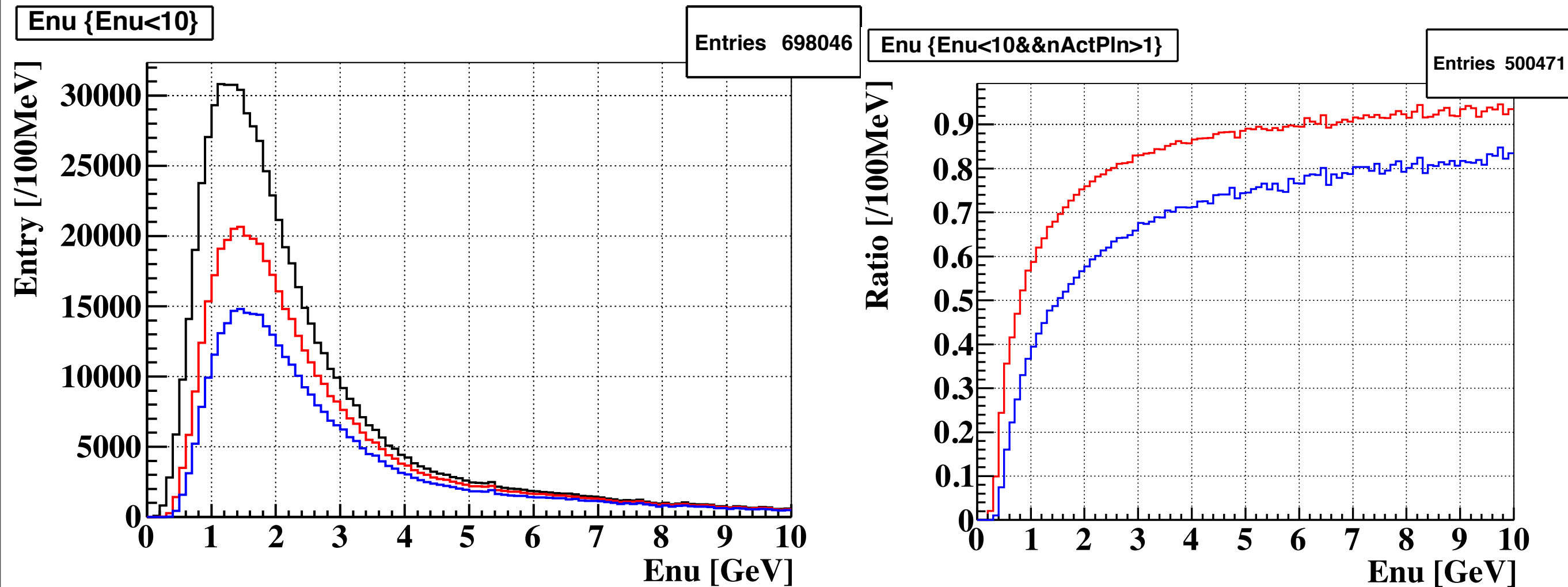
	nocut	active plane > 1	active plane > 2
CC all	533035	462857 (87%)	367047 (69%)
QE	199024	169639	132720
1 π	176324	145269	112510
coherent π	3542	3425	2920
DIS	140420	131617	108817

Interaction mode 分布



	nocut	active plane > 1	active plane > 2
NC all	186965	58513 (31%)	29767 (16%)
Elastic	72929	5747	1473
1 π	67024	19126	7365
coherent π	2029	832	269
DIS	40415	29566	19205

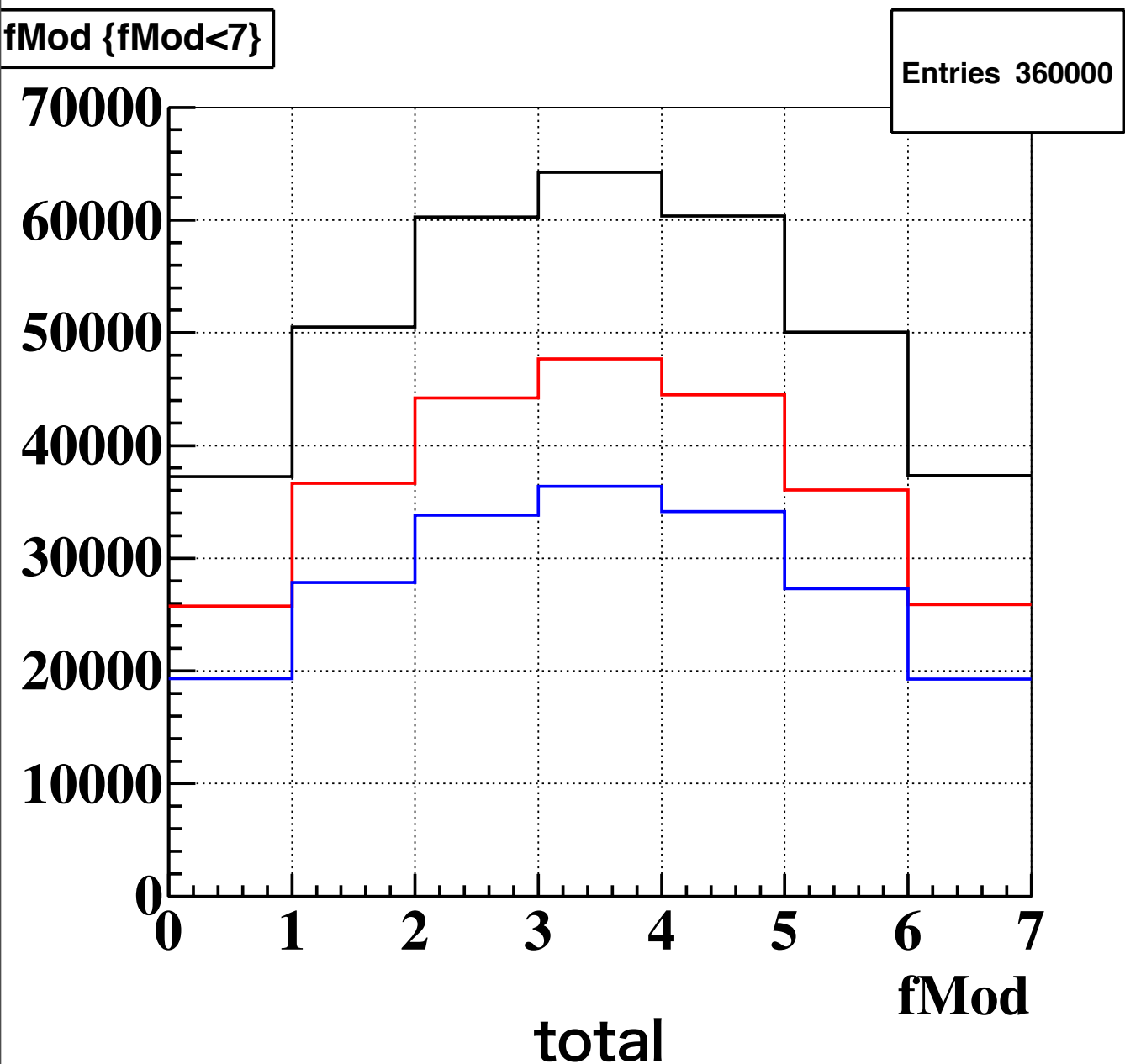
Neutrino Energy 分布



	nocut	active plane > 1	active plane > 2
Total	720000	521370(72%)	396814(55%)
Enu < 10 GeV	698046	500471(72%)	378103(54%)
Enu < 3 GeV	534145	356795(67%)	257248(48%)

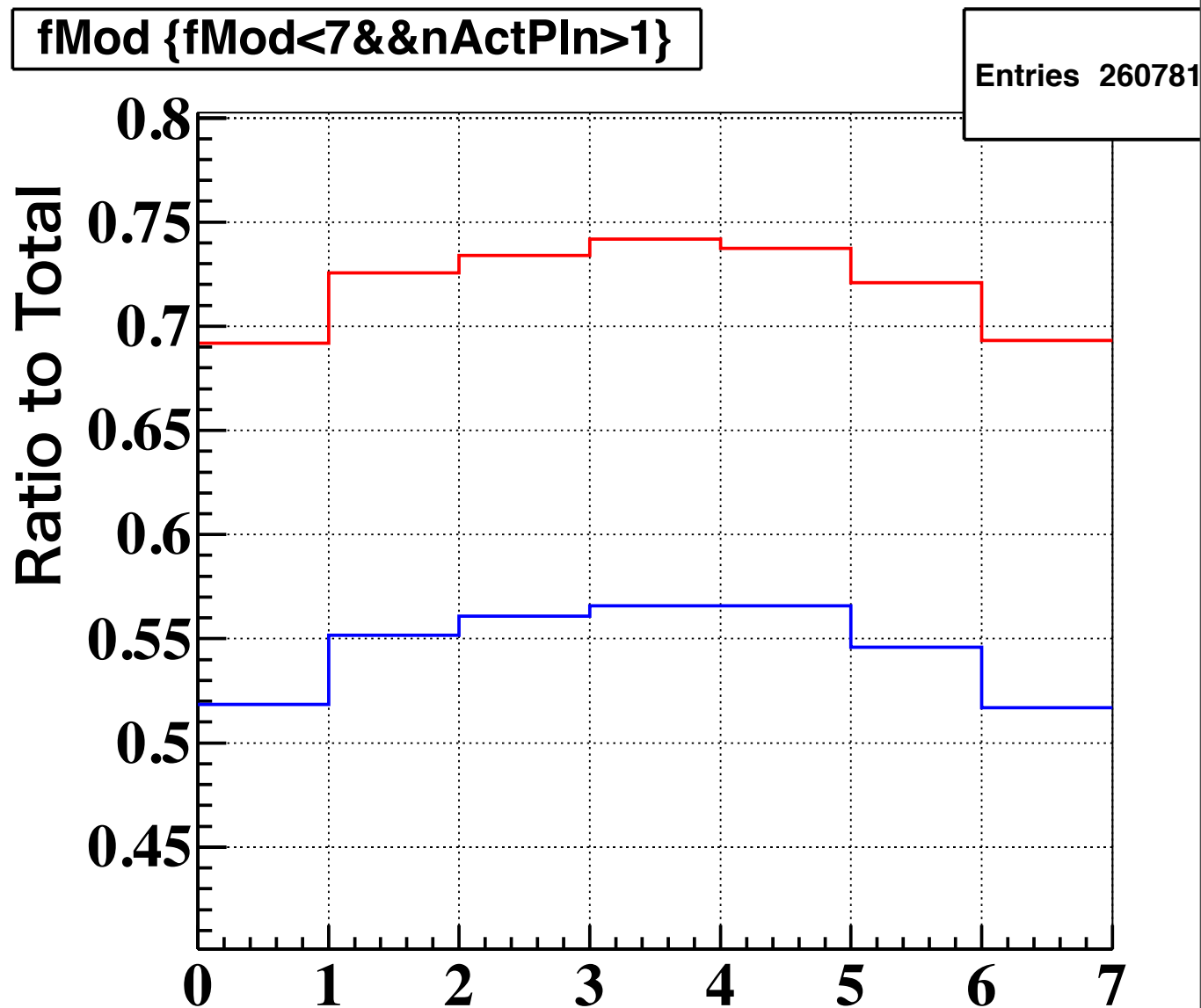
Module 分布

horizontal



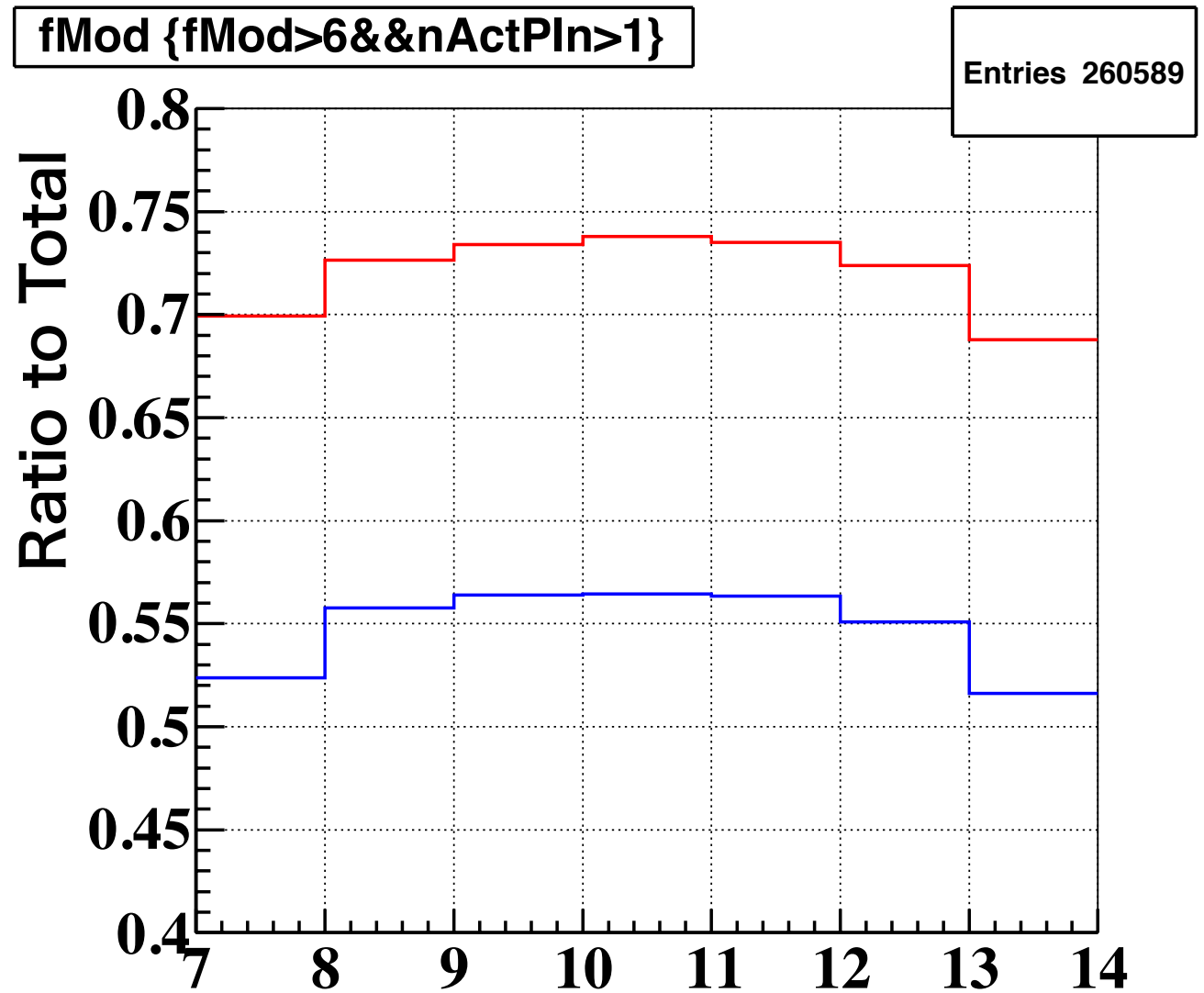
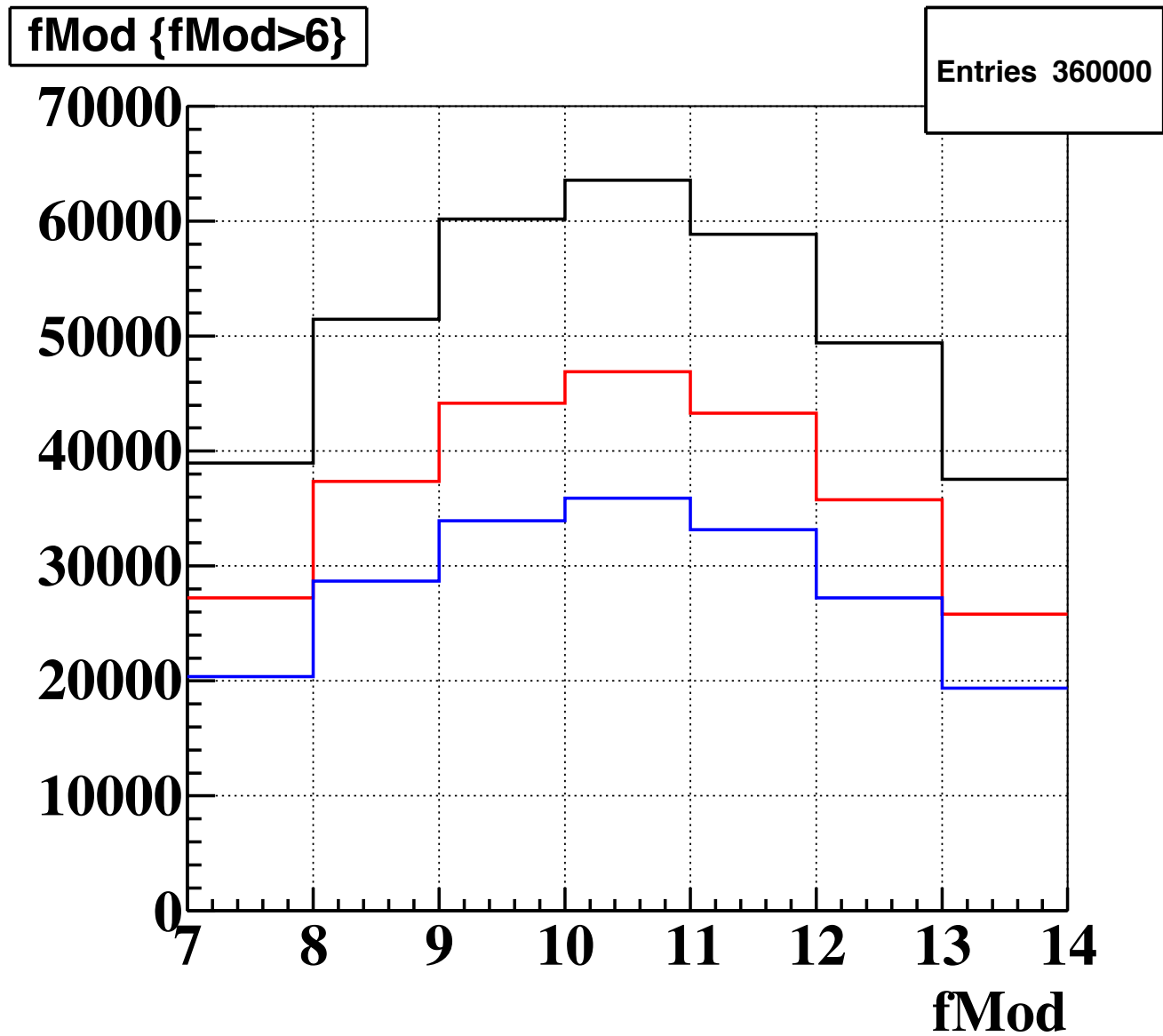
active plane > 1

active plane > 2

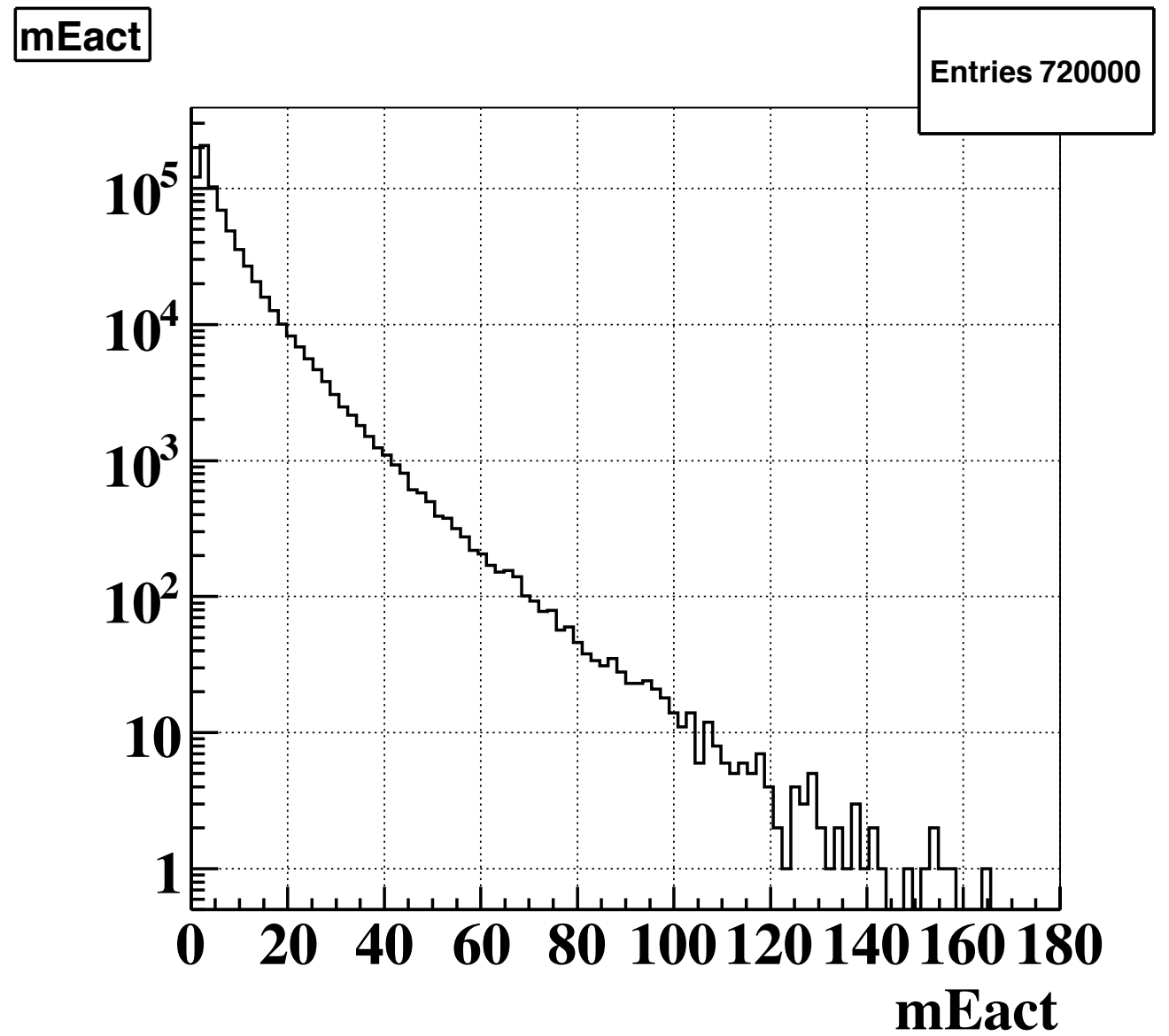
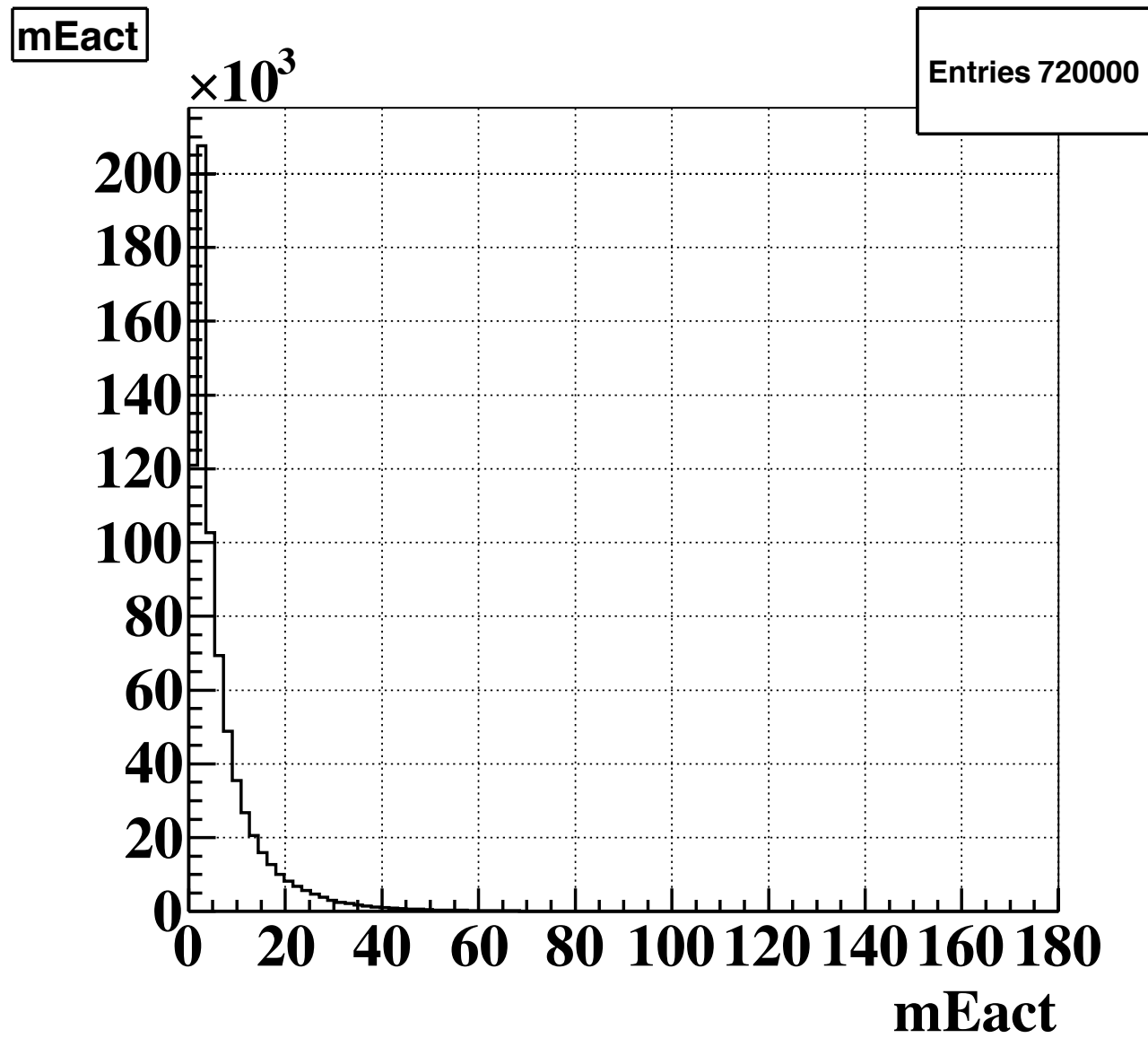


Module分布

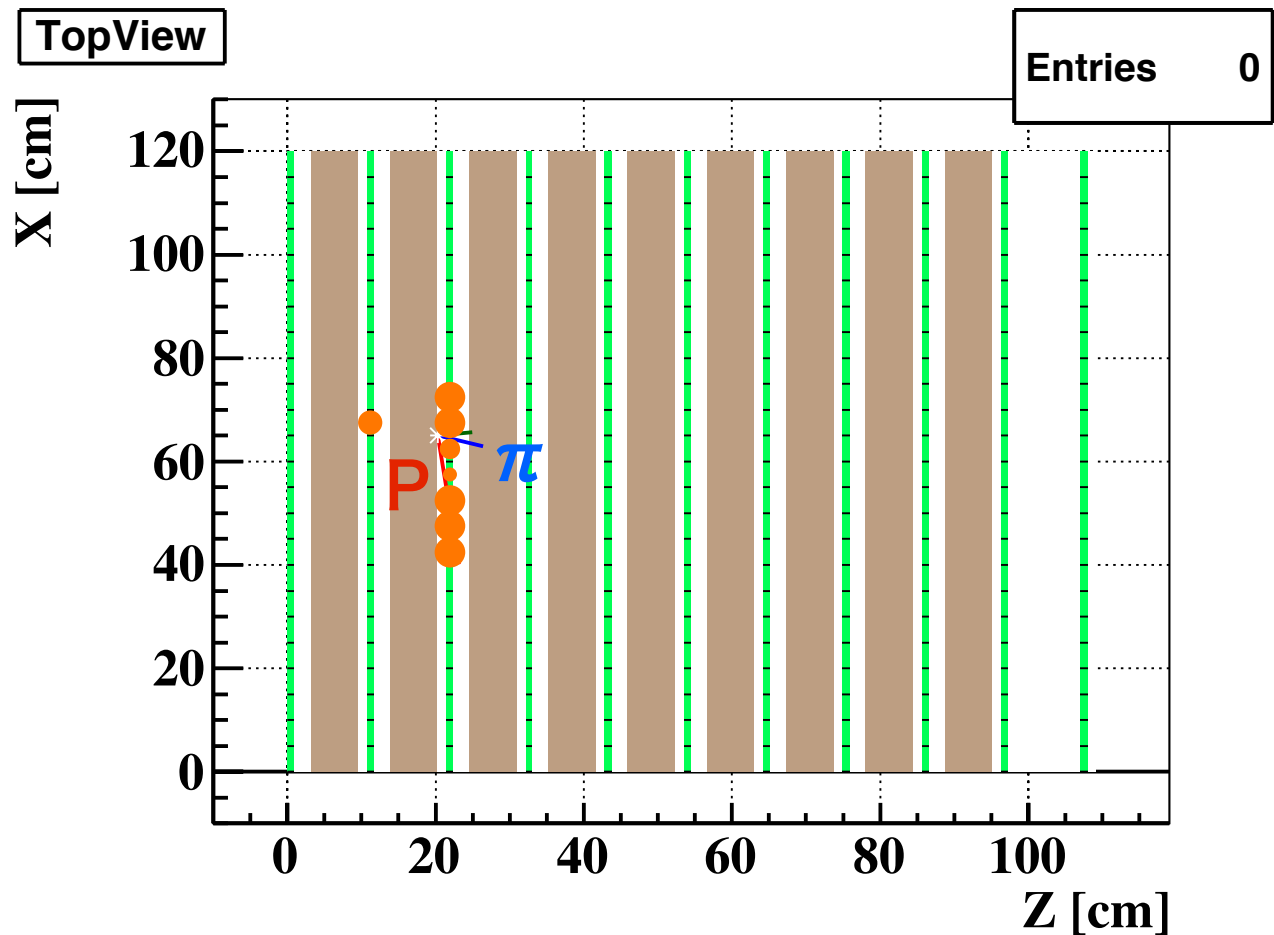
vertical



Mean Edep 分布



mean edep large

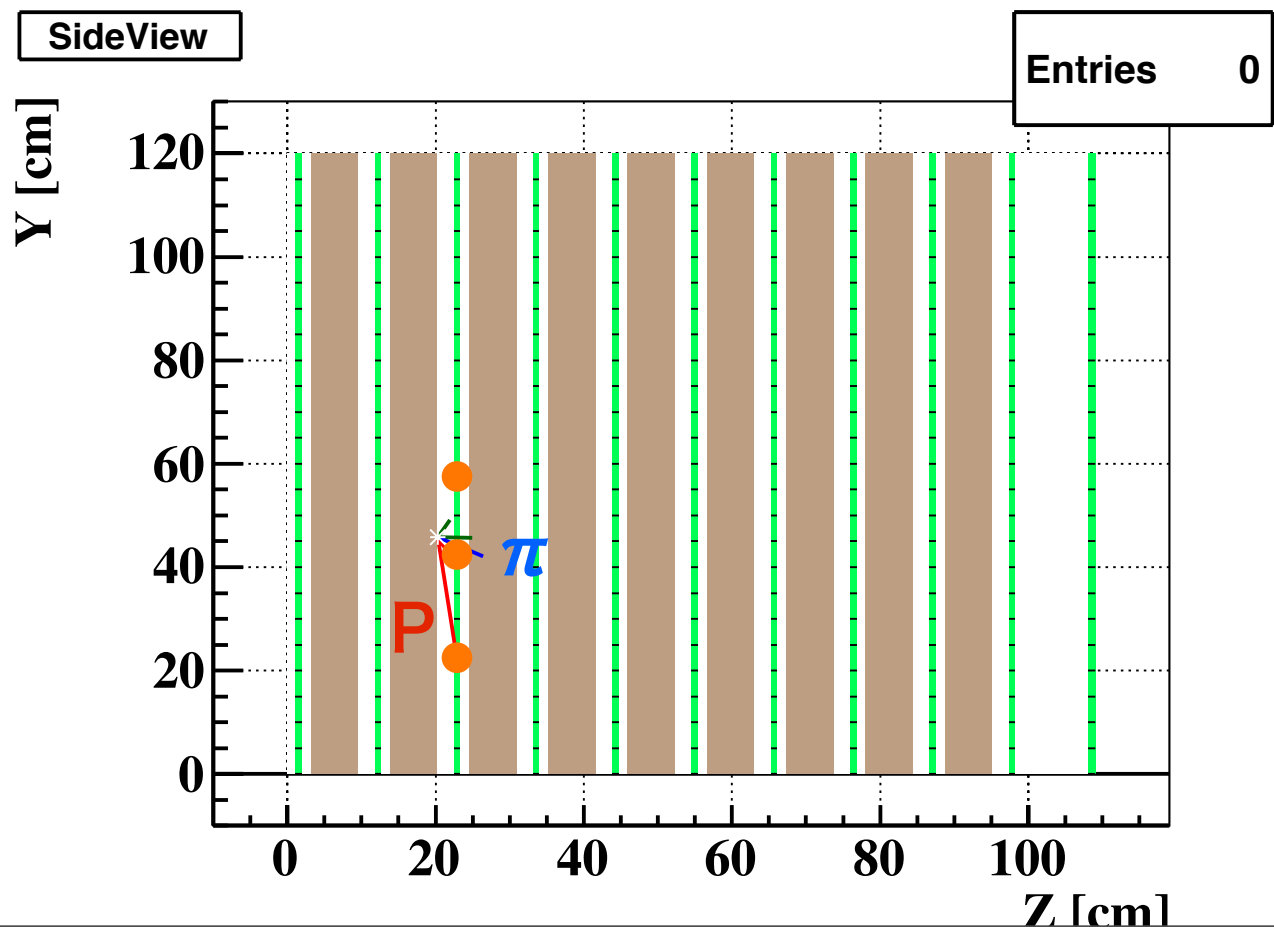


Enu[GeV] 2.95707

NCDIS

P : 177MeV

π : 640MeV



Edep = 10 ~ 40 ~ 80MeV

Mean Edep = 153.78

Mean Edep 分布

$15p.e./MIP(2MeV)$

Thresh old [p.e.]	4.5	5.5	6.5	7.5	8.5	9.5	10.5
Thresh old [MeV]	0.6	0.733333	0.866667	1	1.133333	1.266667	1.4
# of entry	610055	609689	609327	608962	608563	608108	607598
ratio to total	0.8473	0.84679	0.846288	0.845781	0.845226	0.844594	0.843886

変化なし

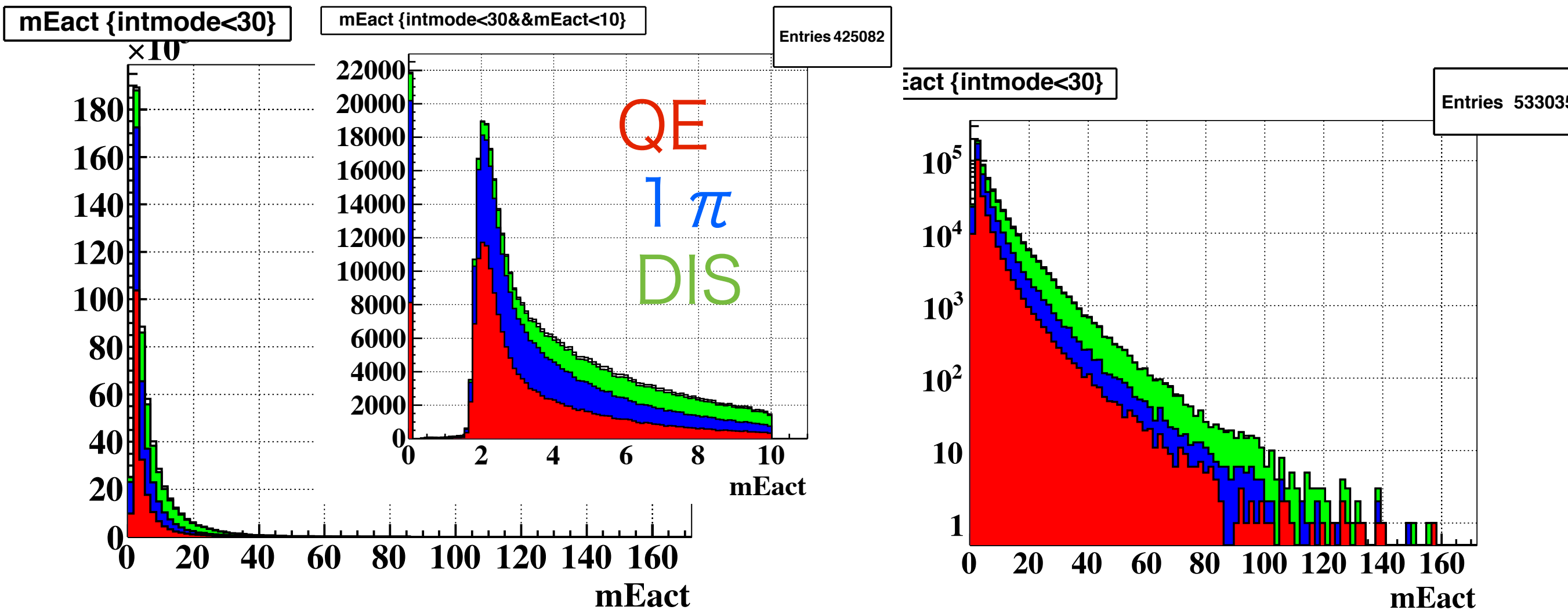
Mean Edep / Active plane 分布

$15p.e./MIP(2MeV)$

Threshold [p.e.]	12	15	18	21	24	27
Threshold [MeV]	1.6	2	2.4	2.8	3.2	3.6
# of entry	606649	570175	502951	455674	420975	391588
ratio to total	0.84257	0.7919097	0.6985431	0.6328806	0.5846875	0.543872

15p.e.以降、Efficiencyは下がっていく

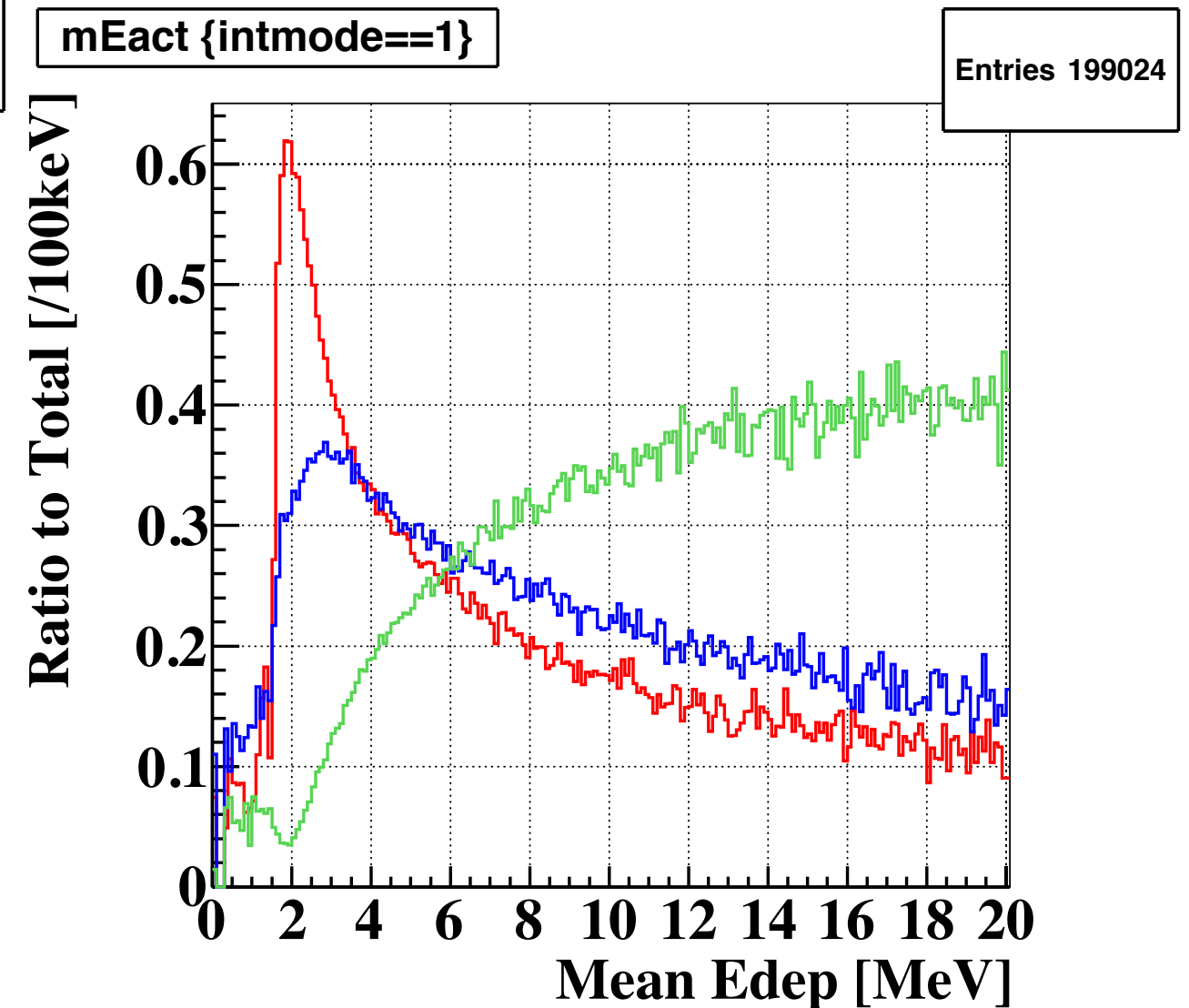
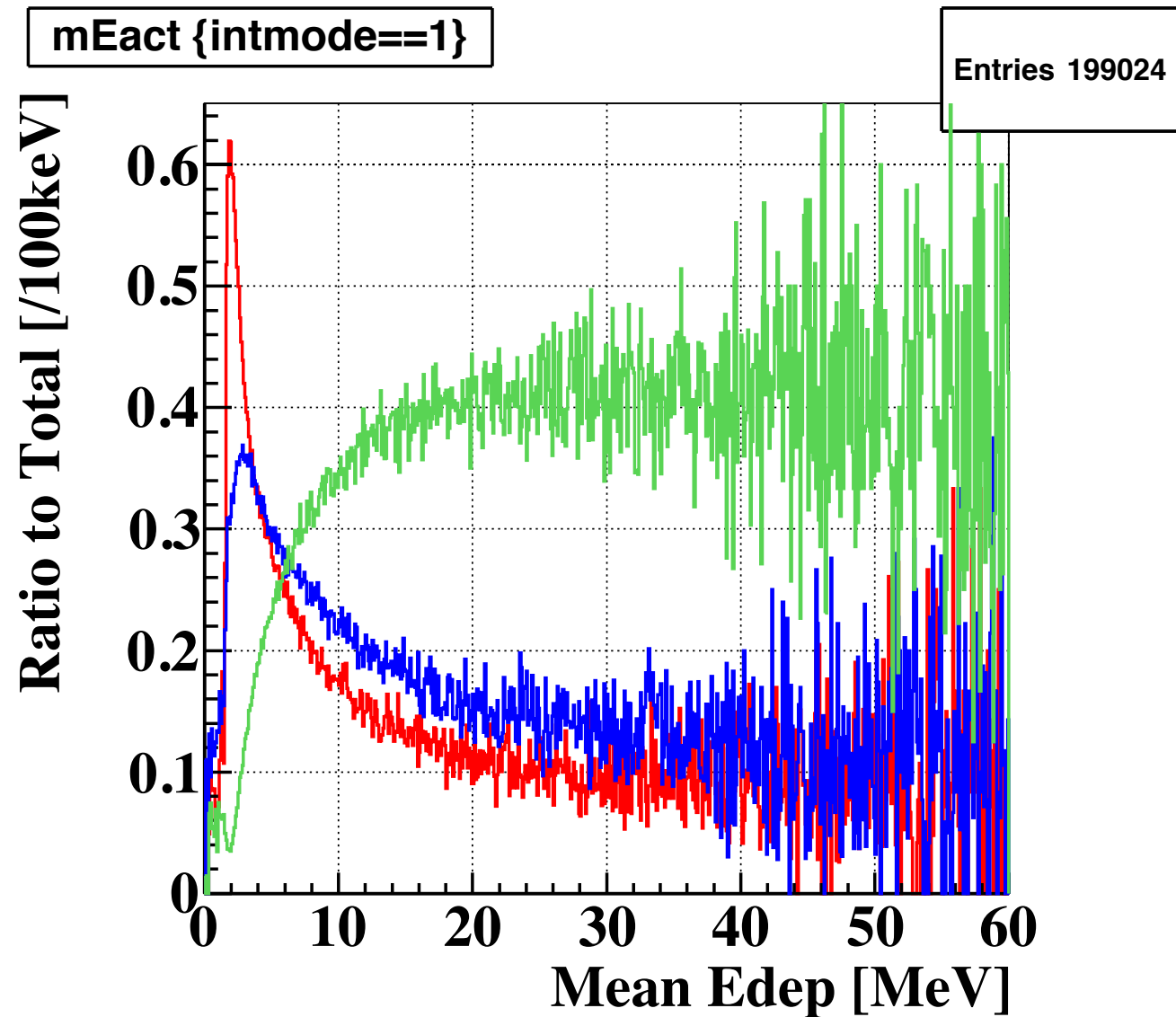
interaction mode (CC)



CC反応のみを描写

interaction mode (CC)

Total(CC+NC)との比



Mean Edep = 2MeVにピーク

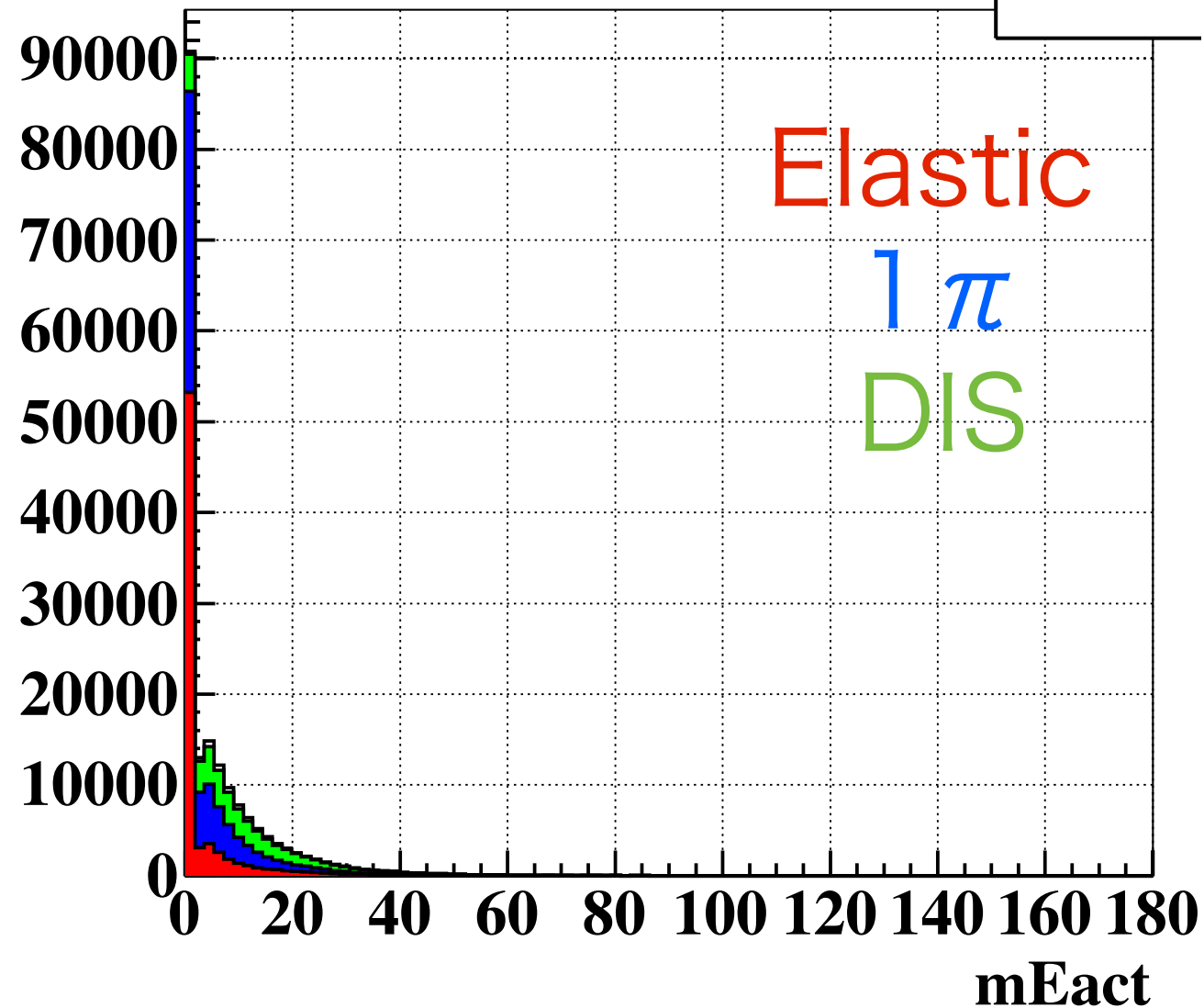
interaction mode (CC)

	nocut	Mean Edep>1	Mean Edep>1.13	Mean Edep>1.6	Mean Edep>2	Mean Edep>2.4
CC all	533035	510742	510626	509826	475040	410551
QE	199024	190774	190743	190398	168152	129708
1 π	176324	164079	164026	163696	152848	130992
coherent π	3542	3524	3523	3520	3224	2712
DIS	140420	138724	138695	138582	137272	133845

interaction mode NC

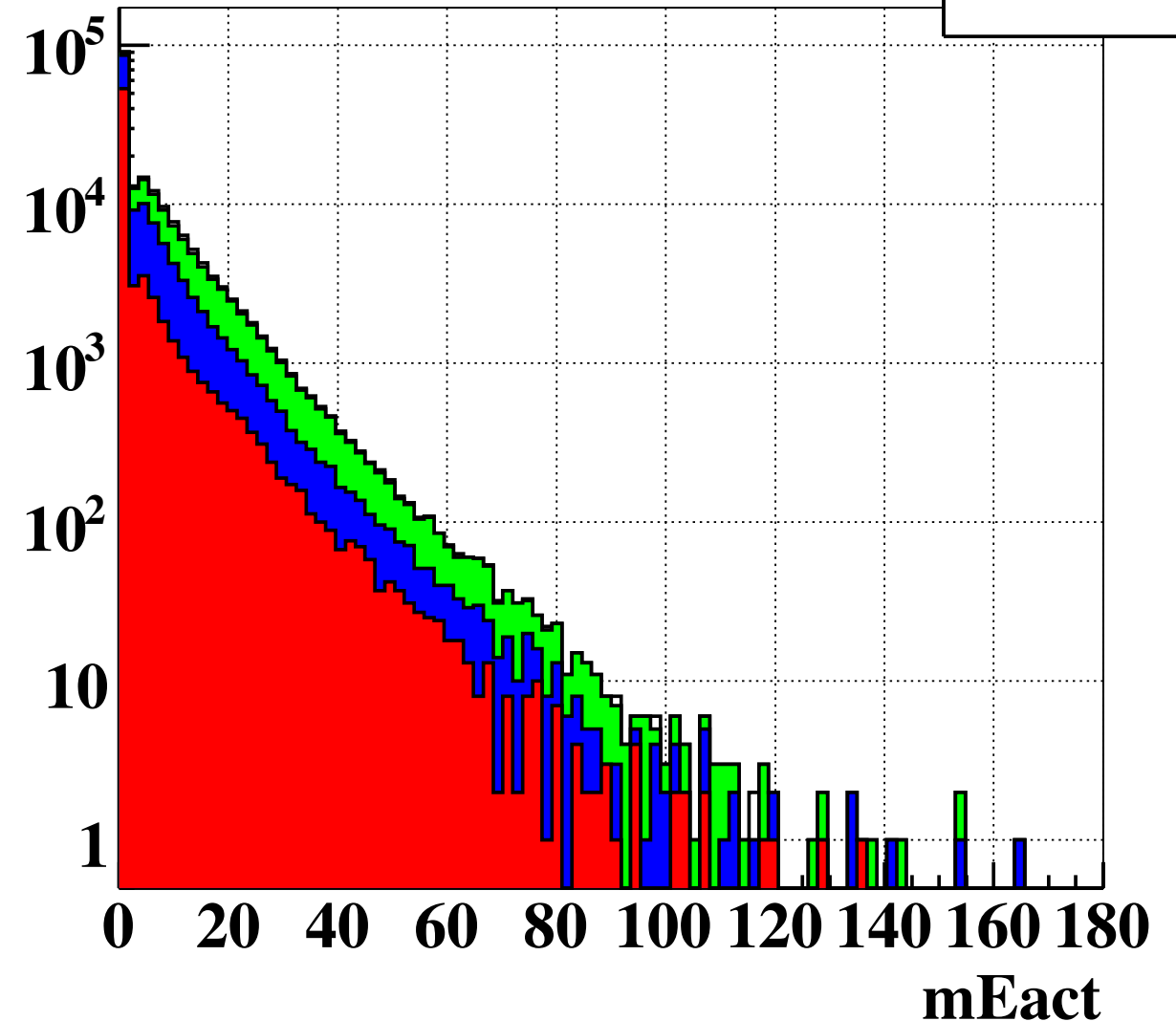
mEact {intmode>30}

Entries 1869



mEact {intmode>30}

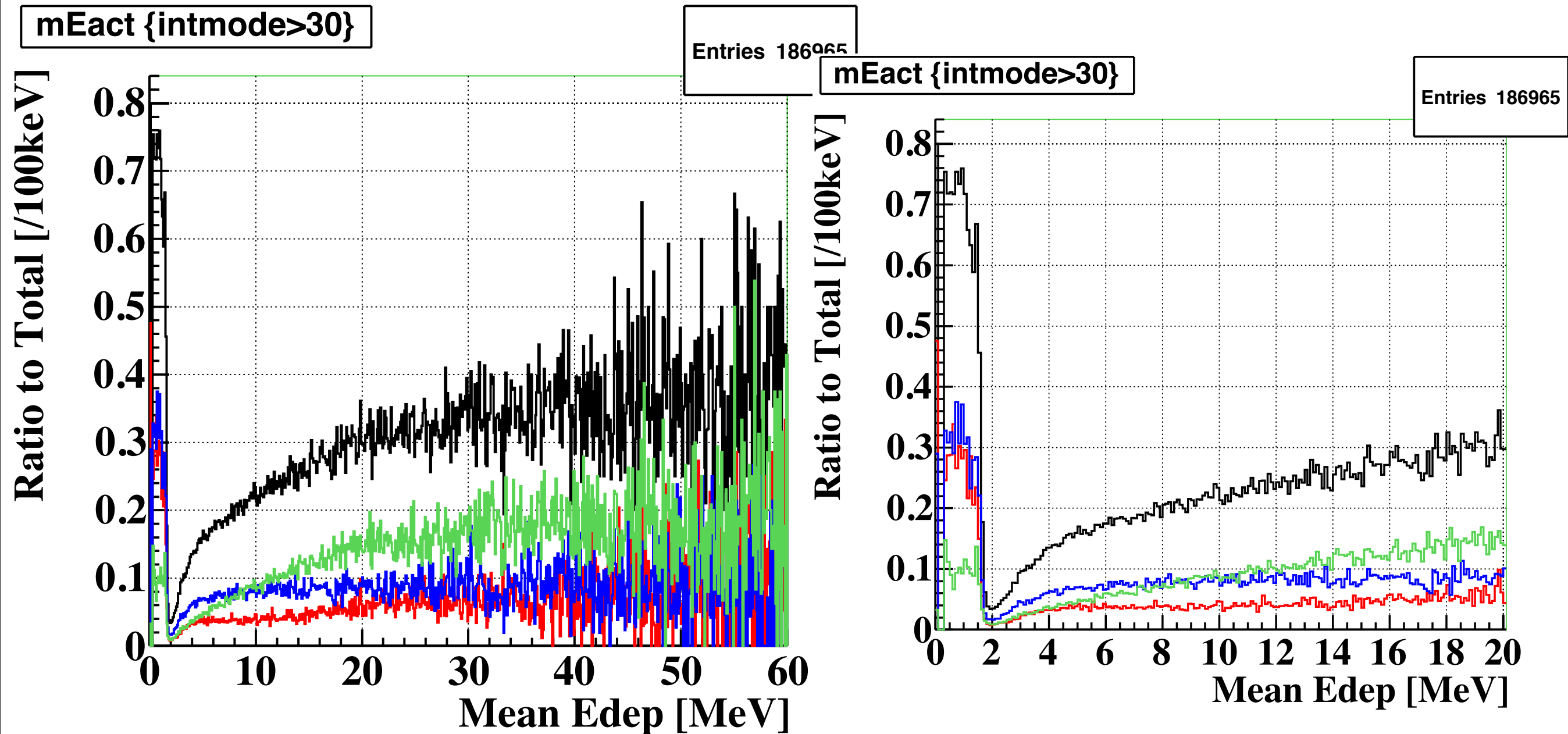
Entries 186965



Mean Edep = 0MeVにピーク

NC反応のみを描写

interaction mode NC

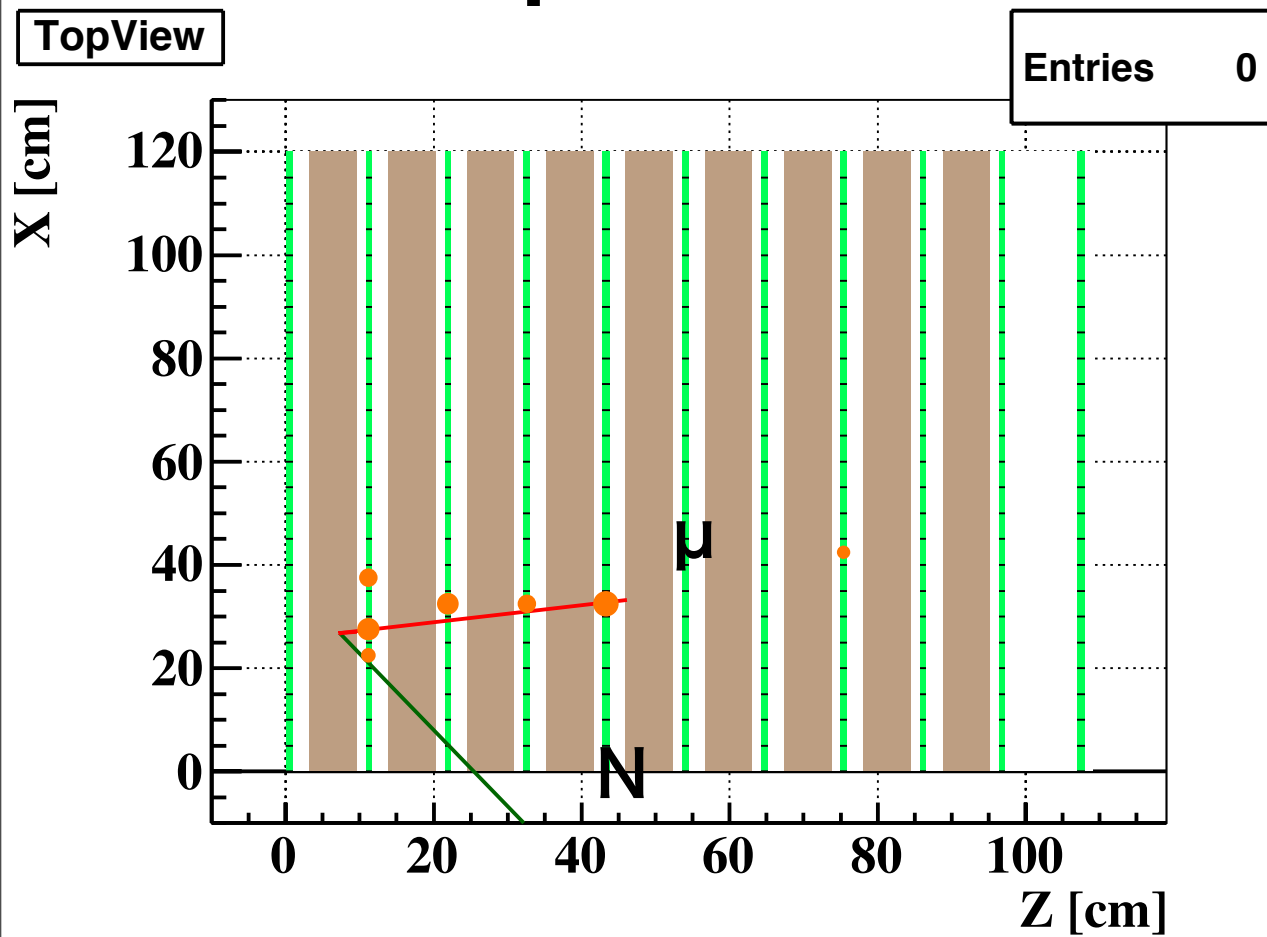


CCとは違い、2MeV付近で最小に

interaction mode 分布

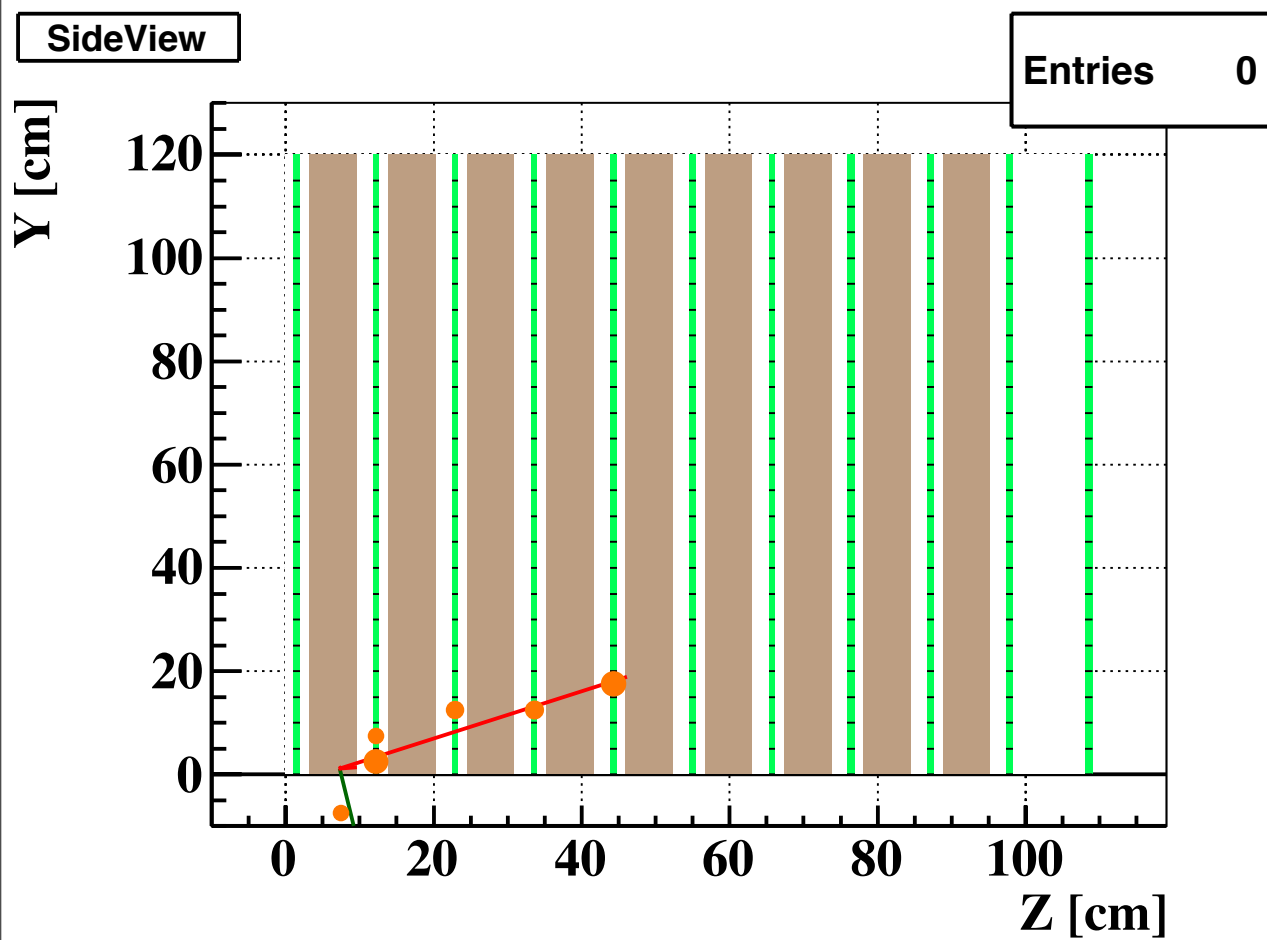
	nocut	Mean Edep>1	Mean Edep>1.13	Mean Edep>1.6	Mean Edep>2	Mean Edep>2.4
NC all	186965	98220	97951	96823	95135	92400
Elastic	72929	20403	20297	19888	19450	18775
1 π	67024	35253	35145	34673	33939	32720
coherent π	2029	1586	1580	1547	1493	1422
DIS	40415	36705	36659	36474	36057	35350

upstream veto cut



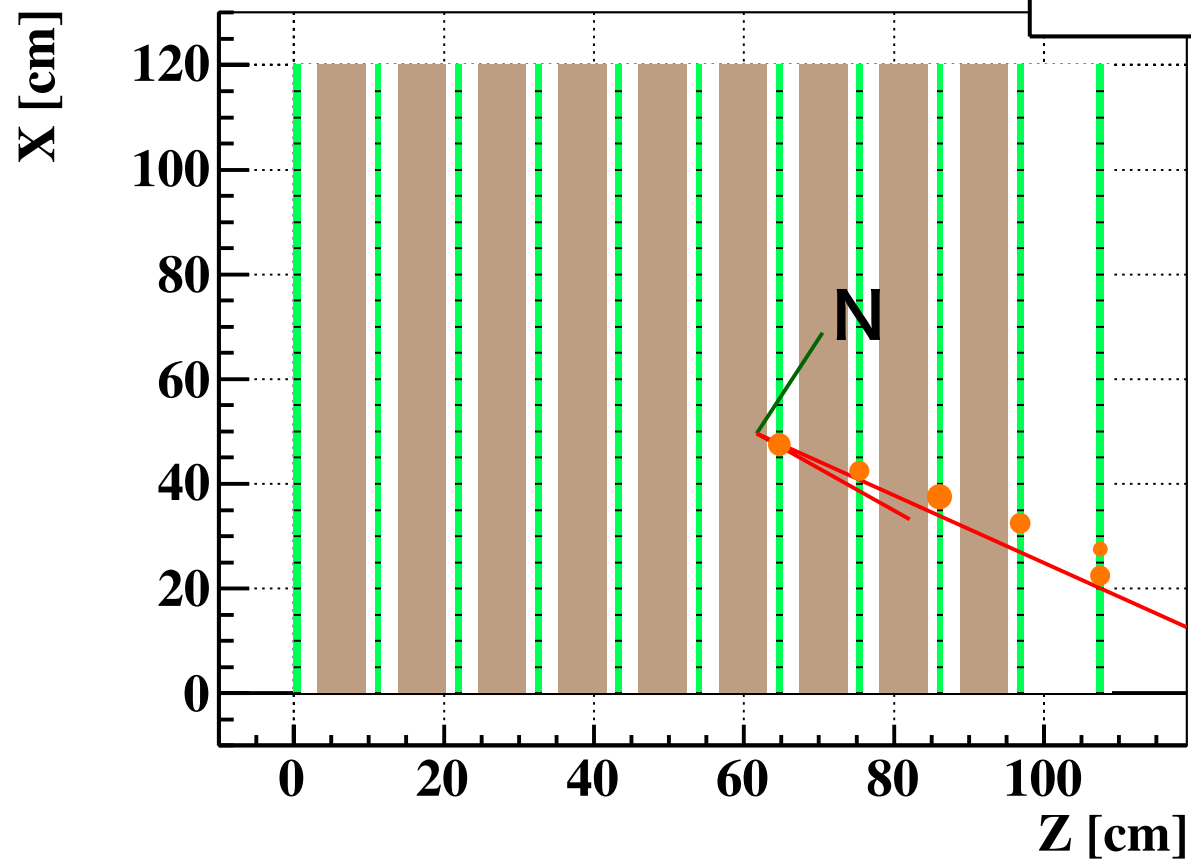
$E_{\nu}=1.4\text{GeV}$

Mode : CC1 π



upstream veto cut

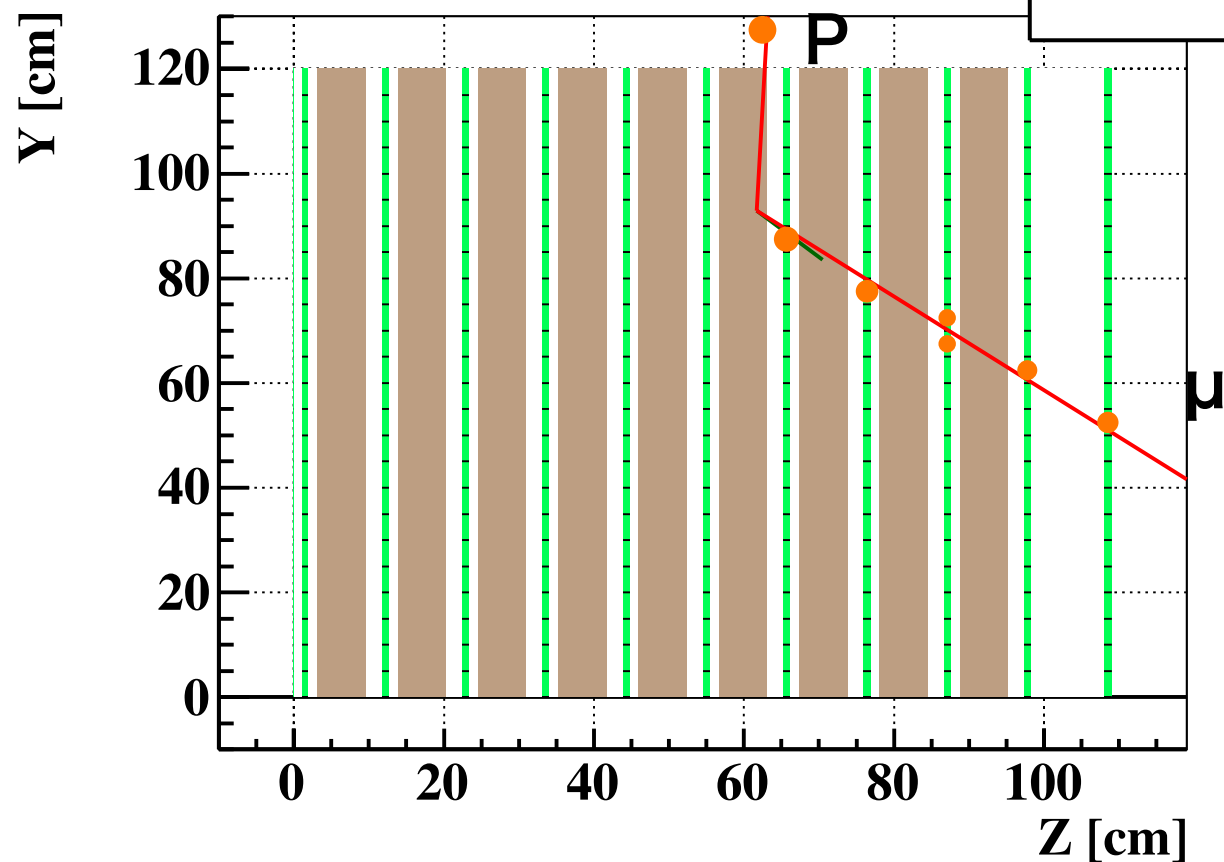
TopView



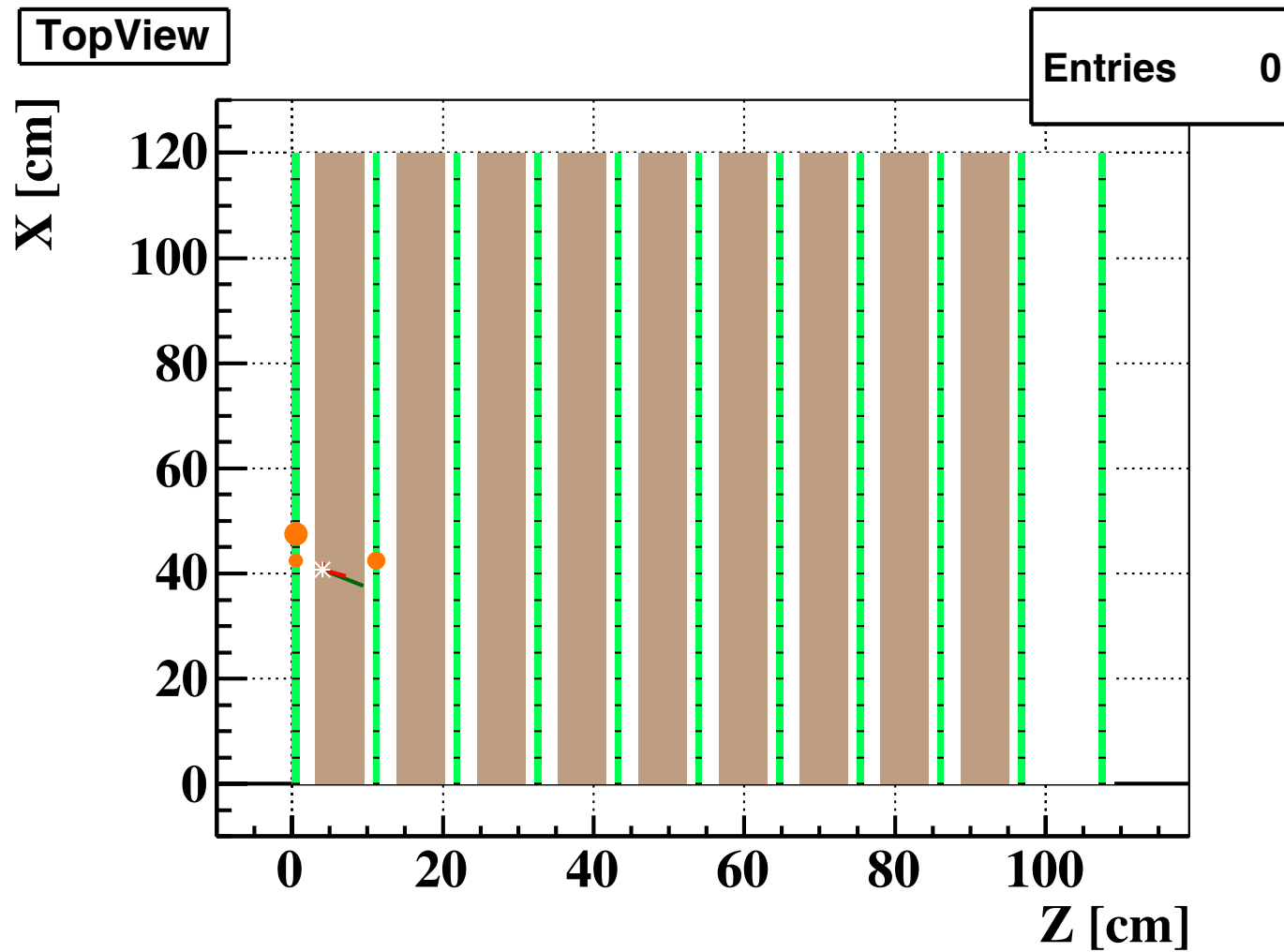
Enu=1.3GeV

Mode : CCQE

SideView



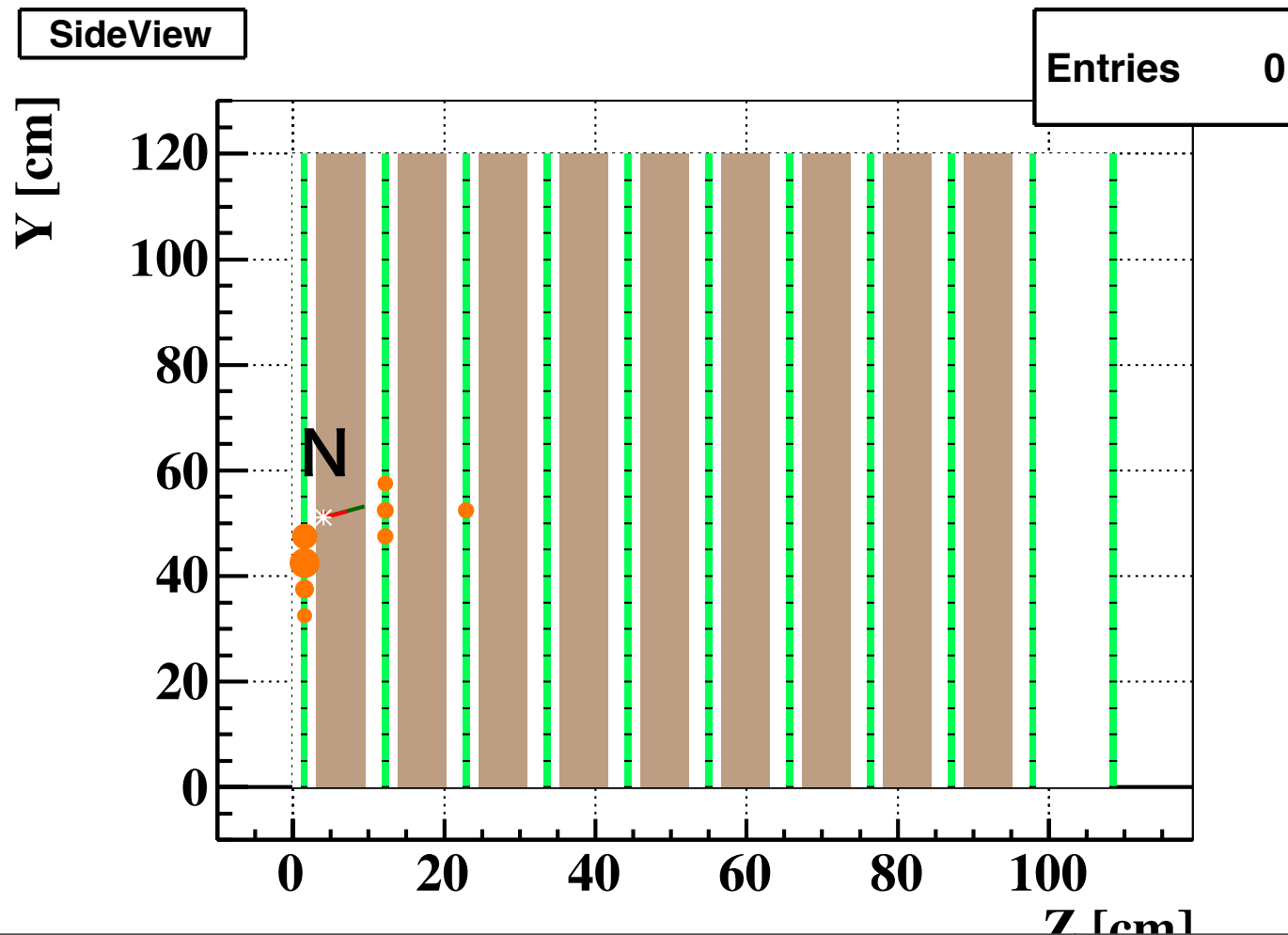
μ



upstream veto

Enu : 1.8GeV

NCDIS



horn1,2,3 = 320kA

Efficiency

	All	%	Enu<3GeV	%
no cut	720000		534145	
active plane > 1	521370	72.4	356795	66.7974052
Mean p.e. > 8.5 p.e.	608563	84.5	434924	81.4243323
upstream veto	683957	95	512578	95.9623323
All cut	491723	68.3±0.1	340819	63.806457

14module(Fe 7.11ton/module×14)で期待されるニュートリノ反応数に検出効率をかけて

3.776±0.005 events/14modules/10¹⁴POT