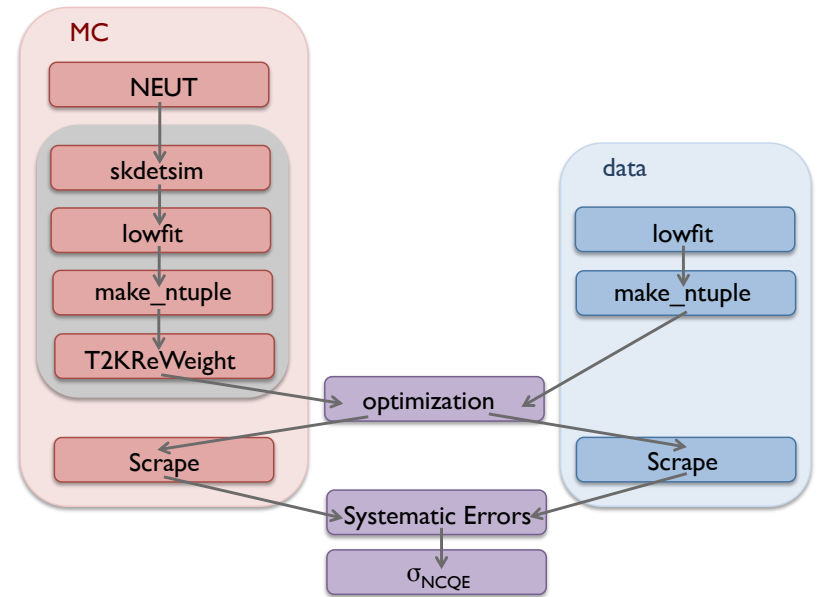


ncgamma analysis tools

work with the
new Kamioka computer system
from February 2017

- done lowfit and make_ntuple for T2K Run 4
- problems with neut, specifically neut_select
- problems with T2KReVWeight
- compare to previous data results
- will make improvements to MC



Compare previous data results

Skip to **Scrape** step

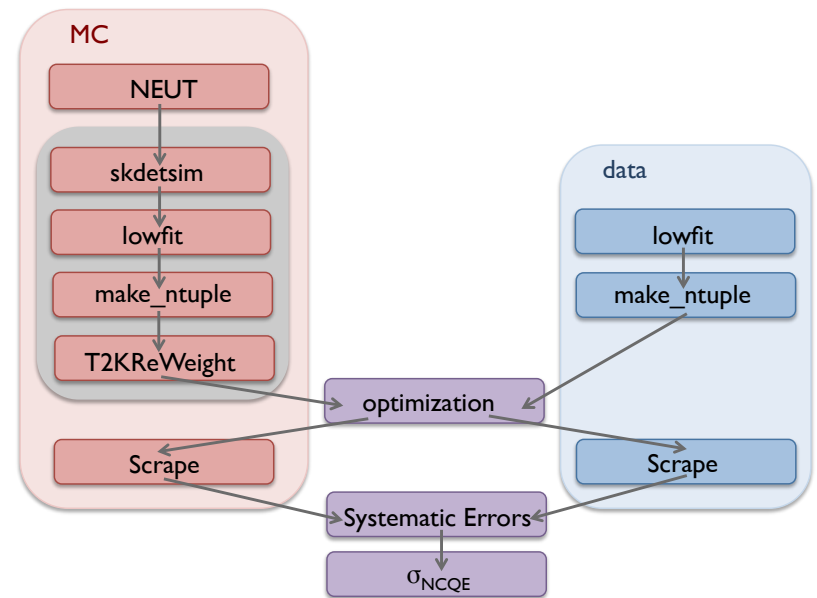
Processing/SelectNCGamma_data.py

Currently using old beamweights

```
cp -r ~/usr4/July2015/ncgamma/SystematicErrors/beamweights/
```

→ what does this mean exactly?

```
python SelectNCGamma_data.py -o ncgammahistRun4.root -l ncgammaRun4.list /  
disk01/usr4/cnantis/lowedata/ntuple/data.lowfit.7*.merge.root
```



Import Error

```
~/ncgamma/Processing@sukap001[134]_% python SelectNCGamma_data.py -o ncgammahist
Run4.root -l ncgammaRun4.list /disk01/usr4/cnantis/lowedata/ntuple/data.lowfit.
7*.merge.root
Traceback (most recent call last):
  File "SelectNCGamma_data.py", line 29, in <module>
    import progressbar as pb
ImportError: No module named progressbar
```

- commented out that line
- and all other pb

Many errors for data runs

- maybe that's ok
- not all runs have candidates
- for example, no error because run 70524 had h1 tree

```
Error in <TChain::LoadTree>: Cannot find tree with name h1 in file /disk01/usr4/cnantais/lowedata/ntuple/data.lowfit.70620.merge.root
Error in <TChain::LoadTree>: Cannot find tree with name h1 in file /disk01/usr4/cnantais/lowedata/ntuple/data.lowfit.70628.merge.root
Error in <TChain::LoadTree>: Cannot find tree with name h1 in file /disk01/usr4/cnantais/lowedata/ntuple/data.lowfit.70635.merge.root
Error in <TChain::LoadTree>: Cannot find tree with name h1 in file /disk01/usr4/cnantais/lowedata/ntuple/data.lowfit.70636.merge.root
Error in <TChain::LoadTree>: Cannot find tree with name h1 in file /disk01/usr4/cnantais/lowedata/ntuple/data.lowfit.70637.merge.root
Error in <TChain::LoadTree>: Cannot find tree with name h1 in file /disk01/usr4/cnantais/lowedata/ntuple/data.lowfit.70639.merge.root
Error in <TChain::LoadTree>: Cannot find tree with name h1 in file /disk01/usr4/cnantais/lowedata/ntuple/data.lowfit.70643.merge.root
Error in <TChain::LoadTree>: Cannot find tree with name h1 in file /disk01/usr4/cnantais/lowedata/ntuple/data.lowfit.70645.merge.root
Error in <TChain::LoadTree>: Cannot find tree with name h1 in file /disk01/usr4/cnantais/lowedata/ntuple/data.lowfit.70654.merge.root
```

ncgammaRun4.list

- 59 events (GOOD!)
- skrun, sksub, skey, ereco, dt0, dwall, effwall, ovaq

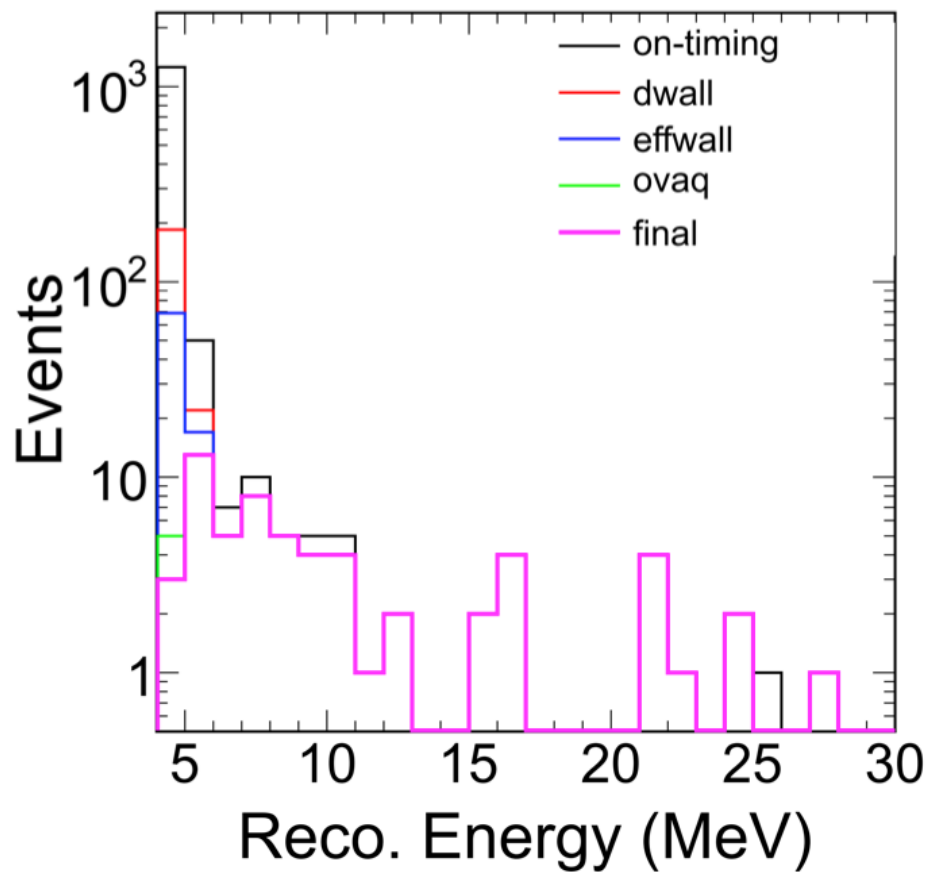
ncgammahistRun4.root

- many, many histograms
- looked at errec, dwall, effwall, and ovaq
- as a function of cuts for timing, dwall, effwall, ovaq, and Cherenkov angle

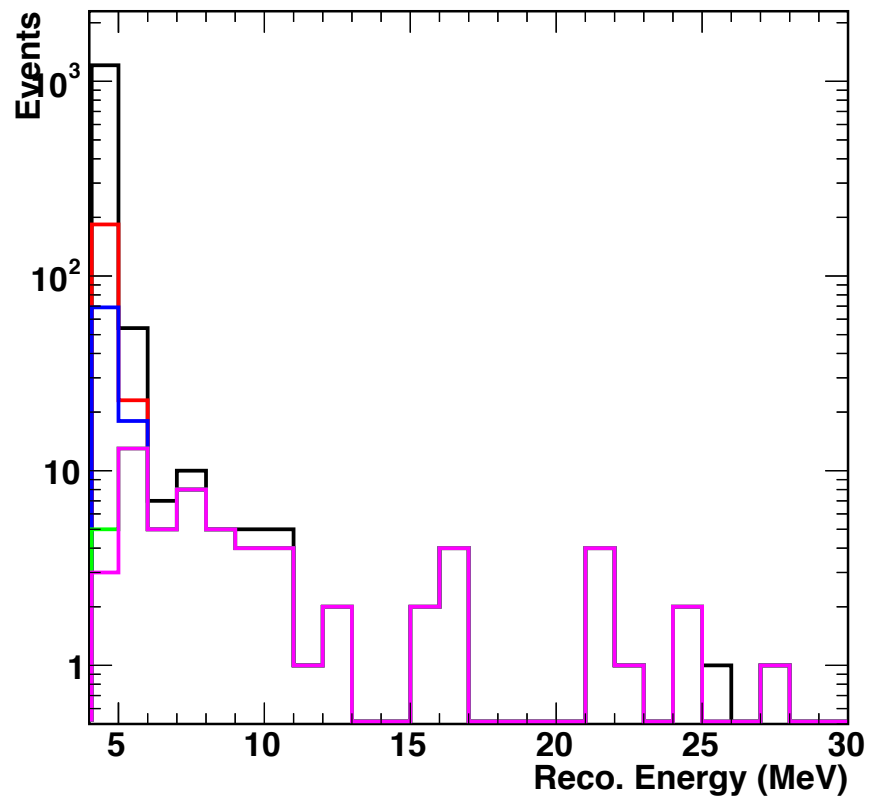
- I haven't understood all of the plots yet
- for example, more than 59 events in vertex plots?

erec

TN-244



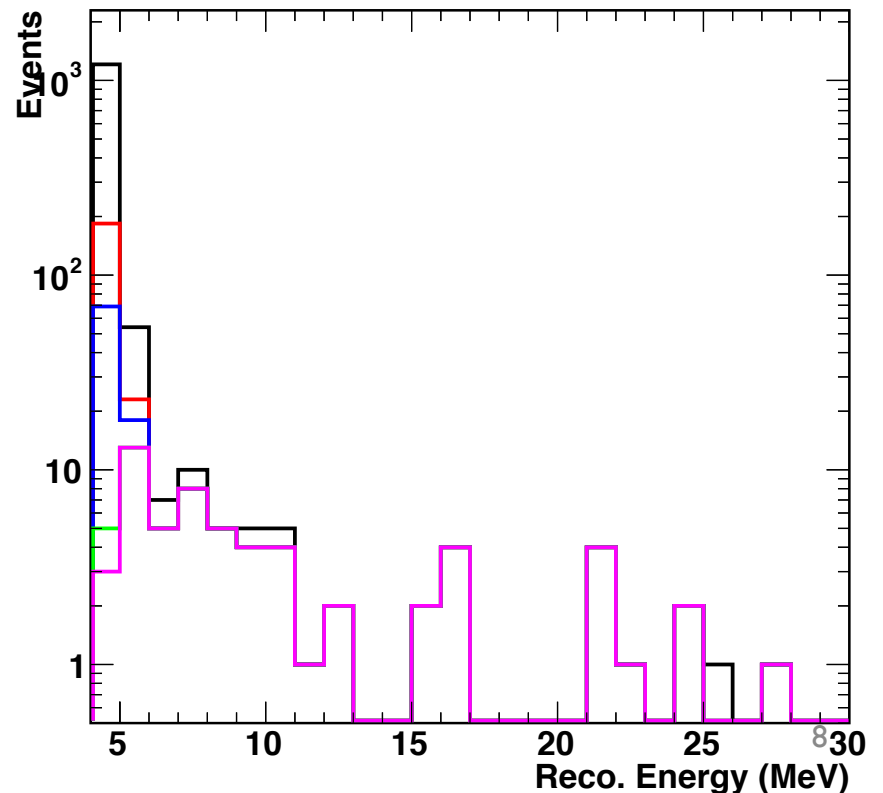
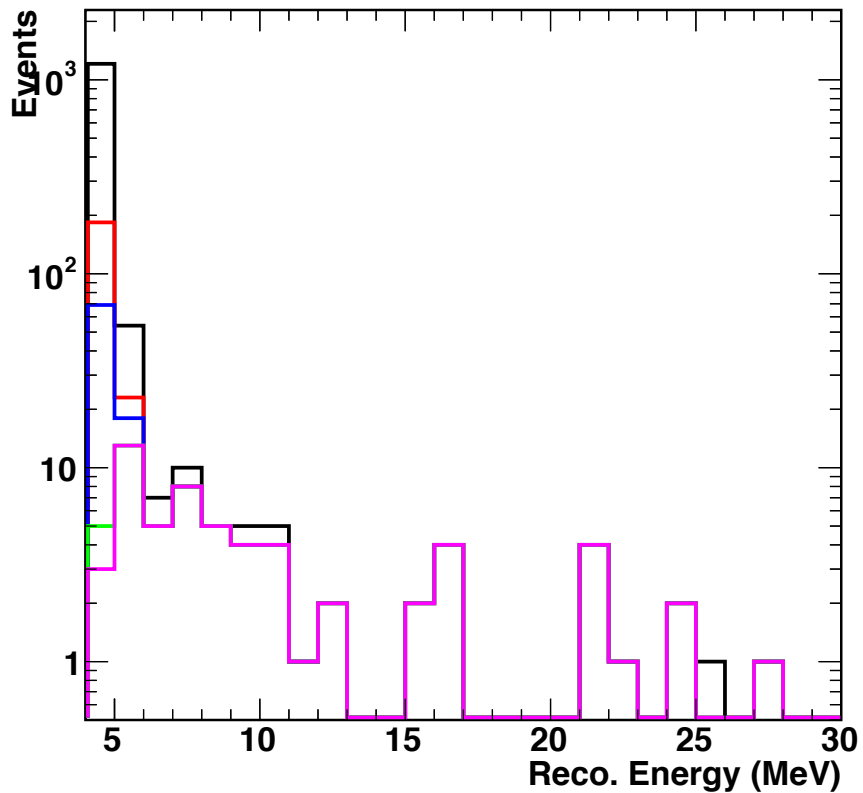
current work



erec

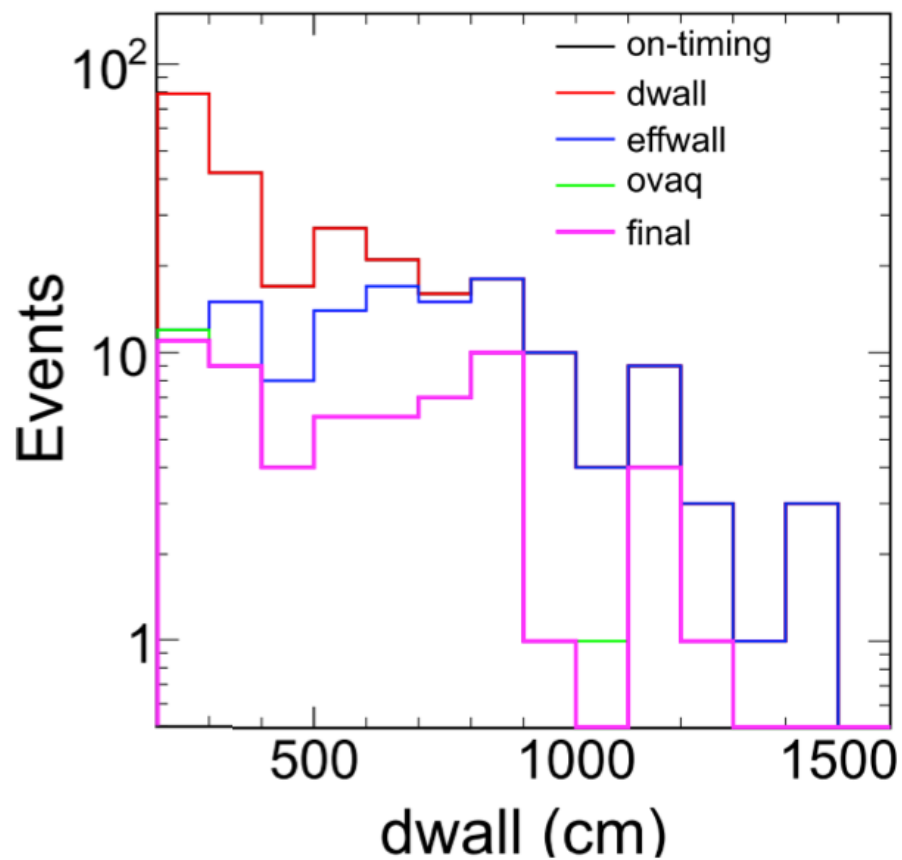
07 Jan 2016

current work

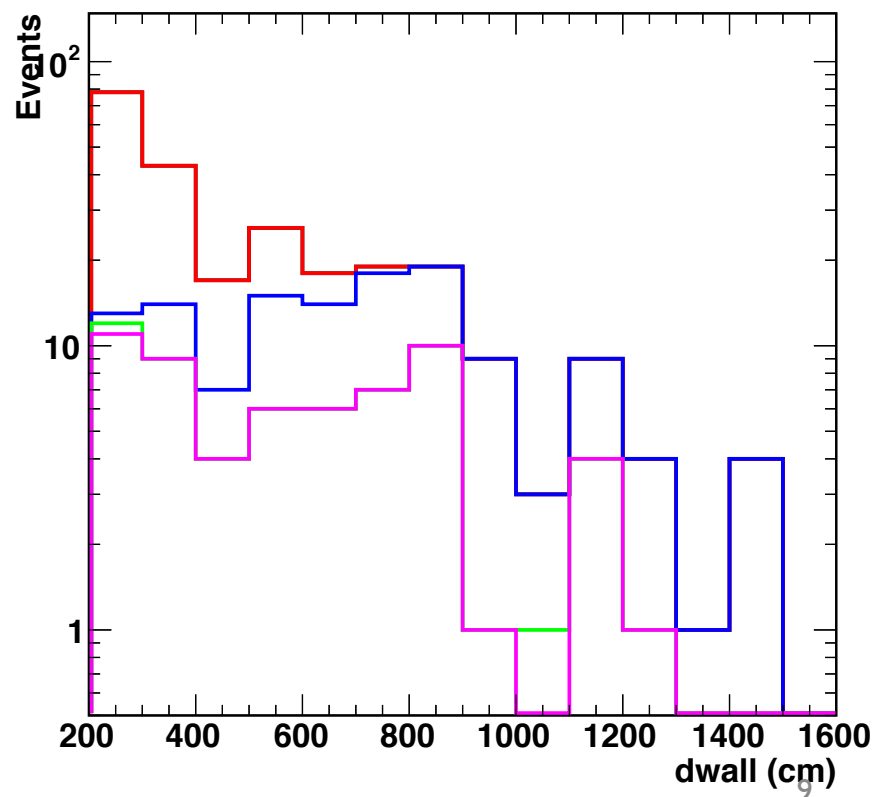


dwall

TN-244



current work

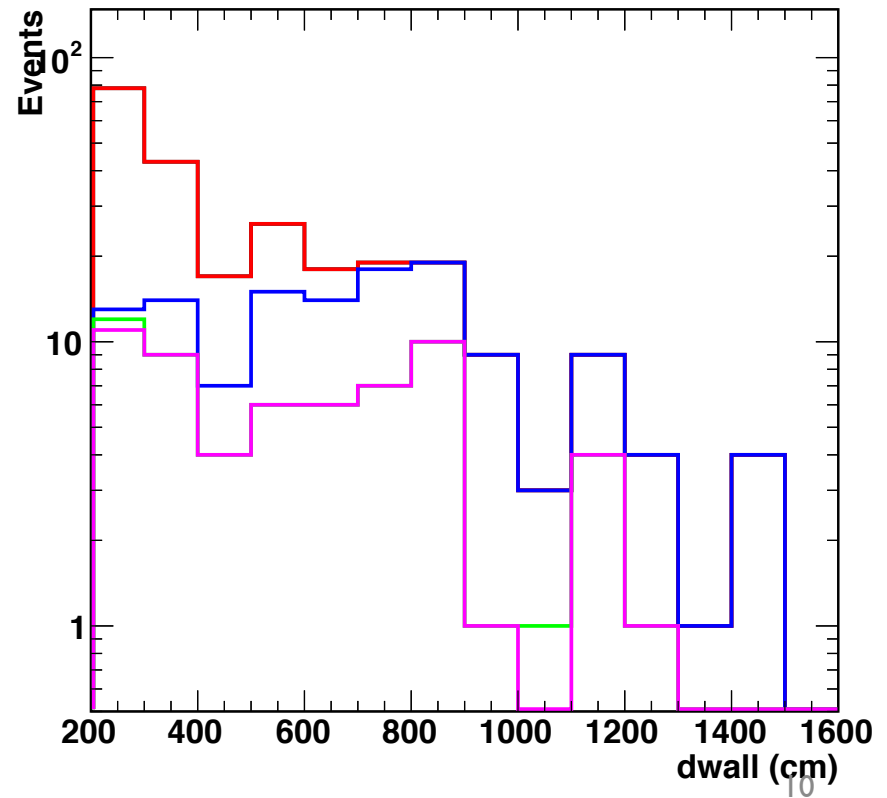
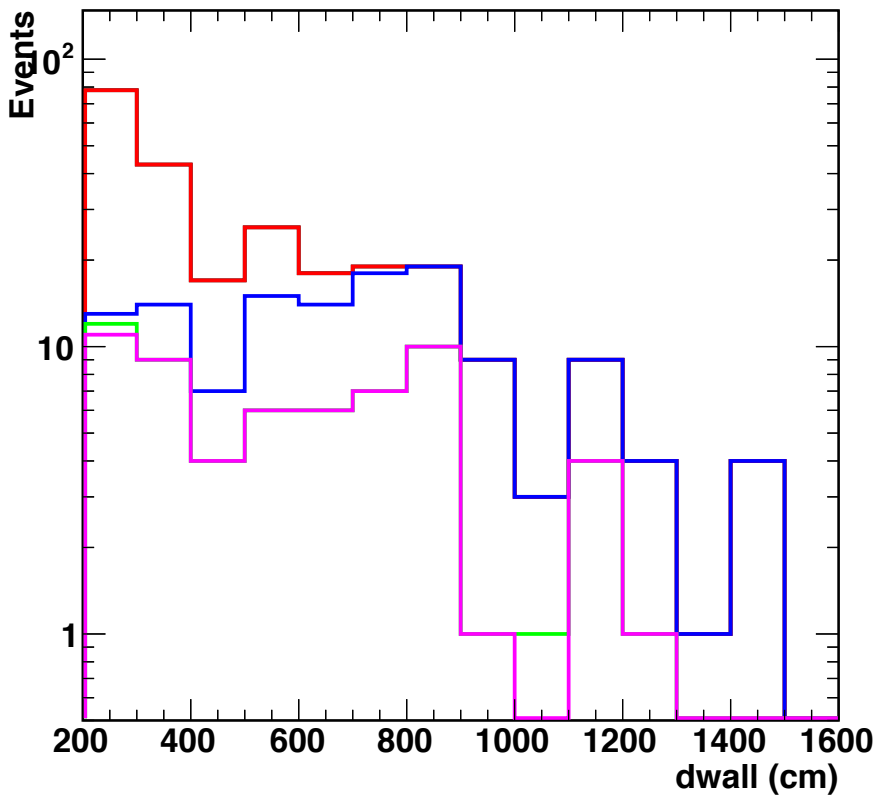


dwall

07 Jan 2016

current work

differences, but not in final sample

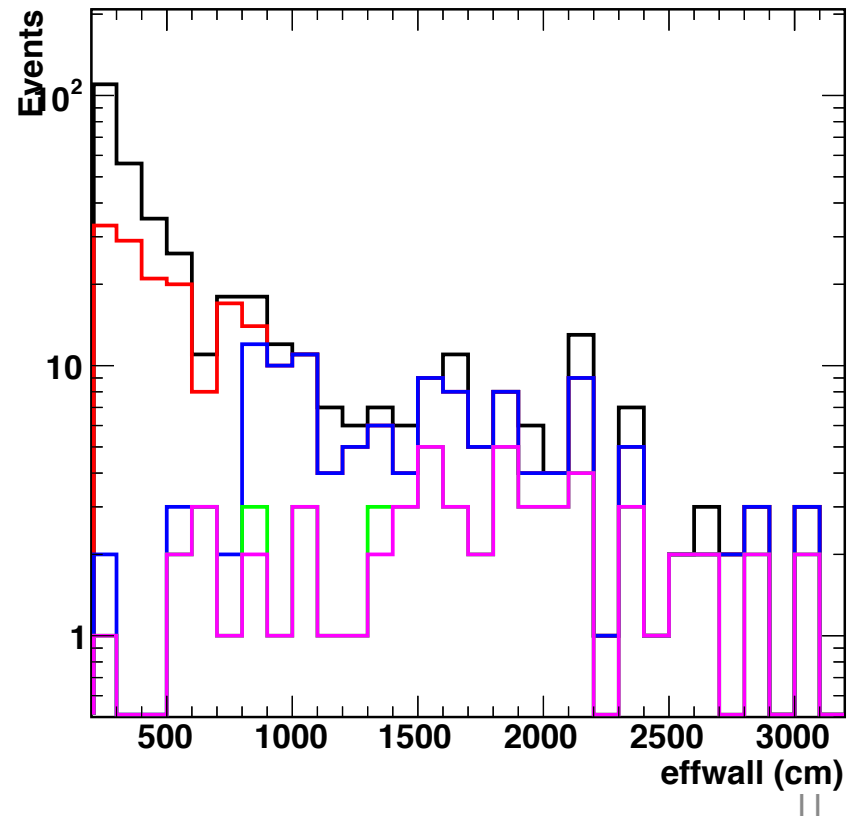
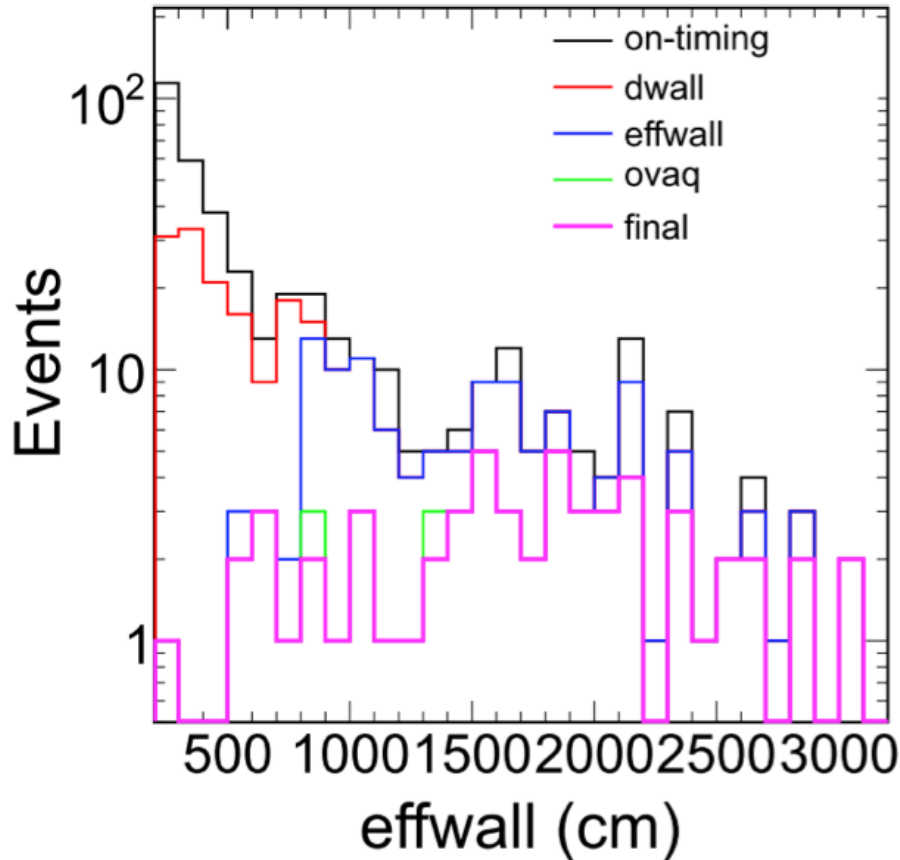


effwall

TN-244

current work

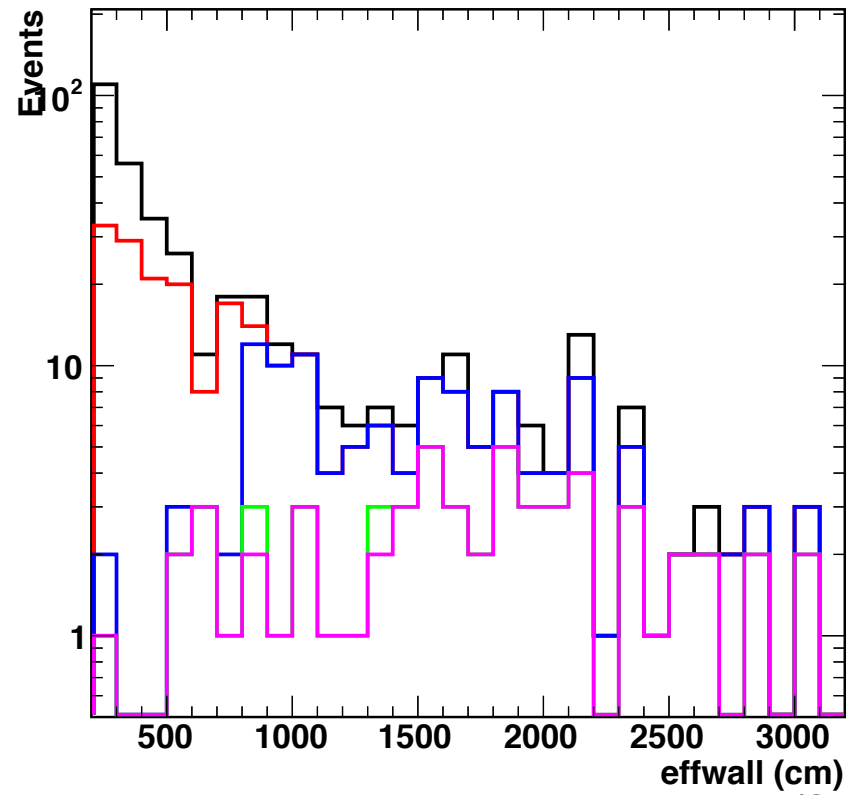
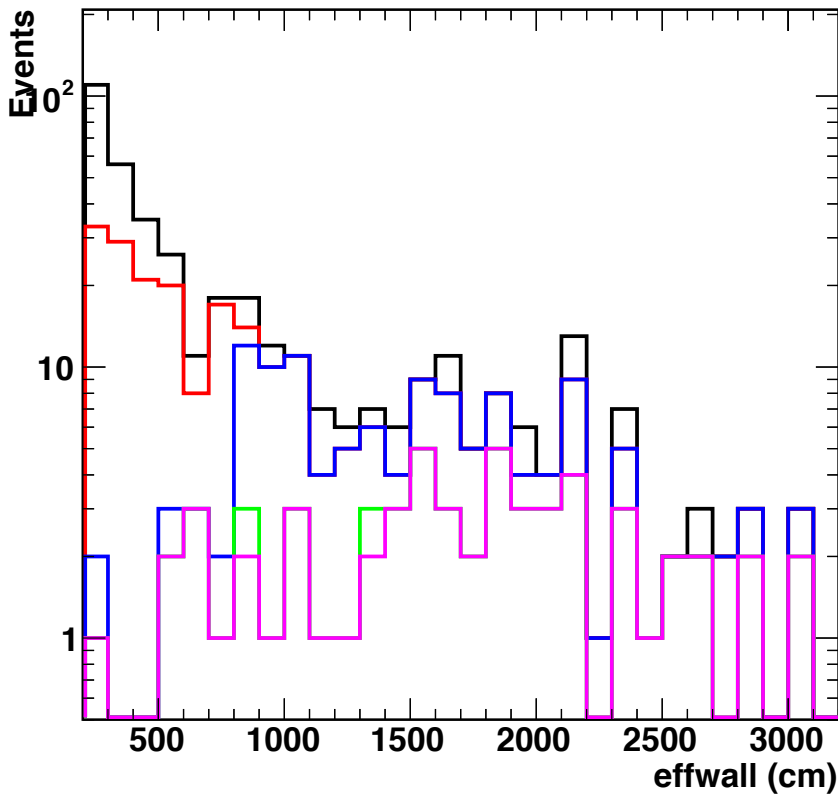
differences, but not in final sample



effwall

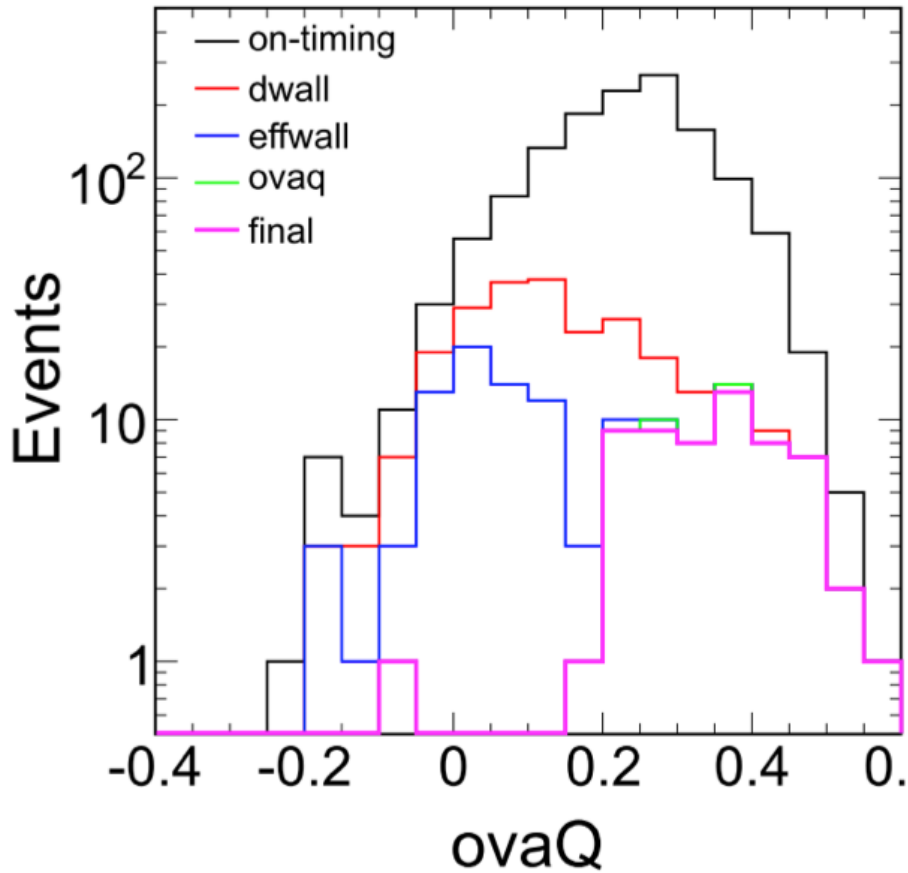
07 Jan 2016

current work



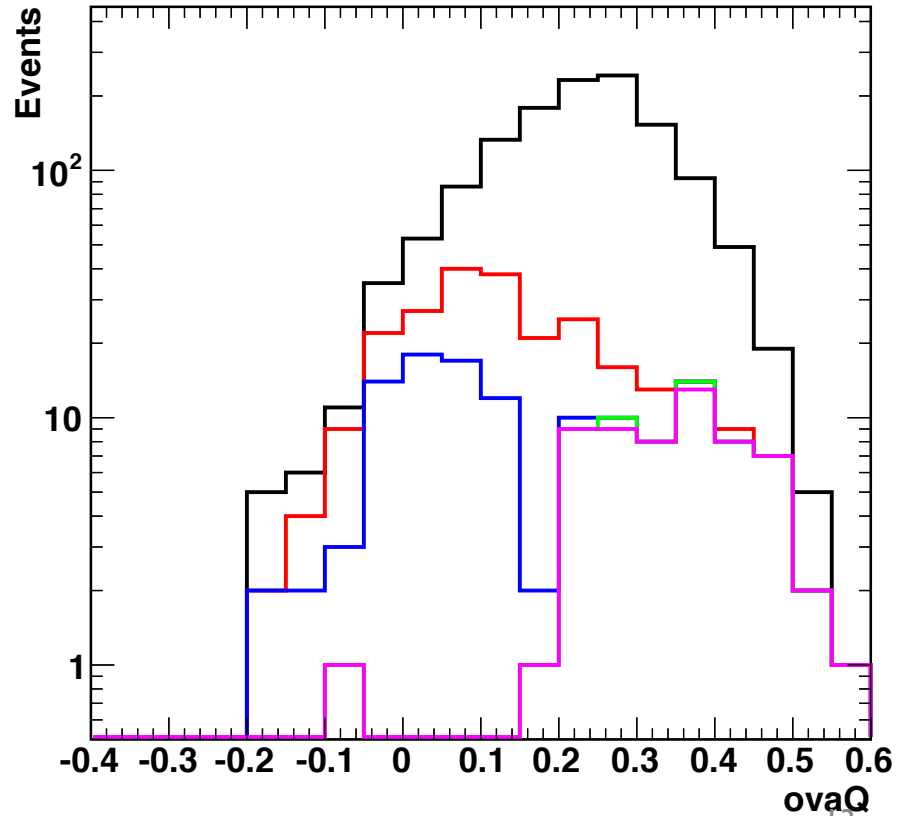
ovaQ

TN-244



current work

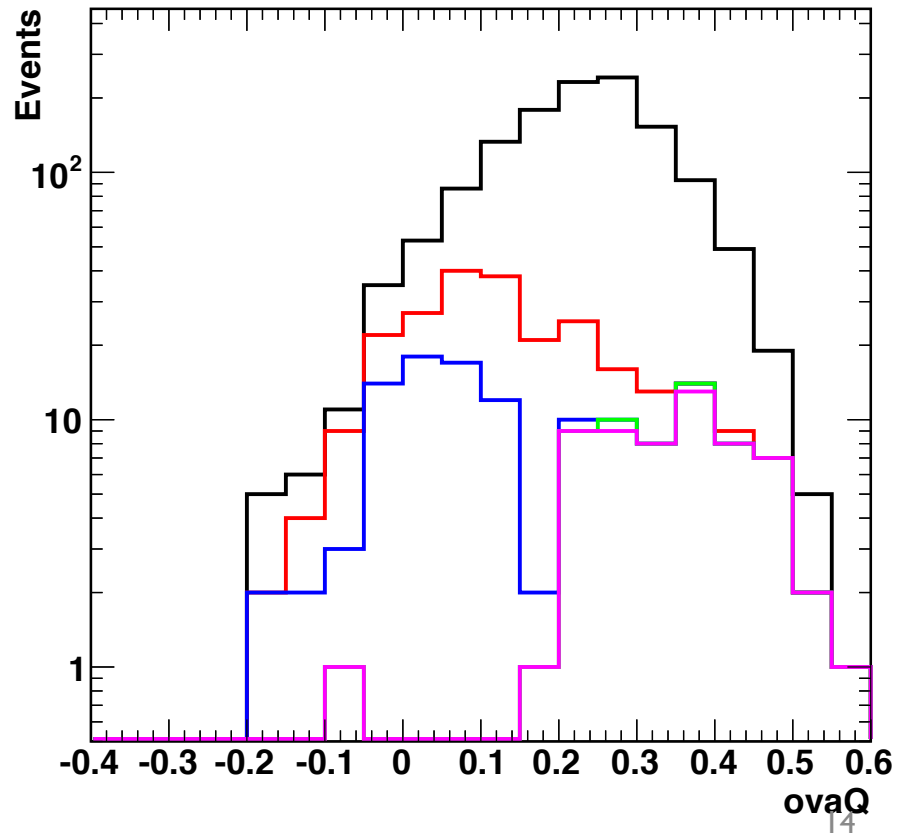
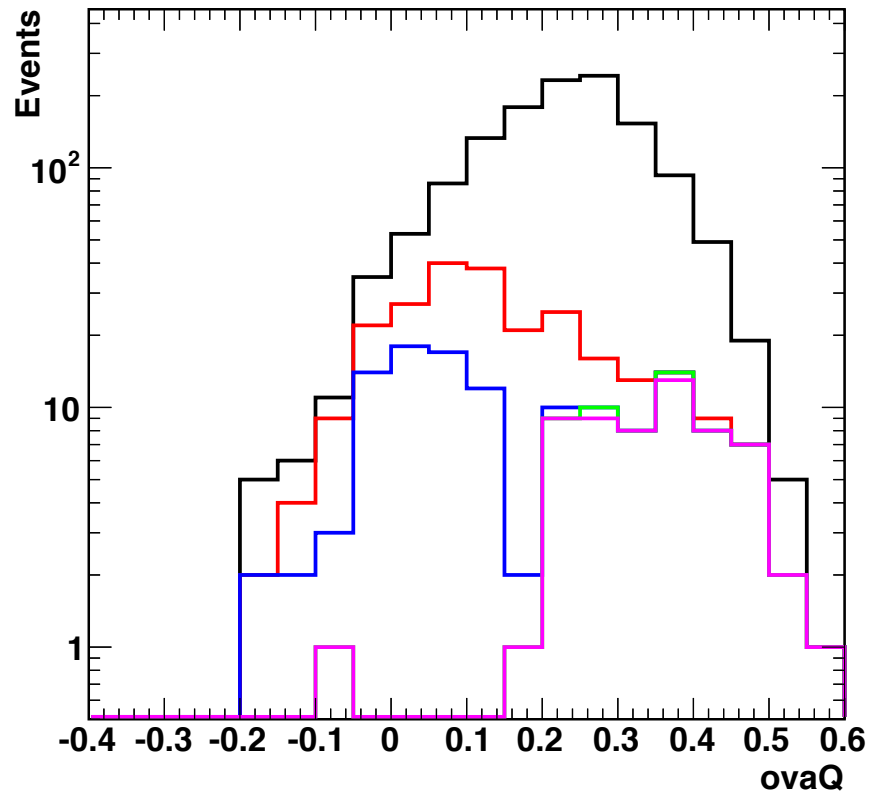
differences, but not in final sample



ovaQ

07 Jan 2016

current work



A question from Fukuda-san

T2K Run4 NCQE event number

```
* skrun, sksub, skev, errec, dwall, effwall, ovaq, angle, vertex[0], vertex[1], vertex[2]
70550, 946, 234582333, 6.75, 642.22, 1610.65, 0.218, 46.80, -779.71 699.93 -822.29
70564, 487, 116754219, 5.03, 316.76, 1968.99, 0.344, 52.20, 128.62 -1367.20 -170.42
70585, 100, 24916433, 16.62, 366.08, 2616.93, 0.455, 74.70, -1323.15 44.97 -10.49
70585, 402, 97547811, 5.23, 221.73, 1799.82, 0.333, 40.50, -1385.00 -487.44 121.07
70603, 1421, 351496285, 10.29, 481.50, 2089.45, 0.230, 87.30, -581.39 1059.46 -54.31
70603, 408, 101177080, 5.93, 294.56, 3351.66, 0.475, 40.50, 1380.65 202.62 -232.32
70613, 1021, 253417626, 10.68, 299.02, 1392.29, 0.428, 77.40, 75.15 -385.88 -1510.98
70613, 363, 89876334, 5.31, 895.25, 1919.29, 0.355, 47.70, 143.89 -316.36 -914.75
70616, 800, 198368914, 21.41, 717.44, 2596.65, 0.175, 81.00, -971.04 54.39 134.25
70617, 114, 28265406, 16.31, 915.44, 1525.37, 0.412, 74.70, -615.81 -442.88 894.56
70672, 1138, 280512312, 5.73, 707.46, 1592.80, 0.418, 44.10, 193.77 -963.24 666.64
70672, 1194, 294487810, 6.51, 880.54, 1415.68, 0.288, 48.60, 147.63 -533.01 -929.46
70674, 636, 153968237, 7.55, 541.58, 2660.54, 0.326, 77.40, -1113.85 -279.69 815.68
70677, 185, 45293230, 16.64, 412.82, 505.47, 0.255, 87.30, -742.74 -1039.00 -765.82
70689, 588, 138934583, 11.20, 238.15, 278.15, 0.425, 85.50, -447.93 -783.81 -1571.85
70701, 271, 67214290, 12.22, 278.52, 3022.92, 0.451, 76.50, -1074.21 -915.61 -552.76
70701, 661, 164226239, 5.11, 1210.71, 2136.40, 0.267, 46.80, -191.22 -439.49 115.15
70710, 213, 52943360, 21.78, 271.49, 1078.17, 0.300, 87.30, 451.46 1344.75 884.19
70833, 931, 221835202, 8.17, 1146.04, 2350.10, 0.390, 41.40, 396.75 -372.13 606.60
70834, 400, 99618169, 6.42, 336.25, 2160.96, 0.375, 42.30, -415.33 50.23 1473.75
70835, 221, 54474696, 5.32, 1176.31, 1830.56, 0.314, 55.80, 135.25 -495.56 -348.17
70840, 1441, 357268559, 5.67, 784.56, 1126.57, 0.353, 58.50, -214.63 -628.26 1025.44
70841, 623, 154810942, 15.24, 515.98, 1401.59, 0.454, 36.90, -194.99 221.55 1294.02
70842, 563, 137131739, 8.94, 319.30, 2820.62, 0.379, 79.20, -1174.09 -477.97 1490.70
70844, 1476, 363617993, 16.49, 345.63, 2433.97, 0.595, 83.70, -702.30 -365.79 -1464.37
70851, 1494, 365761760, 8.98, 470.82, 1223.45, 0.296, 46.80, -249.85 652.68 -1339.18
70852, 1004, 244590448, 5.96, 349.55, 1073.30, 0.249, 44.10, -1293.30 352.41 -34.20
70855, 275, 68207601, 24.73, 786.36, 1802.63, 0.471, 45.00, -377.10 354.00 -1023.64
70855, 887, 217706387, 24.77, 818.32, 2370.57, 0.353, 87.30, 579.12 -373.01 991.68
70856, 111, 27180117, 22.28, 861.94, 1527.88, 0.255, 76.50, 571.35 -599.36 -685.73
70858, 54, 12855212, 7.76, 748.65, 1672.16, 0.481, 68.40, -475.13 438.55 -1061.35
70863, 662, 159385402, 7.24, 286.48, 981.64, 0.286, 45.00, -1363.36 -333.36 1274.01
70868, 932, 230658043, 27.24, 567.99, 1870.19, 0.246, 86.40, 143.15 -161.94 -1242.01
70869, 534, 131621157, 4.91, 1138.35, 1725.33, 0.327, 45.00, 544.40 89.18 609.21
70870, 1463, 362951229, 15.24, 384.11, 807.79, 0.501, 84.60, -248.66 -1281.99 745.48
70871, 540, 134289348, 6.16, 585.19, 2821.61, 0.523, 42.30, -1024.25 -414.14 562.51
70876, 643, 158679509, 4.85, 806.50, 2068.94, 0.433, 43.20, -578.34 667.91 422.79
70902, 69, 15948635, 10.90, 844.62, 1960.14, -0.067, 46.80, 749.25 391.53 -907.35
70905, 356, 87842877, 9.03, 825.62, 1647.15, 0.360, 39.60, -560.17 658.31 269.64
70905, 575, 141756699, 21.08, 651.23, 1881.43, 0.219, 75.60, 188.01 917.00 1158.77
70906, 1122, 276877905, 9.57, 843.10, 2198.48, 0.203, 54.00, 107.70 -610.05 966.90
70909, 142, 35183303, 5.19, 379.68, 670.08, 0.421, 44.10, -1073.05 751.99 1216.72
70910, 329, 81397402, 7.06, 540.43, 736.39, 0.368, 87.30, 380.76 -654.42 1269.57
70911, 435, 107550877, 4.33, 685.04, 1561.03, 0.296, 62.10, 883.17 479.54 -200.03
70912, 627, 155220765, 12.18, 760.04, 1078.62, 0.265, 34.20, 625.57 39.04 1049.96
70983, 1042, 259288719, 8.82, 288.36, 656.87, 0.240, 72.00, 1345.40 -393.05 -1267.98
70987, 305, 75605157, 8.38, 876.40, 2162.72, 0.374, 87.30, 252.67 773.38 -406.85
71017, 456, 113399804, 5.35, 219.15, 3699.49, 0.474, 37.80, -163.05 -1461.78 1391.64
71017, 491, 122201800, 9.41, 640.82, 1545.50, 0.440, 41.40, -1018.98 -249.88 -996.73
71018, 490, 121364403, 7.10, 276.26, 892.19, 0.355, 82.80, 1409.38 110.92 35.62
71045, 451, 112008763, 9.84, 218.78, 3081.82, 0.360, 43.20, 1226.50 -812.52 -19.33
71057, 755, 185771014, 7.37, 343.68, 1886.59, 0.401, 70.20, -203.80 -156.62 -1466.32
71058, 684, 170264646, 5.81, 1137.40, 2347.29, 0.306, 41.40, -38.24 -136.94 -672.60
71060, 1358, 336232380, 5.24, 661.56, 2079.38, 0.310, 43.20, 44.99 -1027.45 -917.45
71060, 195, 48443224, 21.73, 898.19, 1301.32, 0.248, 74.70, 56.75 789.78 -183.33
71061, 30, 7253167, 7.22, 720.57, 1438.81, 0.239, 48.60, 615.17 319.28 1089.43
71065, 1015, 251739265, 7.73, 624.00, 2579.08, 0.369, 87.30, -159.34 911.76 -1186.00
71242, 131, 32286759, 10.38, 435.29, 539.88, 0.393, 87.30, 1217.12 257.39 1374.71
71242, 311, 76879601, 6.53, 537.02, 694.63, 0.349, 41.40, -602.93 -982.77 743.99
```

This information by </home/huangkx/t2k/alex/ncgamma/Processing/final.ncgamma.list>

A question from Fukuda-san

zoom from previous page, list of final candidate events in T2K Run 4

- skrun, sksub, skev, erec, dwall, effwall, ovaq, angle, vertex[0], vertex[1], vertex[2]
- 70550, 946, 234582333, 6.75, 642.22, 1610.65, 0.218, 46.80, -779.71 699.93 -822.29

```
– Old (/disk01/usr3/huang/data/ontiming/nc/ntuple/data.lowfit.70550.merge.root
  • h1 ->Scan("pos:bdir:erec:wall:effwall","nrun==70550&&nsub==946&&nev==234582333")
  • *****
  • * Row * Instance * pos * bdir * erec * wall * effwall *
  • *****
  • * 16626 * X 0 * -779.7136 * 0.0369143 * 6.7491316 * 642.21502 * 1610.6524 *
  • * 16626 * Y 1 * 699.92852 * -0.476207 * 6.7491316 * 642.21502 * 1610.6524 *
  • * 16626 * Z 2 * -822.2887 * -0.878557 * 6.7491316 * 642.21502 * 1610.6524 *
  • * 16627 * X 0 * 432.85034 * 0.2285846 * 2.7925639 * 16.425149 * 18.652454 *
  • * 16627 * Y 1 * -1616.630 * 0.9715372 * 2.7925639 * 16.425149 * 18.652454 *
  • * 16627 * Z 2 * -965.0955 * -0.062164 * 2.7925639 * 16.425149 * 18.652454 *
  • * 16628 * X 0 * 1263.1737 * 0.2160525 * 3.6550607 * 11.889160 * 15.539605 *
  • * 16628 * Y 1 * -530.9381 * 0.6065989 * 3.6550607 * 11.889160 * 15.539605 *
  • * 16628 * Z 2 * -1798.110 * 0.7650876 * 3.6550607 * 11.889160 * 15.539605 *
  • *****
```

row 16626 agrees
with final list

learn about
subevents in SK
to understand
rows 16627
and 16628

Why are there 3 event?

would be cut anyway because energy too low and too close to wall

Back to MC problems...

NEUT

Currently using Huang-san's modified version of NEUT 5.1.4.2.
The spectroscopic factors were updated.

```
copy /home/huangkx/t2k/alex/mc/neut/tags/5.1.4.2/
```

Although we were starting to use NEUT 5.3.2, previous results used NEUT 5.1.4.2.

NEUT step 1 of 2 – Worked

Generated 100 files each for num, nue, and nmb

produced /disk01/.../neutfile/num.h2o.sk.flux1 | a.neut_514.*.dat

dat files, err files (size 0), out files were all the same size as jan7

NEUT Step 2 of 2 – Did not work!

neut_select/ removes high energy events from the neut files to save CPU time for skdetsim

immediately in neutfile/select/err files:

error in COPEN: No such file or directory

produced .dat files in neutfile/hbk/

- BUT files are much smaller than jan7 (12 kB vs 900 kB)

also tried with a copy of neut_select/ from Huang-san's directory

→ same thing

Learn from out/

- rewrite DISK to LOCAL
- IT WORKED! files in select/
- but out/
- select/*.dat files same size
- hbk/*.dat files ~900 kB, maybe a bit small?
- errors with MCVECT, etc.
- played around with env variables
- Koshio-san will try to look at it

```
2999 1682 99 13 309.158112
FZIN. LUN= 10 End of Run 0
FZIN. LUN= 10 Zebra EoF

FZIN. LUN= 10 System EOF # 1 seen as End-of-Data
*** ERROR *** ( MCVECT DOES NOT EXIST IN VCRDVC )
*** ERROR *** ( MCVERTEX DOES NOT EXIST IN VCRDVX )
*** ERROR *** ( NEUT DOES NOT EXIST IN NERDNEBK )
3001 1683 99 0 573.180542

FZIDIA. LUN= 10 Attempt to read beyond E-o-D
*** ERROR *** ( MCVECT DOES NOT EXIST IN VCRDVC )
*** ERROR *** ( MCVERTEX DOES NOT EXIST IN VCRDVX )
*** ERROR *** ( NEUT DOES NOT EXIST IN NERDNEBK )
3002 1684 99 0 573.180542

FZIDIA. LUN= 10 Attempt to read beyond E-o-D

ZFATAM. !!!!! Going to ZFATAL for FZIDIA - reading beyond EOD

!!!!!! ZFATAL called from FZIDIA
called from FZIN

Current Store number = 0 (JQDIVI= 2)
1ZEBRA SYSTEM Post-Mortem from ZPOSTM.
```

How to proceed with MC: new code and new computer

- still problems with NEUT, specifically neut_select/
- no work on T2KReWeight
- skip trying to make old code work on new computers
- instead, make new code work on new computers, i.e., NEUT 5.3.2, new T2KReWeight, Prob3++, etc.

ok, maybe in parallel try to solve current problems with old code and new computer