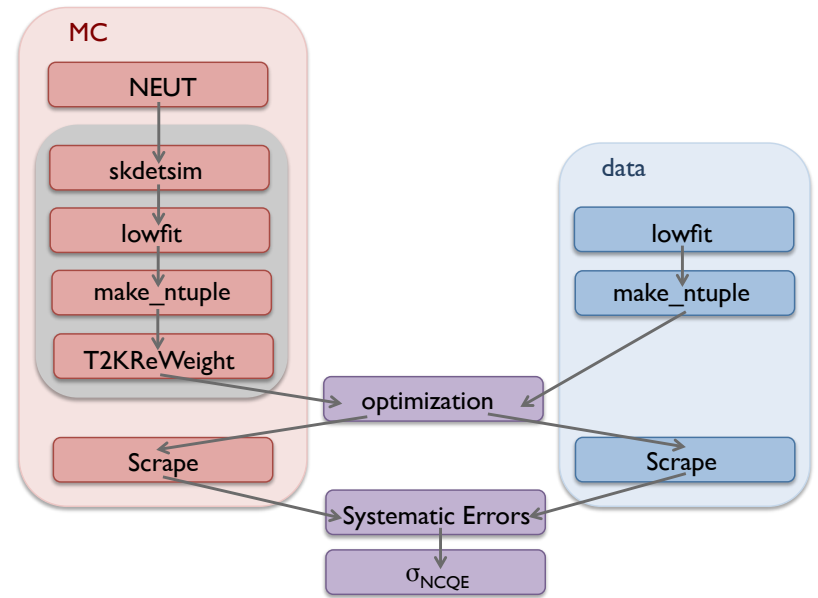


# ncgamma analysis tools



# Move from p2 to p3 of T2KReWeight\_v1r27

- Xiaoyue updating T2KReWeight from v1r27p2, because they found a bug
- and she made a mistake in the setup file regarding ROOT  
(maybe that's why everything just stopped working for me?)

Tag	Description and main features	Date	NEUT	GENIE	JReWeight	NIWGRWeight	GEANTRWeight	Change Log
v1r27p3	<p>Patch the previous release for Summer 2017 OA.</p> <p><b>Fixes from v1r27:</b></p> <ul style="list-style-type: none"> <li>▪ 2p2h shape dial implemented with 3D(Enu, q0, q3) tables. Patched due to bugfix.</li> <li>▪ Improved and added validation scripts.</li> </ul> <p><b>Updates from v1r27:</b></p> <ul style="list-style-type: none"> <li>▪ Include modern SK spline generation script.</li> <li>▪ Updated BANFF spline app</li> <li>▪ Update NEUT to include alternate form factor work by Patrick Stowell. Patch 3 completed validation with changes in NEUT at revision 301.</li> <li>▪ New Eb dial included, but is unstable and is biased in the forward region. <b>We advise against using it for uncertainties.</b></li> <li>▪ 5.3.3 MaQE bug fix in NEUT for hydrogen targets. Patch 4 (soon) for updated apps for BANFF/OA.</li> </ul> <p>Note: "p1" also exists in CVS for both T2KReWeight and NIWGRWeight containing an additional set of SF-&gt;RFG reweighting tables that were removed because they did not resolve the underlying issue of mixing event-by-event reweighting with binned reweighting. They were discarded wholesale from this version because we do not want anyone using a "new" version that is not better than the old version, and has not gone through as much validation as the previous iteration of tables.</p>	May 9th 2017	<p>5.3.3 v1r27p3 maqefix (tarball) (this is also on SVN Revision at 405)</p>	2.10.0 (>=2.8.0)	v1r13	v1r23p2	v1r1	

# Sophie's suggested example

- Sophie used this simpler executable
- T2K-SK 14a MC file
- doesn't need BANFF postfit

`./genWeights_SK_SFRFG_RPA.exe`

```
-s /disk01/sklb2/t2kmc/t2kmc_14c/t2k_14a_root/nu-  
mode/numu_x_numu/root/numu_x_numu.h2o.sk.flux13a.neut_532_ap14a.000.999_fQ  
v4r0.root
```

- IT WORKED!
- output file is `testweights_skexample_nue.root`

# Sophie's suggested example

testweights\_skexample\_nue.root

```
TFile**      testweights_skexample_nue.root
TFile*       testweights_skexample_nue.root
  KEY: TTree  weightstree;1  Tree storing TArray of weights and twkdials per event
[root [2] weightstree->Print()
*****
*Tree      :weightstree: Tree storing TArray of weights and twkdials per event *
*Entries   :    984 : Total =      86352 bytes File Size =    11937 *
*          :          : Tree compression factor =    7.51          *
*****
*Br    0 :nweights : nweights/I          *
*Entries :    984 : Total Size=    4504 bytes File Size =    138 *
*Baskets :     1 : Basket Size=   32000 bytes Compression= 29.12 *
*.....*
*Br    1 :weights  : TArrayF              *
*Entries :    984 : Total Size=   20255 bytes File Size =    6708 *
*Baskets :     1 : Basket Size=   32000 bytes Compression=  2.95 *
*.....*
*Br    2 :brNIWG2014a_SF_RFG : TArrayF    *
*Entries :    984 : Total Size=   20310 bytes File Size =    1407 *
*Baskets :     1 : Basket Size=   32000 bytes Compression= 14.06 *
*.....*
*Br    3 :brNIWG_rpaCCQE_norm : TArrayF    *
*Entries :    984 : Total Size=   20315 bytes File Size =    1387 *
*Baskets :     1 : Basket Size=   32000 bytes Compression= 14.26 *
*.....*
*Br    4 :brNIWG_rpaCCQE_shape : TArrayF   *
*Entries :    984 : Total Size=   20320 bytes File Size =    1424 *
*Baskets :     1 : Basket Size=   32000 bytes Compression= 13.89 *
*.....*
```

# Use all 2015 files

`./genWeights_2015.exe`

`-i /disk01/sklb2/t2kmc/t2kmc_14c/t2k_14a_root/nu-  
mode/numu_x_numu/root/numu_x_numu.h2o.sk.flux13a.neut_532_ap14a.000.999_fQ  
v4r0.root`

`-p postfit_banff_2015_data_20150417.root`

`-o weight_output.root`

`-horn 1`

`-app 0`

`-t 5`

`--use-prefit`

`--drop-flux`

**IT WORKED!**

18 branches

# want more recent executable

- ask Xiaoyue which genWeights  
→ genWeights\_2016 written by Mark Scott in app
- had to fix bug in px, py, pz, E to E, px, py, pz
- Xiaoyue fixing another momentum bug
- can copy it over from p2 to p3

# Chatting with Mark Scott

like Xiaoyue said

- probably don't have to use NIWG, it's now included in NEUT reweight → ok?
- use `genWeights_SK_2016`
- maybe Alex edited `src/T2KNeutReWeight` → have to check
- best to try to add Alex's changes to `genWeights_SK_2016`
- would be able to use Alex's `genWeights_ncgamma` if

```
rw.Systematics().Include(t2krew::kNIWG2014a_SF_RFG); → SF to RFG  
rw.Systematics().Include(t2krew::kNXSec_VecFFCCQE); → form factor maqe
```

```
rw.Systematics().SetTwkDial(t2krew::kNIWG2014a_SF_RFG, 1);  
rw.Systematics().SetTwkDial(t2krew::kNXSec_VecFFCCQE, 2);
```

- did he say set to 0?
- would also need 2012 banff postfit

# most recent files

`./genWeights_SK_2016.exe`

`-i /disk01/sklb2/t2kmc/t2kmc_14c/t2k_14a_root/numo/numu_x_numu/root/numu_x_numu.h2o.sk.flux13a.neut_532_ap14a.000.999_fQv4r0.root`

`-p BANFF_PostFit_170521.root`

`-o weight_2016_output.root`

`-horn 1`

`-app 0`

`-t 5`

`--use-prefit`

`--drop-flux`

**IT WORKED!**

16 branches



# now make it work with ncgamma files

- the input is after neut, skdetsim, lowfit, make\_ntuple
- I think it will take in lentuple/
- try from /disk01/usr4/cnantais/Attempts/7Jan2016/lemc\_jan7/lentuple/  
lentp\_numubar.ncgamma\_flux|la\_neut5|4.099.root
- root -l lentp\_numubar.ncgamma\_flux|la\_neut5|4.099.root
- TTree h1

/disk01/sklb2/t2kmc/...	lentuple
h1 DST	h1 T2KLowE Common Ntuple
Br 373	Br 115

# most recent files on 2016 ncgamma MC

`./genWeights_SK_2016.exe`

`-i lentp_numubar.ncgamma_flux|la_neut5|4.099.root`

(copied from Attempts/7Jan2016/lemc\_jan7/lentuple)

`-p BANFF_PostFit_170521.root`

`-o weight_nc_output.root`

`-horn 1`

`-app 0`

`-t 5`

`--use-prefit`

`--drop-flux`

**IT WORKED!**

16 branches

# ProcessNCEL\_mc.sh

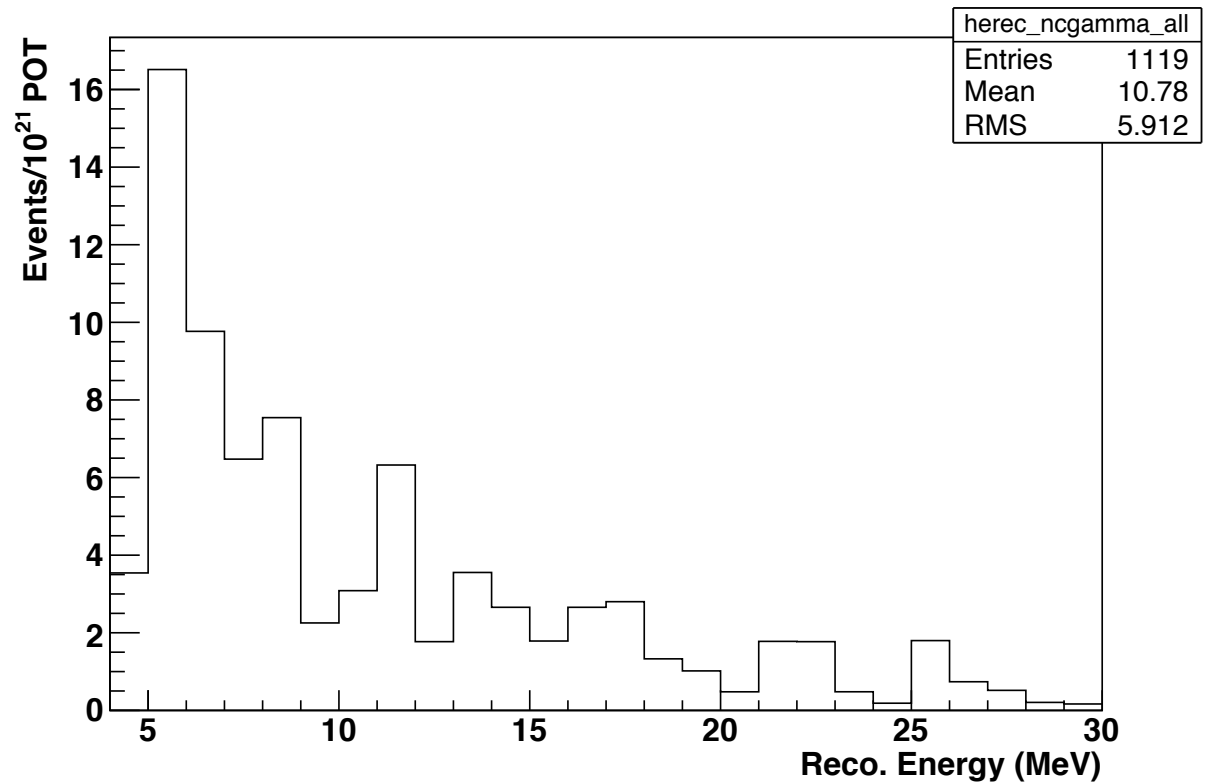
- ./ProcessNCEL\_mc.sh 001 numu
  - IT WORKED!
  - flux\_preffit/ 29 branches
  - xsec\_preffit/ 16 branches
  - compare to Attempts/7Jan2016/
  - flux\_preffit/ 24 branches?
  - xsec\_preffit/ 7 branches?
- why are the number of branches of TArrayF different?

# Next in analysis flow

- next is Optimization
- can maybe do Alternate Processing instead
- **.../ncgamma/Processing/**
- `$ python SelectNCGamma.py -o ncgammamcRun4.root /disk/.../lemc/lentuple/lentp_nu*.root`
- can try with just one file

# one MC file, looks good

- e.g., herec\_ncgamma\_all



skip Optimization for now,  
until have all MC

# Do all MC Processing

- python PrepareNQS.py
- no T2KReWeight files???
- nothing in log
- try another single file, say numu 099
- **problem probably in setup**

- `./ProcessNCEL_mc.sh 099 numu`
- no shared library
  
- `source my_setup.csh`
- `make clean`
- `./config.sh`
- `gmake`
- `./ProcessNCEL_mc.sh 050 numu`
- IT WORKED!

why do I have to compile each time?

# Moving on to Scrape step in the meantime

- `runscrape.csh` (and `Scrapper.py`) require `OrderedDict` and `NumPy`
- Hayato-san installed on sukap:
- `numpy 1.7.1`
- `scipy 0.12.1`
- `orderdict 1.1`



```
~/ncgamma/Processing@sukap001 [490]_ % ./runscript.csh
Getting flux weights from ~/ncgamma/SystematicErrors/beamweights/
No friend trees given
Creating branch erc/D
Creating branch pnu/D
Creating branch inu/I
Creating branch mode/I
Creating branch isCC/I
Creating branch isQE/I
Creating branch appeared/I
Creating branch onePi0/I
Creating branch onePipm/I
Creating branch cosbeam/D
Creating branch t2kposc/D
Creating branch weight1/D
Creating branch weight2/D
Creating branch weight3/D
Creating branch weight4/D
Creating branch nrun/I
Creating branch nsub/I
Creating branch nev/I
Creating branch mrrun/I
Creating branch Nn/I
Creating branch Np/I
Creating branch wallv/D
Creating branch ng1/I
Creating branch ng2/I
Creating branch toteg1/D
Creating branch toteg2/D
Creating branch wall/D
Creating branch effwall/D
Creating branch ovaq/D
Creating branch angle/D
Creating branch anglepass/D
Creating branch nompeak/I
Creating branch dt0/D
Creating branch dtbunchcenter/D
Creating branch dt0passtight/I
Creating branch dt0passloose/I
Creating branch dt0beamunrelpre/I
Creating branch dt0beamunrelpost/I
Creating branch wallpass1/I
Creating branch effwallpass1/I
Creating branch ovaqpass1/I
Creating branch wallpass2/I
Creating branch effwallpass2/I
Creating branch ovaqpass2/I
Creating branch wallpass3/I
Creating branch effwallpass3/I
Creating branch ovaqpass3/I
Creating branch wallpass4/I
Creating branch effwallpass4/I
Creating branch ovaqpass4/I
Begin processing 328 data files
Error in <TChain::LoadTree>: Cannot find tree with name h1 in file /disk01/usr4/cnantis/lowedata/ntuple/data.lowfit.70620.merge.root
```

some files totally missing (no candidates?)

some files have h1

some files don't have h1???

check 07 Jan 2016

lowedata/ missing?

check 17 Jan 2016

...

# Summary

- can use T2KReWeight on ncgamma mc
- problem with T2KReWeight setup when submitting many jobs
- then do Optimization
- then Scrape, must understand errors in output