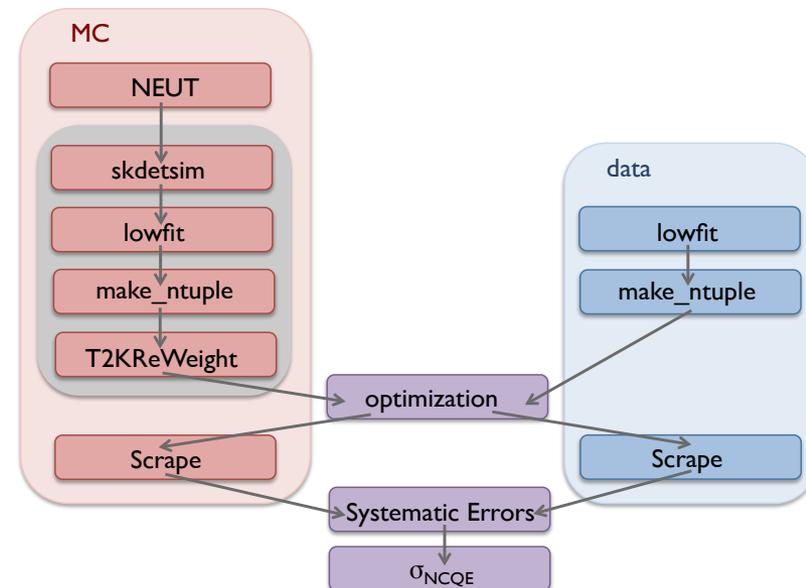


ncgamma analysis tools

Corina Nantais
group meeting
17 August 2017

- Update to flux 13a
 - tuned histograms
 - nominal flux files
- environment variables
 - mk_num.sh (nue, nmb)
 - neut_select/
 - Prob3++
- update MC lowfit executable
- MC scales (in progress)
- T2KReWeight withouth NCQE (just started)



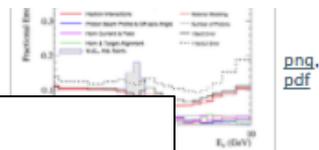
updating flux

I1a nominal with I1bv3.2 tuning → I3a nominal with I3av2 tuning

- `SystematicErrors/beamweights/` → these are the tuned ROOT histograms, on t2k.org
`SelectNCGamma.py`, `para/Calcmc.py`, `Scrapper.py`, `NominalXsec.py`
- `/disk01/sklb/OLD/flux` → these are the nominal flux files, used to be HBK ntuples on sukap
`mc/(neut/neut_5.3.2/src/t2kflux_zbs/)``mk_num.sh` (nue, nmb) and `mk_fluxlist.sh`

I3av2 tuned ROOT histograms on t2k.org

The fractional uncertainty on the SK ν_{μ} flux prediction as a function of neutrino energy for the 250 kA horn operation mode. The dotted line is the uncertainty from the previous flux prediction that used NA61 2007 thin target data for the tuning.



[png](#),
[pdf](#)

beam/NuFlux/FluxRelease/13arelease
13av2-tuned-fluxes-for-runs1-8-slides (Tomislav Apr 2017)

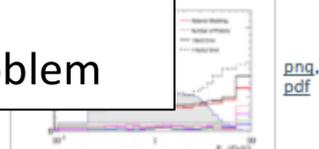
tuned13av2.tar.gz.

TN-217 will be updated, read?

13av2 flux uncertainties will be released later → asked Tom if that's a problem

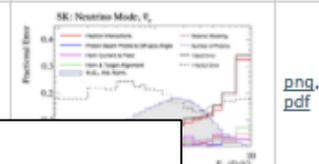


[png](#),
[pdf](#)



[png](#),
[pdf](#)

The fractional uncertainty on the SK $\nu_{e-\bar{e}}$ flux prediction as a function of neutrino energy for the 250 kA horn operation mode. The dotted line is the uncertainty from the previous flux prediction that used NA61 2007 thin target data for the tuning.



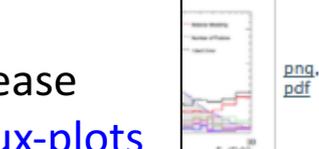
[png](#),
[pdf](#)

Emailed Tom

Mark Hartz released the 13av2 flux
uncertainties shortly after Tom's flux release

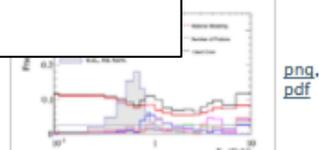
<https://www.t2k.org/docs/plots/045/flux-plots>

how to use?



[png](#),
[pdf](#)

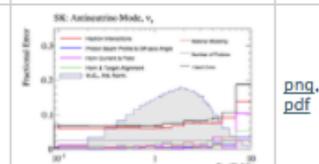
The fractional uncertainty on the SK ν_{μ} flux prediction as a function of neutrino



[png](#),
[pdf](#)

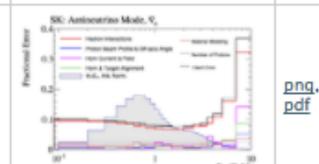
The fractional uncertainty on the SK ν_{μ} -bar flux prediction as a function of neutrino energy for the -250 kA horn operation mode.

The fractional uncertainty on the SK ν_e flux prediction as a function of neutrino energy for the -250 kA horn operation mode.



[png](#),
[pdf](#)

The fractional uncertainty on the SK $\nu_{e-\bar{e}}$ flux prediction as a function of neutrino energy for the -250 kA horn operation mode.



[png](#),
[pdf](#)

tuned13av2.tar.gz

```

[MissMary:tuned13av2 corinanantais$ ls
run1      run2      run4      run5b    run60    run6c    run6f    run7c
run1-7c   run3b    run58    run5c    run61    run6d    run7a    run8
run1-8    run3c    run5a    run5c-7b run6b    run6e    run7b
  
```

TN-284

		58
		60
		61
		63
Run6	?	58
		59
		61
		62
		63

run 58, 61, (and 63) in both
numode and antinumode?

why run 58, 60, 61 (all numode)
are separate, corresponds to 6a?
Emailed Tom

Tom doesn't think there's a
special reason

TN-264

2014 RHC data up to summer shutdown					
Run 6a	580045	Nov 2 03:24:48 2014	580086	Nov 4 09:00:52 2014	+250 kA
	600012	Jan 12 23:49:57 2015	600032	Jan 16 10:00:11 2015	+250 kA
	610012	Feb 25 16:41:26 2015	610027	Feb 27 10:08:25 2015	+250 kA
All FHC data of run 58-61					
Run 6b	580099	Nov 4 23:22:52 2014	580265	Nov 25 06:59:58 2014	-250 kA
	590004	Nov 29 22:17:30 2014	590152	Dec 22 06:52:44 2014	-250 kA
RHC up to the end of run 59					
Run 6c	610034	Feb 27 19:44:32 2015	610099	Mar 12 12:57:01 2015	-250 kA
	2015 RHC data up to the beginning of the OTR drift				
Run 6d	610100	Mar 12 16:20:15 2015	610209	Apr 1 06:55:10 2015	-250 kA
	RHC data from OTR drift to end of run 61				
Run 6e	620016	May 8 23:48:20 2015	620111	May 20 07:00:02 2015	-250 kA
	630011	May 22 23:18:00 2015	630094	Jun 1 09:37:54 2015	-250 kA
run 62 RHC data up to 2015 shutdown + run 63 RHC data					

how to use
MR 58, 60, 61 in T2K Runs?

- run6a58
- run6a60
- run6a61

SelectNCGamma.py

```

if mcmode:
    runs = ["1", "2", "3b", "3c", "4"]
    fluxdir = "~/ncgamma/SystematicErrors/beamweights"
    tunefiles = {
        "1" : "sk_tuned13av2_13anom_run1_numode.root",
        "2" : "sk_tuned13av2_13anom_run2_numode.root",
        "3b" : "sk_tuned13av2_13anom_run3b_numode.root",
        "3c" : "sk_tuned13av2_13anom_run3c_numode.root",
        "4" : "sk_tuned13av2_13anom_run4_numode.root"
    }
    fluxtunes = defaultdict(dict)

    if options.frienddir:
        friendFiles = {}
        for filenames in groupedFiles.values():
            for fname in filenames:
                weightname = os.path.basename(fname).replace(".fit.root", "_weights.root")
                weightname = os.path.join(options.frienddir, weightname)
                friendFiles[fname] = weightname

    for run in runs:
        fluxtune = TFile(os.path.join(fluxdir, tunefiles[run]))
        fluxtunes[run]["numu"] = fluxtune.Get("enu_sk_tuned13a_numu_ratio")
        fluxtunes[run]["nue_x_numuflux"] = fluxtune.Get("enu_sk_tuned13a_numu_ratio")
        fluxtunes[run]["numubar"] = fluxtune.Get("enu_sk_tuned13a_numub_ratio")
        fluxtunes[run]["nue"] = fluxtune.Get("enu_sk_tuned13a_nue_ratio")
        fluxtunes[run]["nuebar"] = fluxtune.Get("enu_sk_tuned13a_nueb_ratio")
        for hist in fluxtunes[run].values():
            hist.SetDirectory(0)
        samples = [ "ncelandic", "ncipi", "ncother", "numucc", "nuecc", "mcall" ]
    else:

```

changed flux

changed flux

these are Tuned/Nominal TH1Ds within root file (Tom's slides)

FHC

- numu flux
- nue appearance
- numubar wrong sign background
- intrinsic nue
- nuebar wrong sign background

→ come back and add runs >4

→ add RHC later

- RHC
- "numubar" → numubar flux → numub
 - "nuebar_x_numubarflux" → nuebar appearance → numub
 - "numu" → numu wrong sign background → numu
 - "nuebar" → intrinsic nuebar → nueb
 - "nue" → nue wrong sign background → nue

python SelectNCGamma.py -o ncgammamcRun4.root /disk01/usr4/cnantais/lemc/lentuple/lentp_nu*.root

para/Calcmc.py

```

fluxdir = "~/ncgamma/SystematicErrors/beamweights"

tunefiles = { "1" : "sk_tuned13av2_13anom_run1_numode.root",
              "2" : "sk_tuned13av2_13anom_run2_numode.root",
              "3b" : "sk_tuned13av2_13anom_run3b_numode.root",
              "3c" : "sk_tuned13av2_13anom_run3c_numode.root",
              "4" : "sk_tuned13av2_13anom_run4_numode.root"
            }

fluxtunes = defaultdict(dict)

# MC Scales from Ueno
ncel_scales = { "numu": 1./1.375e23 * 100.,
               "nue": 1./6.798e24 * 100.,
               "numubar": 1./3.841e24 * 100.
             }

if options.frienddir:
    friendFiles = {}
    for filenames in groupedFiles.values():
        for fname in filenames:
            weightname = 'banff_prefit.' + os.path.basename(fname).replace(".fit.root", "_weights.root")
            print "weight name is %s" % weightname
            weightname = os.path.join(options.frienddir, weightname)
            friendFiles[fname] = weightname

for run in runs:
    fluxtune = TFile(os.path.join(fluxdir, tunefiles[run]))
    fluxtunes[run]["numu"] = fluxtune.Get("enu_sk_tuned13a_numu_ratio")
    fluxtunes[run]["nue_x_numuflux"] = fluxtune.Get("enu_sk_tuned13a_numu_ratio")
    fluxtunes[run]["numubar"] = fluxtune.Get("enu_sk_tuned13a_numub_ratio")
    fluxtunes[run]["nue"] = fluxtune.Get("enu_sk_tuned13a_nue_ratio")
    fluxtunes[run]["nuebar"] = fluxtune.Get("enu_sk_tuned13a_nueb_ratio")
    for hist in fluxtunes[run].values():
        #pull out 1D histogram, and save hist to current memory
        hist.SetDirectory(0)
samples = [ "ncelastic", "ncipi", "ncother", "numucc", "nuecc", "mcall" ]

```

changed flux

changed flux

(same as SelectNCGamma.py)

→ come back and add runs >4

→ add RHC later

python Calcmc.py /disk/.../lemc/lentuple/*ncgamma_flux11a_neut532*.root

no errors, dat and hist files are same size

(files I recently generated in June)

→ come back and add runs >4

→ add RHC later

Processing/Scrapper.py

```
def PrepareFluxWeights(self, fluxdir = "~/ncgamma/SystematicErrors/beamweights/"):
    print "Getting flux weights from",fluxdir
```

```
tunefiles = { "1" : "sk_tuned13av2_13anom_run1_numode.root",
              "2" : "sk_tuned13av2_13anom_run2_numode.root",
              #"3" : "sk_tuned11bv3.2_11anom_run3b-run3c.root",
              #"12" : "sk_tuned11bv3.2_11anom_run1-run2.root",
              "3b" : "sk_tuned13av2_13anom_run3b_numode.root",
              "3c" : "sk_tuned13av2_13anom_run3c_numode.root",
              "4" : "sk_tuned13av2_13anom_run4_numode.root"
            }
```

changed flux

```
for run in self.runs:
```

```
    fluxtune = TFile(os.path.join(fluxdir,tunefiles[run]))
```

changed flux

```
    self.fluxtunes[run]["numu"] = fluxtune.Get("enu_sk_tuned13a_numu_ratio")
    self.fluxtunes[run]["nue_x_numuflux"] = fluxtune.Get("enu_sk_tuned13a_numu_ratio")
    self.fluxtunes[run]["numubar"] = fluxtune.Get("enu_sk_tuned13a_numub_ratio")
    self.fluxtunes[run]["nue"] = fluxtune.Get("enu_sk_tuned13a_nue_ratio")
    self.fluxtunes[run]["nuebar"] = fluxtune.Get("enu_sk_tuned13a_nueb_ratio")
```

```
    for hist in self.fluxtunes[run].values():
        hist.SetDirectory(0)
```

Scrapper.py is used by ScrapeLE.py, which is run by runscape.csh

runscrape.csh used for data and SelectionPlots

why 3 and 12?

don't exist for tuned13av2

```
class Scrapper:
    runs = ["1","2","3","4"] #,"3b","3c"]
```

- change "3" to "3b and 3c" in runs
- comment out "3" and "12"
- hopefully no problem without 12

./runscrape.csh

created:

```
ncgamma.data.ontiming.test.root
ncgamma.data.ontiming.nosel.test.root
ncgamma.data.offtiming.nosel.test.root
ncgamma.data.widetiming.nosel.test.root
ncgamma.xsec_predit.ankowski.nosel.test.root
```

NominalXsec.py

```
#fflux = TFile("$HOME/ncgamma/SystematicErrors/beamweights/sk_tuned11bv3.2_11anom_run1-run4_fine.root", "read")
fflux = TFile("$HOME/ncgamma/SystematicErrors/beamweights/tuned13av2/run1-8/sk_tuned13av2_13anom_run1-8_numode_fine.root", "read")
banff = {}
fluxes = {}
totflx = 0.
totflxes = {}
for sample in [ "numu", "numub", "nue", "nueb" ]:
    fluxes[sample] = fflux.Get("enu_sk_tuned13a_"+sample)
```

changed flux

changed flux

Nominal flux
(Tom's slides)

antimumode too

or should I use the SK 13a nominal histograms?
but tuned11bv3.2_11a were used?

Trevor

"1-8_numode" has numode runs only
(1,2,3b,3c,4,5a,5b,6a,6f,7a,7c,8)

"5c-7b_antimumode" has antimumode
runs only (5c,6b,6c,6d,6e,7b)

I want:

tuned13av2/run5c-
7b/sk_tuned13av2_13anom_run5c-
7b_antimumode_fine.root

python NominalXsec.py

```
Emax: 1.85
Emin: 0.47
Info in <TCanvas::MakeDefCanvas>: created default TCanvas with name c1
Info in <TCanvas::Print>: gif file fluxmean.gif has been created

Flux Mean: 0.820
Flux +/-68%:-0.223 +0.441
Flux +/-68%:0.596 to 1.261

Replacing with
Flux Median: 0.630
Flux +/-68%:-0.230 +0.310
Flux +/-68%:0.400 to 0.940

Flux-averaged xsec for ankowski is 2.00515
Flux-averaged xsec for ma1.01 is 1.55375
Flux-averaged xsec for ma1.21 is 1.90529
Flux-averaged xsec for ma1.41 is 2.21734
Flux-averaged xsec for neut is 2.2686
```

- TN-244 theory $2.01e-38 \text{ cm}^2$
- (previously 2.01667)

I 3a nominal flux

/disk01/sklb/OLD/flux/

/disk01/sklb/OLD/flux/flux11a/sk/hbk/nu.sk_fluxain.*.hbk

```
[/disk01/sklb/OLD/flux@sukap001[626]_% ls
flux10a flux10a_2 flux10a_root flux11a flux13a sk sk_nd5
```

flux13a directories are empty

```
[/disk01/sklb/OLD/flux@sukap001[698]_% cd flux13a/
[/disk01/sklb/OLD/flux/flux13a@sukap001[699]_% ls
sk_nd5
[/disk01/sklb/OLD/flux/flux13a@sukap001[700]_% cd sk_nd5/
[/disk01/sklb/OLD/flux/flux13a/sk_nd5@sukap001[701]_% ls
root
[/disk01/sklb/OLD/flux/flux13a/sk_nd5@sukap001[702]_% cd root/
[/disk01/sklb/OLD/flux/flux13a/sk_nd5/root@sukap001[703]_% ls
/disk01/sklb/OLD/flux/flux13a/sk_nd5/root@sukap001[704]_%
```

James Feb 2016

- likely a mistake transferring files and in parent directory
- no hbk files, but names are probably the same in hbk and root

```
[/disk01/sklb/OLD/flux/sk_nd5/root@sukap001[714]_% ls
file_m.lst          fluka_13a_nom_sk_nd5_250ka.511.root
fluka_13a_nom_sk_nd5_250ka.0.root  fluka_13a_nom_sk_nd5_250ka.512.root
fluka_13a_nom_sk_nd5_250ka.1.root  fluka_13a_nom_sk_nd5_250ka.513.root
fluka_13a_nom_sk_nd5_250ka.10.root fluka_13a_nom_sk_nd5_250ka.514.root
```

- sk_nd5, instead of sk? → extra ND280 trees h3002 shouldn't affect SK part
- 1080 files, instead of 500 → *10 interactions requested
- root, instead of hbk → it should be ok, but it's not

Emailed Roger

- files I found are usable
- or download flux files from location described in Megan's slides (Jan 2014 T2K CM)
https://www.t2k.org/meet/collab/archive/201401/talks/thuram/13afluxprod_mfriend/view

ND280 13a Nominal Flux Release

Released as of 12/19/2013:

- On the GRID
 - At lfn:/grid/t2k.org/beam/mc/beamMC/flux13a/
- On the NEUT cluster
 - At neutsrv2:/neut/datasrv2a/mhartz/flux13a/
- On KEKcc
 - At /gpfs/fs03/t2k/beam/mc/beamMC/flux13a

Available files:

- ND5 → basket
 - 250 kA: flux_13a_sk_and_nd5_250ka_root.tar.gz
 - Includes SK flux
- ND6 → magnet
 - 250 kA: flux_13a_nd6_250ka_root_posfix.tar.gz
 - -250 kA: flux_13a_nd6_m250ka_root_posfix.tar.gz
- ND13 → ND280 muon plane
 - 250 kA: flux_13a_nd13_250ka_root_posfix.tar.gz

Ready but not yet copied to the GRID:

- -250 kA ND5 flux, -250 kA ND13 flux

don't have access to GRID (but could)

I found them on NEUT

I should use -250 kA too

Emailed Tom

- different people were making releases for various runs so files are all over the place
- could ask Arturo for help with files on neut cluster

Emailed Roger

- T2K-SK people don't really use nominal flux files, just rely on official beam MC files
- I4ac MC generated by Okumura-san, he may have the nominal flux files
→ emailed Okumura-san, he just pointed me to t2k.org histograms

OR

- scp antineutrino from neut cluster to `/disk01/usr4/cnantais/`
- later move them to SKLB on sukap

looked into files on neut cluster,
but start working with the ones already on sukap

What's in the root file?

```
/disk01/sklb/OLD/flux/sk_nd5/root@sukap001[661]_% root -l fluka_13a_nom_sk_nd5_250ka.999.root
```

```
root [2] .ls
TFile**      fluka_13a_nom_sk_nd5_250ka.999.root      HBOOK file: /home/t2k/mfriend/mcdata/fluka_13a_nom_250ka_iseq924_sd91957961_rn001_flkout.hbk converted to ROOT
TFile*      fluka_13a_nom_sk_nd5_250ka.999.root      HBOOK file: /home/t2k/mfriend/mcdata/fluka_13a_nom_250ka_iseq924_sd91957961_rn001_flkout.hbk converted to ROOT
KEY: TTree  h3002;1 Near
KEY: TTree  h2000;1 nu
KEY: TH2F   h203;1 TPI-TLEPTON (Ke3)
KEY: TH2F   h204;1 TPI-TLEPTON (Kmu3)
KEY: TH2F   h201;1 TPI-TLEPTON (K0e3)
KEY: TH2F   h202;1 TPI-TLEPTON (K0mu3)
KEY: TH2F   h207;1 DALITZ PLOT (Ke3)
KEY: TH2F   h208;1 DALITZ PLOT (Kmu3)
KEY: TH2F   h205;1 DALITZ PLOT (K0e3)
KEY: TH2F   h206;1 DALITZ PLOT (K0mu3)
KEY: TH2F   h307;1 DALITZ PLOT (Ke3)
KEY: TH2F   h308;1 DALITZ PLOT (Kmu3)
KEY: TH2F   h305;1 DALITZ PLOT (K0e3)
KEY: TH2F   h306;1 DALITZ PLOT (K0mu3)
KEY: TTree  h3000;1 Near
KEY: TH1F   h4001;1 E[n]?[m] at SK
KEY: TH2F   h210;1 cos[q] v.s. x
KEY: TH2F   h211;1 cos[q] v.s. x
KEY: TTree  h1000;1 Version
```

Emailed Tom

TTree h2000

full hadronic interaction chain starting with primary photons and finishing with neutrino parents

raw flux predictions (unchanged between v1.1 and v2.0 because bug only affected tuned predictions)

mk_num.sh (nue, nmb)

makes the nqs/neut_532_num.*.sh files

flux.list is made by mk_fluxlist.sh

```
set num = 0
while ($num <= 99)

set fnum = `printf "%03d" $num`
#set nqs_fname = nqs/neut_514_num.$fnum.sh
set nqs_fname = nqs/neut_532_num.$fnum.sh

cat <<! >! $nqs_fname
#! /bin/csh -f
source /usr/local/sklib_g77/skofl-trunk/env.csh
set hdir = $top_dir
set card = neut_num.card
#set fdir = /net/sukond1/export/data/t2k/flux
#set fdir = /disk/sklb/flux
set fdir = /disk01/sklb/OLD/flux
set odir = /disk01/usr4/cnantaais/neutfile
setenv RANFILE \${hdir}/seed/random.tbl.$num
setenv RFLIST \${hdir}/rflist.$fnum
cat <<! >! \${RFLIST}
10{
!
cat flux.list >> $nqs_fname
cat <<! >> $nqs_fname
}
20{{"\${odir}/num.h2o.sk.flux11a.neut_532.$fnum.dat",LOCAL,,WRT,,,"recl=5670 status=new"}}
!
echo ! >> $nqs_fname
cat <<! >> $nqs_fname
cd \${hdir}
uname -a
date
[]
time ./t2kneut_sk \${card}

date

echo done.
```

no change to fdir

changed flux.list

```
#! /bin/csh -f

set i = 0
while ($i <= 1000)
cat <<! >> flux.list
{"\${fdir}/sk_nd5/root/fluka_13a_nom_sk_nd5_250ka.$i.root",LOCAL,,RED,,,"recl=1024 status=old"}
!
@ i++
end
```

changed number of files

changed directory and root file

./mk_fluxlist.sh

flux.list looks good

try a single NEUT file

```
RZOPEN: cannot determine record length. File /disk01/sklb/OLD/flux/sk_nd5/root/fluka_13a_nom_sk_nd5_250ka.0.root probably not in RZ format
***** ERROR in HROPEN : Cannot open file :
neopskfxv:file in RFLIST does not exist.
```

→ probably because root instead of hbk

Compare ROOT branches and HBK variables

- root -l fluka_13a_nom_sk_nd5_250ka.0.root
- h2000.Print()
- **32 branches**
- paw
- enter (ignore workstation type)
- hist/file 2 fluka_13a_nom_sk_nd5_250ka.0.hbk
- hist/list
- nt/print 2000
- **20 variables**
- **tree_to_ntuple is missing some branches**

```
/disk01/sklb/OLD/flux/flux11a/sk/
```

```
root/
```

```
root -l nu.sk_flukain.0.root
```

```
h2000.Print()
```

```
32 branches
```

```
hbk/
```

```
paw
```

```
enter (ignore workstation type)
```

```
hist/file 2 nu.sk_flukain.0.hbk
```

```
hist/list
```

```
nt/print 2000
```

```
32 variables
```

→ didn't pursue, because in the end we're not going to convert anyway

ROOT histograms with LUN 11 form=formatted

- Roger looked through **t2kneut_sk.cc** and **t2kflux_sk.cc**, can take ROOT histograms or HBK ntuples → but not ROOT ntuples
- HBK ntuple needs to be named 2000, so may be on the right track
- ~~either way~~, input file needs to be specified as logical unit number **(LUN) 11**, and fed to code via the RFLIST
- need a line in mk_num.sh:
11{{"/path/to/file/myfile.root",LOCAL,,"form=formatted"**}}**
- actually, **"form=formatted"** flag tells RFA libraries that input file is formatted text, so for binary files (ROOT, HBK) you shouldn't need it
- those libraries are proprietary pieces of Fujitsu code, don't really understand

A few options (from Roger and Hiro)

1. make NEUT (t2kflux_sk) take ROOT ntuple
maybe, but don't want to mess with code
2. convert ROOT → HBK
but why convert back if flux group produces HBK and converts to ROOT?
if we insist on HBK, try to find original HBK files before converting ROOT → HBK
3. use ROOT files to fill histograms
but same as released, combine 1100 files for stats
4. why use vector TTree at all? can we use tuned l3av2 release histograms?
maybe because of 50 MeV binning, ngamma only looks at 4–30 MeV
→ will ask Alex, or Huang-san

t2kflux_sk.cc

```

ierr = 0;
for ( i = 0 ; i < 4 ; i++ ){
    if (fluxhisto[i] != NULL){
        delete fluxhisto[i];
    }
    snprintf(hname,sizeof(htitle),"enu_sk_13a_real_%s",
             beam_flavor_string[i]);
    tmphisto = (TH1D *) (histf->Get(hname));
    if (tmphisto == NULL){
        ierr = 1;
        break;
    }
    snprintf(hname,sizeof(htitle),"t2k_skflux_%s",
             flavor_string[i]);
    snprintf(htitle,sizeof(htitle),"t2k_skflux %s;energy",
             flavor_string[i]);
    fluxhisto[i]=(TH1D *)tmphisto->Clone(hname);
    fluxhisto[i]->SetTitle(htitle);
}

```

tuned13av2 histograms

ROOT ntuple is raw flux predictions → Untuned

Roger said need name t2k_skflux_numu, etc.

- don't change name in NEUT
- save new histo with new name

actually,

- use original names
- later cloned to histograms with new names

add in FLUX_13A?

```

#include <TH1D.h>
#include <iostream>
#include <t2kflux_sk.h>
#include <stdlib.h>
#include <TFile.h>

```

```

#ifdef FLUX_10A
#include "uhdef.h"
#define FLXCOM nusk_
#else
#ifdef FLUX_10C
#include "uhdef_10c.h"
#define FLXCOM nusk_
#else
#ifdef FLUX_11A
#include "uhdef_11a.h"
#define FLXCOM nusk_
#else
#include "beamntpic.h"
#define FLXCOM fxvcsk_
#endif
#endif
#endif

```

Roger said LUN 11 either way

actually,

10 is for HBK ntuple

11 is for ROOT histograms

```

const char
T2kflux_SK::beam_flavor_string[4][10] =
{
    "numu\0", "numub\0", "nue\0", "nueb\0"
};

const char
T2kflux_SK::flavor_string[4][10] =
{
    "numu\0", "numu_bar\0", "nue\0", "nue_bar\0"
};

const int
T2kflux_SK::pidtbl[4] =
{
    14, -14, 12, -12
};

const int T2kflux_SK::luni      = 10;
const int T2kflux_SK::histo_luni = 11;
const int T2kflux_SK::t2k_skflux_ntid = 2000;

```

ignore most of this, here is where I made a mistake

tuned13av2 release histograms (without changing names)

- but which runs? Try this to start:
- .../ncgamma/SystematicErrors/beamweights/tuned13av2/run1-8/sk_tuned13av2_13anom_run1-8_numode.root
- don't need mk_fluxlist.sh and flux.list → made a mistake while changing this

```

set fdir = /home/cnatais/ncgamma/SystematicErrors/beamweights/tuned13av2/run1-8
set odir = /disk01/usr4/cnatais/neutfile
setenv RANFILE \${hdir}/seed/random.tbl.$num
setenv RFLIST \${hdir}/rflist.$fnum
cat <<! >! \${RFLIST}
11[{"\${fdir}/sk_tuned13av2_13anom_run1-8_numode_fine.root",LOCAL,,RED,,"form=formatted"}}
cat <<! >> \${hqs_fname}
}
20[{"\${odir}/num.h2o.sk.flux11a.neut_532.$fnum.dat",LOCAL,,WRT,,,"recl=5670 status=new"}}
!

```

changed fdir

(there is also a missing comma here)

changed options

MISTAKE changed root file

changed LUN
error

changed 11a → 13a

```

MZLINK. Initialize Link Area /HCB00K/ for Store 1 NL/NS= 49 4
Failed to open file (LUN=20.
0.046u 0.022s 0:00.31 19.3% 0+0k 40216+96io 35pf+0w
Wed Aug 9 03:19:48 JST 2017
done.

```

LUN=20 is the output file

explaining MISTAKE

```

set num = 0
while ($num <= 99)

set fnum = `printf "%03d" $num`
#set nqs_fname = nqs/neut_514_num.$fnum.sh
set nqs_fname = nqs/neut_532_num.$fnum.sh

cat <<! >! $nqs_fname
#! /bin/csh -f
source /usr/local/sklib_g77/skofl-trunk/env.csh
set hdir = $top_dir
set card = neut_num.card
#set fdir = /net/sukond1/export/data/t2k/flux
#set fdir = /disk/sklib/flux
set fdir = /disk01/sklib/OLD/flux
set odir = /disk01/usr4/cnantais/neutfile
setenv RANFILE \${hdir}/seed/random.tbl.$num
setenv RFLIST \${hdir}/rflist.$fnum
cat <<! >! \${RFLIST}
10{
!
cat flux.list >> $nqs_fname
cat <<! >> $nqs_fname
}
20{{"\${odir}/num.h2o.sk.flux11a.neut_532.$fnum.dat",LOCAL,,WRT,,,"recl=5670 status=new"}}
!
echo ! >> $nqs_fname
cat <<! >> $nqs_fname
cd \${hdir}
uname -a
date
[]
time ./t2kneut_sk \${card}

date

echo done.

```

deleted first 2 lines,
but not second line

cut off final "!"

original
mk_num.sh

```

set fdir = /home/cnantais/ngamma/SystematicErrors/beamweights/tuned13av2/run1-8
set odir = /disk01/usr4/cnantais/neutfile
setenv RANFILE \${hdir}/seed/random.tbl.$num
setenv RFLIST \${hdir}/rflist.$fnum
cat <<! >! \${RFLIST}
11{{"\${fdir}/sk_tuned13av2_13anom_run1-8_numode_fine.root",LOCAL,,RED,,,"form=formatted"}}
cat <<! >> $nqs_fname
}
20{{"\${odir}/num.h2o.sk.flux11a.neut_532.$fnum.dat",LOCAL,,WRT,,,"recl=5670 status=new"}}
!

```

MISTAKE

edited
mk_num.sh

without noticing mistake,
(and before looked into histogram names)

tuned I3av2 release histograms (changing names)

```
#!/bin/csh -f

set top_dir = `pwd`

if (-d script) then
mkdir script
endif

set num = 0
while ($num <= 99)

set fnum = `printf "%03d" $num`
#set nqs_fname = nqs/neut_514_num.$fnum.sh
set nqs_fname = nqs/neut_532_num.$fnum.sh

cat <<! >! $nqs_fname
#!/bin/csh -f
source /usr/local/sklib_g77/skofl-trunk/env.csh
#source /home/cnatais/hcgamma/skenv_py.csh
set hdir = $top_dir
set card = neut_num.card
#set fdir = /net/sukond1/export/data/t2k/flux
#set fdir = /disk/sklib/flux
set fdir = /home/cnatais/hcgamma/SystematicErrors/beamweights
set odir = /disk01/usr4/cnatais/neutfile
setenv RANFILE \${hdir}/seed/random.tbl.$num
setenv RFLIST \${hdir}/rflist.$fnum
cat <<! >! \${RFLIST}
11{{"\${fdir}/name.root",LOCAL,,RED,, "recl=1024 status=old form=formatted"}}
cat <<! >> $nqs_fname
}
#changed root file
20{{"\${odir}/num.h2a.sk.flux13a.neut_532.$fnum.dat",LOCAL,,WRT,, "recl=5670 status=new"}}
!
echo ! >> $nqs_fname
cat <<! >> $nqs_fname
MISTAKE
cd \${hdir}
uname -a
date

time ./t2kneut_sk \${card}

date

echo done.

!

chmod u+x $nqs_fname

echo $num
@ num++
end
```

wrote macro to

- read in tuned 13av2 release histograms
- clone them
- save with new name, **name.root**

same error with LUN 20

emailed Roger (and Hiro)

→ check the path

→ delete file if it already exists

→ then Roger noticed MISTAKE

Roger sent me a edited version of mk_num.sh

- removed “cat <<! >> \$nqs_name” in between RFLIST lines
- cleaned up old pieces that had been commented out
- added comments

```

set top_dir = `pwd`
if ( -d script) then
mkdir script
endif

set num = 0
while ($num <= 99)

set fnum = `printf "%03d" $num`
set nqs_fname = "nqs/neut_532_num.$fnum.sh"

# This command will print all subsequent lines to $nqs_fname until
# the c-shell reaches a line with only "!"
cat <<! >! $nqs_fname

source /usr/local/skifb_g77/skafl-trunk/env.csh
set hdir = $top_dir
set card = neut_num.card
set fdir = /home/cnatais/ngamma/SystematicErrors/beamweights
set odir = /disk01/usr4/cnatais/neutfile
setenv RANFILE \${hdir}/seed/random.tbl.$num
#setenv RFLIST \${hdir}/rflist.$fnum

# write everything up until "!" to RFLIST
# here we are still writing to $nqs_fname
cat <<! >! \${RFLIST}
11{{"\${fdir}/name.root",LOCAL,,RED,,,"recl=1024 status=old form=formatte"}}
20{{"\${odir}/num.h2o.sk.flux13a.neut_532.\${fnum}.dat",LOCAL,,WRT,,,"recl=5670 status=new"}}

# everything up until this point was written to $nqs_fname
!

# add "!" to $nqs_fname to tell it to stop writing to RFLIST
echo "!" >> $nqs_fname

#Restart open output to $nqs_fname, but in append (>>) mode
cat <<! >> $nqs_fname

cd \${hdir}
uname -a
date

time ./t2kneut_sk \${card}

date

echo done.

!
# everything up until this point was appended to $nqs_fname

chmod u+x $nqs_fname

echo $num
  @ num++
end

```

But wasn't making RFLIST until (in this order):

- uncommented RFLIST
- removed comments
- put back in “#! /bin/csh -f”
- returned to no quotation marks
- removed escape in fnum

next, change from name to tuned 13av2

```

FZFILE. LUN= 20 initialize for OPT= LX0
FZFILE. Use LREC= 5670, options= LX0
Specified flux histogram file/home/cnatais/ngamma/SystematicErrors/beamweights/name.rootseems not the one generated by this program.
Try flux hbook file.
Specified flux histogram file/home/cnatais/ngamma/SystematicErrors/beamweights/name.rootseems to be corrupted.
Try flux hbook file.
neopskfxv:No file was specified in RFLIST
int T2Kflux_9K::load_flux(): No file was specified in RFLISTFailed to fix energy for event #0.
0.132u 0.027s 0:01.03 14.5% 0+0k 49144+112io 43pf+0w
Thu Aug 10 02:19:02 JST 2017
done.

```

```
set top_dir = `pwd`
```

```
if ( -d script) then
mkdir script
endif
```

```
set num = 0
while ($num <= 99)
```

```
set fnum = `printf "%03d" $num`
set nqs_fname = nqs/neut_532_num.$fnum.sh
```

```
# This command will print all subsequent lines to $nqs_fname until
# the c-shell reaches a line with only "!"
```

```
cat <<! >! $nqs_fname
```

```
#!/bin/csh -f
```

```
source /home/cnantais/hcgamma/skenv_py.csh
```

```
set hdir = $top_dir
```

```
set card = neut_num.card
```

```
set fdir = /home/cnantais/hcgamma/SystematicErrors/beamweights/tuned13av2/run1-8
```

```
set odir = /disk01/usr4/cnantais/neutfile
```

```
setenv RANFILE \${hdir}/seed/random.tbl.$num
```

```
setenv RFLIST \${hdir}/rflist.$fnum
```

```
cat <<! >! \${RFLIST}
```

```
11{{"\${fdir}/sk_tuned13av2_13anom_run1-8_numode.root",LOCAL,,RED,, "recl=1024 status=old"}};
```

```
20{{"\${odir}/num.h20.sk.flux13a.neut_532.$fnum.dat",LOCAL,,WRT,, "recl=5670 status=new"}};
```

```
!
```

```
echo "!" >> $nqs_fname
```

```
#Restart open output to $nqs_fname, but in append (>>) mode
```

```
cat <<! >> $nqs_fname
```

```
cd \${hdir}
```

```
uname -a
```

```
date
```

```
time ./t2kneut_sk \${card}
```

```
date
```

```
echo done.
```

```
!
```

```
# everything up until this point was appended to $nqs_fname
```

```
chmod u+x $nqs_fname
```

```
echo $num
```

```
@ num++
```

```
end
```

```
FZFILE. LUN= 20 initialize for OPT= LX0
```

```
FZFILE. Use LREC= 5670, options= LX0
```

```
Specified flux histogram file/home/cnantais/hcgamma/SystematicErrors/beamweights/tuned13av2/run1-8/sk_tuned13av2_13anom_run1-8_numode.rootse\
```

```
ams not the one generated by this program.
```

```
Try flux hbook file.
```

changed fdir

changed root file

changed options

back to tuned 13av2 Run 1–8 (without changing names)

created **num.h20.sk.flux13a.neut_532.000.dat**
(15 M, compared to 16 M in May)

checksum warnings in err log, can ignore
(empty in May)

- but keeps going? **with PYTHIA?**
- no other obvious errors?
- tried to look at .dat with skdetsim
- usually 2 h
- after 2h, only 1/3 finished, so I quit

Change from **tuned I3av2 Run1-8** to **SK I3a nom**

(noticed from later work on MC scales)

<http://www.t2k.org/beam/NuFlux/FluxRelease/13arelease/sknom13aflux>

```
set fdir = /home/cnantais/ncgamma/SystematicErrors/beamweights/sk_13a_fluxrelease
set odir = /disk01/usr4/cnantais/neutfile
setenv RANFILE \${hdir}/seed/random.tbl.$num
setenv RFLIST \${hdir}/rflist.$fnum
cat <<! >! \${RFLIST}
11>{"\${fdir}/sk_13anom_250ka_fine.root",LOCAL,,RED,,,"recl=1024 status=old"}
20>{"\${odir}/num.h20.sk.flux13a.neut_532.$fnum.dat",LOCAL,,WRT,,,"recl=5670 status=new"}
!
echo "!" >> $nqs_fname
```

changed fdir

changed root file

created **num.h20.sk.flux13a.neut_532.000.dat** (larger 17 M, 15 M last time, or 16 M in May)
same message about histograms, but it keeps going

```
FZFILE. LUN= 20 initialize for OPT= LX0
FZFILE. Use LREC= 5670, options= LX0
Specified flux histogram file/home/cnantais/ncgamma/SystematicErrors/beamweights/sk_13a_fluxrelease\
/sk_13anom_250ka_fine.rootseems not the one generated by this program.
Try flux hbook file.
```

out/ log

finished work with 13a nominal flux, I think

environment variables:
mk_num.sh (nue, nmb)

mc/(neut/neut_5.3.2/src/t2kflux_zbs/)mk_num.sh (nue, nmb)

source skenv_py.csh instead of /usr/local/sklib_g77/skofl-trunk.env.csh

```
source /usr/local/sklib_g77/skofl-trunk/env.csh
```

```
setenv CC "gcc34"
setenv CXX "g++34"
setenv CPP "/lib/cpp"
setenv FC "g77"
setenv SKOFL_ROOT /home/skofl/sklib_g77/skofl-trunk
setenv CERN /home/skofl/sklib_g77/cern
setenv CERN_LEVEL 2005
setenv CERN_ROOT /home/skofl/sklib_g77/cern/2005
setenv ROOTSYS /home/skofl/sklib_g77/root_v5.28.00h
setenv NEUT_ROOT /home/skofl/sklib_g77/neut_5.3.6
setenv ATMPD_ROOT /home/skofl/sklib_g77/atmpd-trunk
set path = ( $SKOFL_ROOT/bin $ATMPD_ROOT/bin $ROOTSYS/bin $CERN_ROOT/bin $path )
if ($?LD_LIBRARY_PATH) then
  setenv LD_LIBRARY_PATH $SKOFL_ROOT/lib:`/home/skofl/sklib_g77/root_v5.28.00h/bin/root-config --libdir`:$LD_LIBRARY_PATH
else
  setenv LD_LIBRARY_PATH $SKOFL_ROOT/lib:`/home/skofl/sklib_g77/root_v5.28.00h/bin/root-config --libdir`
endif
```

/usr/local/sklib_g77/skofl-trunk/env.csh

```
setenv top /usr/local/sklib_g77
setenv SKOFL_ROOT $top/skofl_14c
setenv SOFTVER "14c"
setenv CERN $top/cern
setenv CERN_LEVEL 2005
setenv CERN_ROOT $CERN/$CERN_LEVEL
setenv ROOTSYS $top/root_v5.28.00h
setenv PYTHONPATH $ROOTSYS/lib:${PYTHONPATH}
setenv NEUTROOT $top/neut_5.3.2
#setenv NEUTROOT /home/atmpd/neut/neut_5.1.4.2
setenv NEUT_ROOT $NEUTROOT
#setenv LD_LIBRARY_PATH "$SKOFL_ROOT/lib:/home/cnantais/ngamma/SterileAna/lib:`$ROOTSYS/bin/root-config --libdir`:$LD_LIBRARY_PATH"
setenv LD_LIBRARY_PATH "$SKOFL_ROOT/lib:/home/cnantais/ngamma/Prob3++/lib:`$ROOTSYS/bin/root-config --libdir`:$LD_LIBRARY_PATH"
setenv ATMPD_ROOT $top/atmpd_$SOFTVER
setenv PATH "$SKOFL_ROOT/bin:$ATMPD_ROOT/bin:$ROOTSYS/bin:$CERN_ROOT/bin:$PATH"
setenv SKPATH "${SKOFL_ROOT}/const:${ATMPD_ROOT}/const:${SKOFL_ROOT}/const/Lowe:/skam/const"
```

skenv_py.csh

differences:

not a problem

probably not a problem

probably a problem

mk_num.sh (nue,nmb)

[/usr/local/sklib_g77/](#) is a link to [/home/skofl/sklib_g77](#)

CONCLUSION:
 tried it (num, nue, nmb)
 and .dat file sizes look fine

skofl-trunk/env.csh	skenv_py.csh
CC "gcc34"	(none) echo \$CC → gcc34
CXX "g++34"	(none) echo \$CXX → g++34
CPP "/lib/cpp"	(none) echo \$CPP → gcc34 -E
FC "g77"	(none) (no echo) but it's set manually in src/neutsmpl/
SKOFL_ROOT /home/skofl/sklib_g77/skofl-trunk	SKOFL_ROOT /usr/local/sklib_g77 /skofl_14c
NEUT_ROOT /home/skofl/sklib_g77/neut_5.3.6	NEUT_ROOT \$NEUTROOT NEUTROOT /usr/local/sklib_g77 /neut_5.3.2
ATMPD_ROOT /home/skofl/sklib_g77/atmpd-trunk	ATMPD_ROOT /usr/local/sklib_g77 /atmpd_14c
path = (\$SKOFL_ROOT/bin \$ATMPD_ROOT/bin \$ROOTSYS/bin \$CERN_ROOT/bin \$path)	PATH "\$SKOFL_ROOT/bin:\$ATMPD_ROOT/bin:\$ROOTSYS/bin:\$CERN_ROOT/bin:\$PATH"
LD_LIBRARY_PATH \$SKOFL_ROOT/lib:/home/skofl/sklib_g77/root_v5.28.00h/bin/root-config -- libdir:\$LD_LIBRARY_PATH	LD_LIBRARY_PATH "\$SKOFL_ROOT/lib:/home/cnantis/nggamma/Prob3++/lib:\$ROOTSYS/bin/root\ -config --libdir:\$LD_LIBRARY_PATH"
(none)	SKPATH "\$SKOFL_ROOT}/const:{\$ATMPD_ROOT}/const:{\$SKOFL_ROOT}/const/lowe:/skam /const"

environment variables:

neut_select/mk_skcount_num.sh (nue,nmb)

```
source /usr/local/sklib_g77/atmpd-trunk/env.csh
```

neut_select/mk_skcount_num.sh (nue,nmb)

- source **skenv_py.csh** instead of **/usr/local/sklib_g77/atmpd-trunk/env.csh**
- (similar to previous slides for skofl-trunk in mk_num.sh (nue,nmb))

```
source /home/skofl/sklib_g77/skofl-trunk/env.csh
setenv ATMPD_ROOT /home/skofl/sklib_g77/atmpd-trunk
setenv NEUT_ROOT /home/skofl/sklib_g77/neut_5.3.6
set path = ( $ATMPD_ROOT/bin $SKOFL_ROOT/bin $path )
rehash
```

want to change
already in skofl-trunk/env.csh, but also skenv_py.csh
“
don't care about path?
don't care about rehash?

CONCLUSION:

tried it (num, nue, nmb)

hbk/.dat file sizes look fine

select/.dat ~5 M smaller

environment variables: Prob3++

Prob3++ environment variables

- don't source **/home/sklb/software/setup.csh** because gcc and l6c
- want g77 and l4c

```
#!/bin/tcsh -f

if (-e /home/skofl/sklib_gcc4.8.5/skofl_16c/env.csh) then
    source /home/skofl/sklib_gcc4.8.5/skofl_16c/env.csh #1
endif

if (-e /home/skofl/sklib_gcc4.8.5/atmpd_16c/env.csh) then
    source /home/skofl/sklib_gcc4.8.5/atmpd_16c/env.csh #2
endif

#setenv CVSROOT :ext:anoncvs@repo.nd280.org:/home/trt2kmgr/ND280Repository
setenv CVSROOT :ext:anoncvs@repo.nd280.org:/home/trt2kmgr/T2KRepository
setenv CVS_RSH ssh
unset CVS_SERVER

#setenv PATH /home/xiaoyue/.local/bin:$PATH

setenv CERNLIB /home/skofl/sklib_gcc4.8.5/cern/2005
□
```

Prob3++ environment variables

```
#! /home/skofl/sklib_gcc4.8.5/skofl_16c/env.csh
```

```
setenv CC "gcc"
setenv CXX "g++"
setenv CPP "/lib/cpp"
setenv FC "gfortran"
setenv SKOFL_ROOT /home/skofl/sklib_gcc4.8.5/skofl_16c
setenv CERN /home/skofl/sklib_gcc4.8.5/cern
setenv CERN_LEVEL 2005
setenv CERN_ROOT /home/skofl/sklib_gcc4.8.5/cern/2005
setenv ROOTSYS /home/skofl/sklib_gcc4.8.5/root_v5.28.00h
setenv NEUT_ROOT /home/skofl/sklib_gcc4.8.5/neut_5.3.6
setenv ATMPD_ROOT /home/skofl/sklib_gcc4.8.5/atmpd_16c
set path = ( $SKOFL_ROOT/bin $ATMPD_ROOT/bin $ROOTSYS/bin $CERN_ROOT/bin $path )
if ($?LD_LIBRARY_PATH) then
  setenv LD_LIBRARY_PATH $SKOFL_ROOT/lib:`/home/skofl/sklib_gcc4.8.5/root_v5.28.00h`
  /bin/root-config --libdir`:$LD_LIBRARY_PATH
else
  setenv LD_LIBRARY_PATH $SKOFL_ROOT/lib:`/home/skofl/sklib_gcc4.8.5/root_v5.28.00h`
  /bin/root-config --libdir`
endif
```

differences:

not a problem

probably not a problem

probably a problem

/usr/local/sklib_g77/ is a link to /home/skofl/sklib_g77

#1 sklib_gcc4.8.5/skofl_16c/env.csh	skenv_py.csh
CC "gcc"	(none) echo \$CC → gcc34
CXX "g++"	(none) echo \$CXX → g++34
CPP "/lib/cpp"	(none) echo \$CPP → gcc34 -E
FC "gfortran"	(none) (no echo)
SKOFL_ROOT /home/skofl/sklib_gcc4.8.5/skofl_16c	SKOFL_ROOT /usr/local/sklib_g77/skofl_14c
CERN /home/skofl/sklib_gcc4.8.5/cern	CERN /usr/local/sklib_g77/cern
ROOTSYS /home/skofl/sklib_gcc4.8.5/root_v5.28.00.h	ROOTSYS /usr/local/sklib_g77/root_v5.28.00h
NEUT_ROOT /home/skofl/sklib_gcc4.8.5/neut_5.3.6	NEUT_ROOT \$NEUTROOT NEUTROOT /usr/local/sklib_g77/neut_5.3.2
ATMPD_ROOT /home/skofl/sklib_gcc4.8.4.5/atmpd_16c	ATMPD_ROOT /usr/local/sklib_g77/atmpd_14c
path = (\$SKOFL_ROOT/bin \$ATMPD_ROOT/bin \$ROOTSYS/bin \$CERN_ROOT/bin \$path)	PATH "\$SKOFL_ROOT/bin:\$ATMPD_ROOT/bin:\$ROOTSYS/bin:\$CERN_ROOT/bin:\$PATH"
LD_LIBRARY_PATH \$SKOFL_ROOT/lib:`/home/skofl/sklib_gcc4.8.5/root_v5.28.00h` /bin/root-config --libdir`:\$LD_LIBRARY_PATH	LD_LIBRARY_PATH "\$SKOFL_ROOT/lib:/home/cnantais/ngamma/Prob3++/lib:`\$ROOTSYS/bin/root` -config --libdir`:\$LD_LIBRARY_PATH"
(none)	SKPATH "\${SKOFL_ROOT}/const:\${ATMPD_ROOT}/const:\${SKOFL_ROOT}/const/lowe:/skam /const"

Prob3++ environment variables

#2 /home/skofl/sklib_gcc4.8.5/atmpd_16c/env.csh

```
source /home/skofl/sklib_gcc4.8.5/skofl_16c/env.csh
setenv ATMPD_ROOT /home/skofl/sklib_gcc4.8.5/atmpd_16c
setenv NEUT_ROOT /home/skofl/sklib_gcc4.8.5/neut_5.3.6
set path = ( $ATMPD_ROOT/bin $SKOFL_ROOT/bin $path )
rehash
```

skenv_py.csh

ATMPD_ROOT /usr/local/sklib_g77/atmpd_14c

NEUT_ROOT \$NEUTROOT

NEUTROOT /usr/local/sklib_g77/neut_5.3.2

PATH "\$SKOFL_ROOT/bin:\$ATMPD_ROOT/bin:\$ROOTSYS/bin:\$CERN_ROOT/bin:\$PATH"

Prob3++ environment variables

- `cp -r /home/skofl/sklib_g77/atmpd_l4c/src/analysis/Prob3++/ .`
- `make`
- `make shared`
- `BargerPropagator.py`
 - `ib = c.cdll.LoadLibrary('../ncgamma/Prob3++/libThreeProb.so')`
- `python simplelinear.py` → created png
- `Processing/testosc.py` → printed probability to screen

CONCLUSION:

- fresh copy of Prob3++
- did not source `setup.csh`
- it still works

change MC lowfit executable

- **lowfit/lowfit_t2k_mc** instead of **mc/lowfit/lowfit_sk4_zbs**
- Fukuda-san asked Huang-san, mc/lowfit/ is an old version, for reference only
- Processing/ProcessNCEL_mc.sh


```
#exe=$soft/lowfit/lowfit_sk4_zbs
exe=$ncgdir/lowfit/lowfit_t2k_mc
```
- ./ProcessNCEL_mc.sh 000 numu
- failed after 45 min (expected ~25 min)

```
=====
==== Lowfit ====          created lemc/destim/detsim_numu.ncgamma_flux13a_neut532.000.hbk(.zbs)
=====
Fri Aug 11 04:37:06 JST 2017
/usr/local/sklib_g77/skof_l_14c/lib:/home/chantais/ncgamma/Prob3++/lib:/usr/local/sklib_g77/root_
v5.28.00h/lib:/home/skof_l/sklib_g77/skof_l_14c/lib:/home/skof_l/sklib_g77/root_v5.28.00h/lib:/usr/
local/lib:/usr/local/lib
/usr/local/sklib_g77/root_v5.28.00h
/home/chantais/ncgamma/lowfit/lowfit_t2k_mc 000 numu.ncgamma_flux13a_neut532.000.hbk lowfit_numu
.ncgamma_flux13a_neut532.000.zbs detsim_numu.ncgamma_flux13a_neut532.000.zbs
Usage: lowfit_sk4_zbs_only f_in f_out... arguments are wrong
cp: cannot stat 'lowfit_numu.ncgamma_flux13a_neut532.000.zbs': No such file or directory

=====
==== LE Ntuple ====
=====
Fri Aug 11 04:37:06 JST 2017
Missing input file lowfit_numu.ncgamma_flux13a_neut532.000.zbs, bailing
```

needed to change arguments too

lowfit_t2k_mc.F

```
c*** check arguments
narg = iargc()
if (narg .ne. 2) then
  print *, 'Usage: lowfit_sk4_zbs_only f_in f_out...'
  call exit(1)
endif
call getarg(1, fname_in)
call getarg(2, fname_out)
```

(this is the error message)
why “lowfit_sk4_zbs_only”?

lowfit_sk4_zbs.F

```
c*** check arguments
narg = iargc()
if (narg .lt. 4) then
  print *, 'Usage: lowfit num f_nt f_out f_in...'
  call exit(1)
endif
```

ProcessNCEL_mc.sh

```
#exe=$soft/lowfit/lowfit_sk4_zbs
exe=$ncgdir/lowfit/lowfit_t2k_mc

#echo $exe $num $f_lf_hbk $f_lf_out $f_lf_in | tee -a $log
#$exe $num $f_lf_hbk $f_lf_out $f_lf_in | tee -a $log
fixed arguments
echo $exe $f_lf_in $f_lf_out | tee -a $log
$exe $f_lf_in $f_lf_out | tee -a $log
```

created files:

detsim/
lowfit/
lentuple/
weights_postfit_banff/flux_prefit/
weights_postfit_banff/xsec_prefit/
log/
batchlogs/

MC scales (in progress)

hardcoded “scales”

- ~~Processing/SelectNCGamma_data.py~~ **ncel_scales**
- Processing/SelectNCGamma.py **ncel_scales**
- para/Calcmc.py **ncel_scales**
- Processing/ScrapeLE.py **scrape.scales**
- SystematicErrors/SysError.py **scales**

like the flux update, I started looking at this in February 2016 and got stuck

MC scales

Hiro/20160212

Have to do for I3a neutrino and antineutrino

I1a

http://www.t2k.org/asg/lowe/mc_scale

ask Hayato-san to give me the total xsec for numu and nue
can send him the card files and tell him version of NEUT:

- 1) neut_numu.card
- 2) neut_nue.card
- 3) neut_numubar.card
- 4) neut_nuebar.card

src/t2kflux_zbs/Cards

(Hiro though in neutsmpl/Cards)

why do people use 35.4 kton (dwall > -50) ?

there is a gap between the PMT wall and the PMT support structure,
but it's bigger than 50 cm?

MC_scale

by [Kunxian Huang](#) — last modified Feb 07, 2016 05:43 AM — [History](#)

```

c In flux11a neut511 1386.9 numu / 22.5kton / 10^21 pot
c --> 218206 numu / 35.4 kton (dwall > -50) / 10^23 pot
c   if(all.ge.218206) goto 1001
c --> 300000 numu = 1.375e23 pot
c 122330 events written in flux11a & neut5.1.4.1

c In flux11a neut511 28.05 nue / 22.5kton / 10^21 pot
c --> 220660 nue / 35.4 kton (dwall > -50) / 5 x 10^24 pot
c   if(all.ge.220660) goto 1001
c --> 300000 nue = 6.798e24 pot

c In flux11a neut511 62.712 nmb / 22.5kton / 10^21 pot
c --> 62712 nmb / 35.4 kton (dwall > -50) / 1 x 10^24 pot
c --> 98667 nmb / 35.4 kton (dwall > -50) / 1 x 10^24 pot

c   if(all.ge.62712) goto 1001
c --> 300000 numu = 4.783e24 pot --> Wrong about this number
c --> 300000 nmb = 3.0405e24 pot

```

[ncgamma svn code](#)

why?

Huang-san told me to send Hayato-san card files from **NEUT 5.3.2** src/t2kflux_zbs/Cards

→ use these instead of neut_numu.card (nue,nmb) e.g., in mk_num.sh(nue,nmb)?

(more on this later)

need cross section as a function of energy

MC scales

TN-12 - J.Albert, SK 10a and 07a event expectation calculations
(2010)

need equivalent to `totpau.tbl` for NEUT 5.3.2
→ Hayato-san said I make it myself
(more on this later)

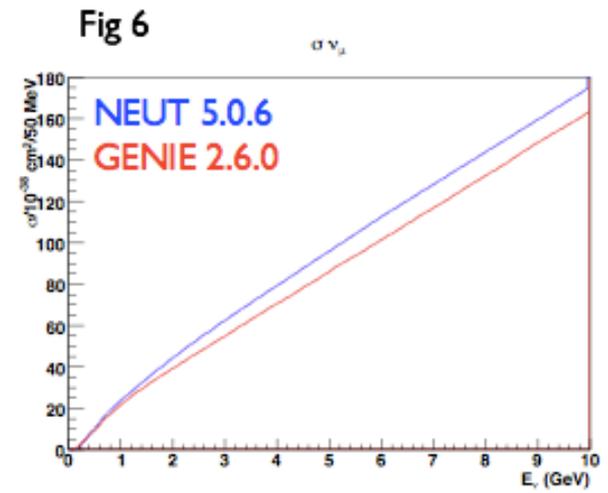
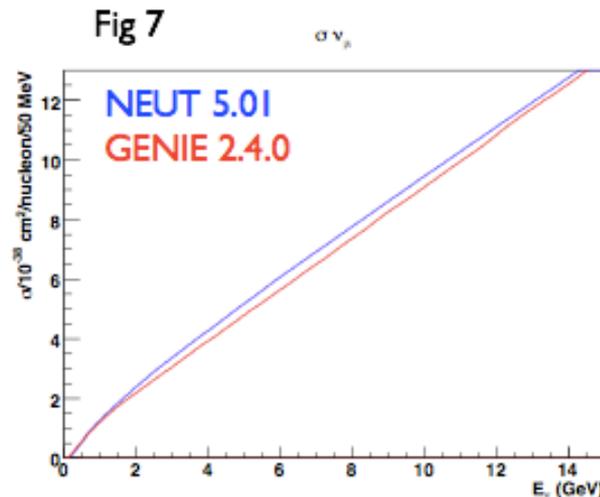
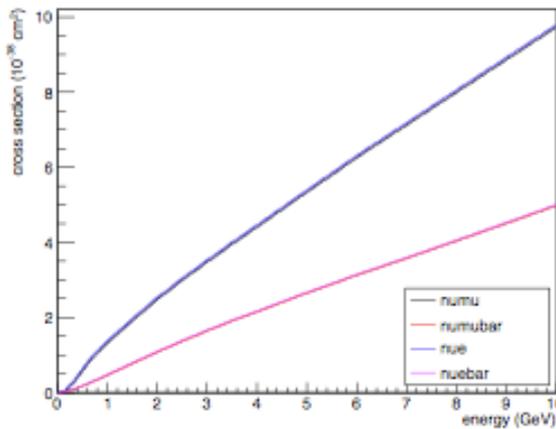
Cross section

Huang-san sent me the `totpau.tbl` for NEUT 5.4.1.2 (or maybe older)

Made by Hayato-san

Comparing to Fig. 7 in TN-12. Is this per nucleon? **yes**

cross sections (numu < nue) and (numubar < nuebar)
because of phase space, mu has more mass



need flux as a function of energy

MC scales

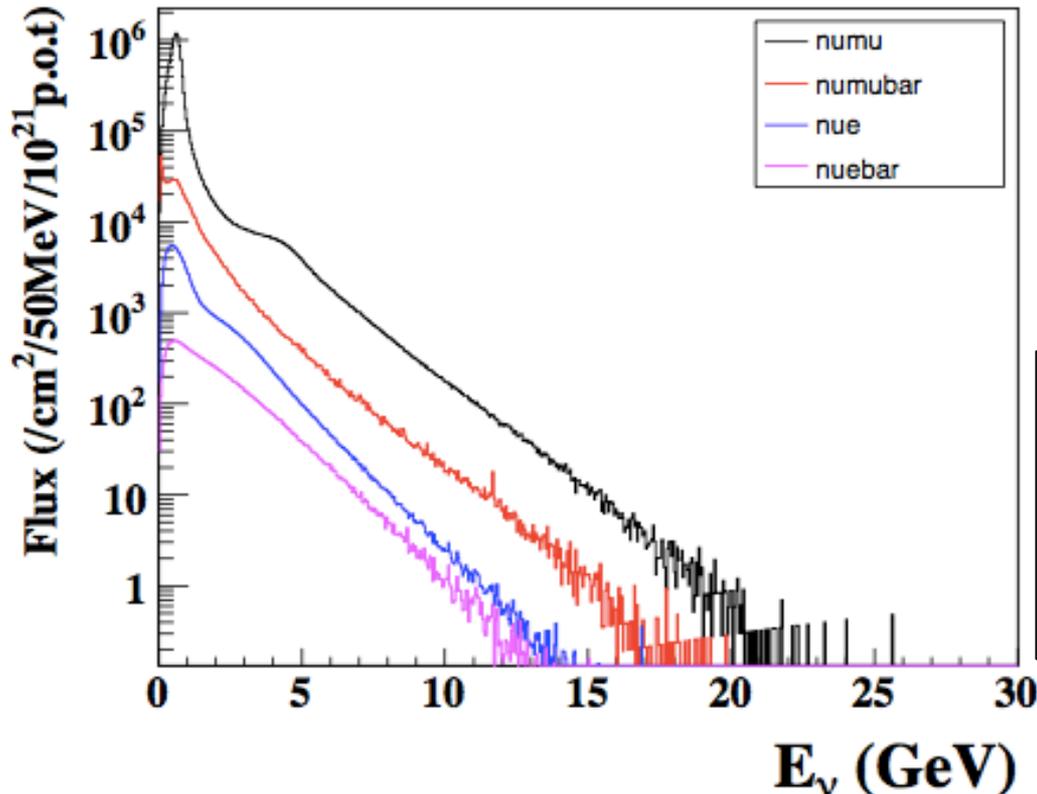
SK 13a Nominal Flux
(not 13av2 tuned fluxes for Runs 1–8)
(no update since I did in Feb 2016)

this is when I realized to use this for MC NEUT files

Flux

www.t2k.org/beam/NuFlux/FluxRelease/I3arelease/sknomI3aflux

up to 30 GeV, instead of 10 GeV – ask Hayto-san what to do about NEUT
→ fix cross section >10 GeV because it saturates anyway



from my code:

```
sk_13anom_250ka_fine.root
```

```
enu_sk_13a_real_*
```

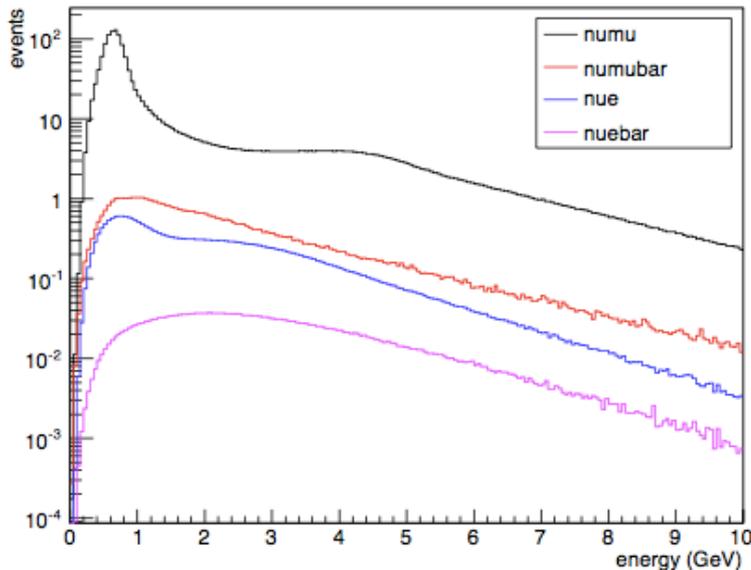
→ this is untuned flux, why not tuned?

MC scales

events = $\alpha * x_s * \text{flux}$ in each bin

factor related to target mass

$\alpha = 22.5 * 1e9 * 6.02e23 * 1e-38$



MC scales

integrated entire histogram for “events”

scale = events * (35.4/22.5) * (1e23/1e21)

why convention of 35.4 kton and 1e23 POT?

Scale numu 231424

Scale numubar 8270.34

Scale nue 4413.05

Scale nuebar 472.216

(100 files) * (3000 events) = 300,000 NEUT events

pot = 300,000 * 1e23 / scale

and remove factor of 1e23?

Scale numu (per POT) 1.29632e+23

Scale numubar (per POT) 3.62742e+24

Scale nue (per POT) 6.79801e+24

Scale nuebar (per POT) 6.35302e+25

Enter scales (per POT)

- 1) [ScrapeLE.py](#)
- 2) [SelectNCgamma_data.py](#)
- 3) [SelectNCgamma.py](#)
- 4) [Calcmc.py](#)

all still have 11a scales

didn't mention SysError.py?

Have to add [nuebar](#)

scale depends on POT, so different depending on the Run
→ must enter POT for each Run within code

Different for nu and antinu mode (different flux), would have to switch

need NEUT 5.3.2 cross sections

→ ask Hayato-san, remember doing this already

Emailed Hayato-san Feb 2016

- (suggested using NEUT 5.3.5)
- NC elastic scattering, two cross sections calculated but based on same model
 - Callum MDLQE=402
 - Huang-san and Mori-san MDLQE=22
- (RPA corrections are off by default in NEUT 5.3.2)
- Callum cross section stored in:
 crsdat/qelSfData.l.21/totXsec/
 +12_1000080160_nc.csv <- nue
 -12_1000080160_nc.csv <- anti nue
 +14_1000080160_nc.csv <- numu
 -14_1000080160_nc.csv <- anti numu
- **this doesn't mean much to me**
- neutsmpl/dumtpotpau.F
- **./Linux_pc/dumtpotpau [cardfile]** will create the total cross section table

which card file?

Feb 2016, Huang-san told me to make sure cards were the same for 5.3.2 and 5.1.4.2

“For NEUT card, I don't think cards for 5.1.4.2 are totally the same with 5.3.2, because the new version includes many new model. You have to check that. If it is the same you can change the produced event number to be 3000. (For CPU time saving)”

I think this means to compare **5.1.4.2 neut_num.card** and **5.3.2 neut_numu.card**?

but maybe **5.1.4.2 neut_numu.card** and 5.3.2 neut_numu.card?

→ nope, these are exactly the same

try to make cross section table

- start with **ncgamma 5.1.4.2 neut_num.card**
- mc/neut/neut_5.3.2/src/neutsmpl/Linux_pc/
- ./dumptotpau t2kflux_zbs/neut_num.card

```
NECARDEV : INPUTTED PARAMETER  
NECARDEV : NEV = 0  
NECARDEV : IDPT in the card was set to 0 but this should be +-12, +-14.
```

try with **5.3.2 neut_numu.card**
SAME PROBLEM

→ Emailed Hayato-san

- neut_num.card or neut_numu.card?
- or a different card for dumptotpau?

While waiting for response, look at instances of scales and POT in ncgamma code

“official” POT

- [beam/NuFlux/fluxreleasesummarylink/](#)
- [flux_release_summary_v3p0.pdf](#) (07 June 2017)

TN-264

Table 4 – Delivered POT ($\times 10^{19}$) for each sub-run w/ updated POT calculation for all runs.

Run Number	Positive Focussing	Negative Focussing
Run 1	3.2875	-
Run 2	11.3406	-
Run 3a	0.1241 (no horns)	-
Run 3b	2.1777	-
Run 3c	13.9028	-
Run 4	36.3628	-
Run 5a	0.6669	-
Run 5b	1.7977	-
Run 5c	-	5.1450
Run 6a	1.2509	-
Run 6b	-	13.1353
Run 6c	-	5.3207
Run 6d	-	7.9310
Run 6e	-	9.3794
Run 6f	0.8984	-
Run 7a	0.8967	-
Run 7b	-	35.2719
Run 7c	3.9929	-
Run 8	72.5565	-
Total	149.2555 (all runs) 149.1314 (w/o run 3a)	76.1833

Processing/SelectNCGamma_data.py

why would MC scales be needed for data only?

```
ncel_scales = { "numu": 1./1.375e23 * 100.,
               "nue": 1./6.798e24 * 100.,
               "numubar": 1./3.041e24 * 100.
             }
```

also remove POT

```
pot = {}
pot["1"] = 0.323e20
pot["2"] = 1.108e20
pot["3b"] = 0.214e20
#pot["3c"] = 0.91e20
pot["3c"] = 1.365e20
pot["4"] = 3.560e20
```

ncel_scales and pot not used elsewhere in code → comment out

```
$ python SelectNCGamma_data.py -o ncgammahistRun4test2.root -l
ncgammaRun4test2.list /disk/.../lowedata/ntuple/data.lowfit.7*.merge.root
```

diff -u ncgammaRun4.list ncgammaRun4**test2**.list → the same

ncgammahistRun4.root and ncgammahistRun4**test2**.root are the same

deleted those lines

edited t2k.org instructions

Processing/SelectNCGamma.py

```
ncel_scales = { "numu": 1./1.38e23 * 100.,
               "nue": 1./6.80e24 * 100.,
               "numubar": 1./3.041e24 * 100.
             }
```

Huang-san's 11a numbers

```
if mcmode:
    wgt = ncel_scales[fileType] / mctree.GetNtrees() * pot[run]
```

```
pot = {}
pot["1"] = 0.32e20
pot["2"] = 1.11e20
pot["3b"] = 0.21e20
pot["3c"] = 0.91e20
pot["4"] = 3.560e20
```

POT before

- reference?
- precision?

```
#FHC
pot = {}
pot["1"] = 0.32875e20
pot["2"] = 1.13406e20
pot["3b"] = 0.21777e20
pot["3c"] = 1.39028e20
pot["4"] = 3.63628e20
pot["5a"] = 0.06669e20
pot["5b"] = 0.17977e20
pot["6a"] = 0.12509e20
pot["6f"] = 0.08984e20
pot["7a"] = 0.08967e20
pot["7c"] = 0.39929e20
pot["8"] = 7.25565e20
```

```
#RHC
pot["5c"] = 0.51450e20
pot["6b"] = 1.31353e20
pot["6c"] = 0.53207e20
pot["6d"] = 0.79310e20
pot["6e"] = 0.93794e20
pot["7b"] = 3.52719e20
```

updated POT,
including for
Runs 5–8,
and 3c

para/Calcmc.py

```
# MC Scales from Ueno
ncel_scales = { "numu": 1./1.375e23 * 100.,
               "nue": 1./6.798e24 * 100.,
               "numubar": 1./3.041e24 * 100.
             }
```

Huang-san's 11a numbers

```
for run in runs:
    wgt = 1.0
    wgt = ncel_scales[fileType] / mctree.GetNtrees() * pot[run]
```

```
pot = {}
pot["1"] = 0.323e20
pot["2"] = 1.108e20
pot["3b"] = 0.214e20
#pot["3c"] = 0.91e20
pot["3c"] = 1.365e20
pot["4"] = 3.560e20
```

updated POT
(same as SelectNCGamma.py)

Processing/ScrapeLE.py

```
# MC Scales from Ueno
scrape.scales = { # POT per files
  "numu": 1.e21/1.375e23 * 100.,
  "nue": 1.e21/6.798e24 * 100.,
  "numubar": 1.e21/3.041e24 * 100.
}
```

Huang-san's 11a numbers

where are these used again in code?

no POT in code?

ScrapeLE.py has a complicated way of fitting into the ncgamma tools...

SystematicErrors/SysError.py

```
scale1 = 0.323e20/1.e21 * atree.GetEntries() / Nevt  
scale2 = 1.108e20/1.e21 * atree.GetEntries() / Nevt  
scale3 = 1.580e20/1.e21 * atree.GetEntries() / Nevt  
scale4 = 3.560e20/1.e21 * atree.GetEntries() / Nevt
```

This is just POT for Runs 1–4, not MC scales

must update POT

combine for Runs 3, 5, 6, 7?

working on T2KReWeight **without NCQE**
(in progress)

T2KReWeight

- more official **BANFF_PostFit_I7052I.root** from iRODS?
- 2015 BANFF postfit from iRODS asg2015oa/BANFF/postfit

Data Storage for Global Analysis Files

<http://www.t2k.org/asg/oagroup/gadatastorage>

iRODS Web Interface

Log on to iRODS interface: <https://hepirods1.ph.qmul.ac.uk/web/index.php>

Host IP: hepirods2.ph.qmul.ac.uk

Port Number: 6835

Username: T2K_ASG_Reader

Password: T2Koscillations

Zone: QMULZone1

ncgamma 20170612

- nothing in asg2017oa (or asg2018oa)
 - latest BANFF/ was asg2016oa
- ask Mark Scott?

T2KReWeight

- turn off NCQE reweighting in T2KReWeight v1r27p3, but how?
- Mark Scott said maybe Alex edited src/T2KNeutReWeight → why important?
- it was the last file he changed → so?
- diff -u
/home/ahimmel/T2K/T2KReWeight/TestVer/src/T2KNeutReWeight.cxx
T2KReWeight_v1r27p3/src/T2KNeutReWeight.cxx
- nothing stands out?

```

/home/ahimmel/T2K/T2KReWeight/TestVer/src@supak001[860]_% ls -lrth
total 5.5M
-rwxr-xr-x 1 ahimmel sk 543 Apr 18 2011 Makefile
-rwxr-xr-x 1 ahimmel sk 1.5K Apr 18 2011 JnuBeamRead.cxx
-rwxr-xr-x 1 ahimmel sk 765 Jun 8 2011 LinkDef.h
-rwxr-xr-x 1 ahimmel sk 4.7K Jul 24 2011 T2KSystSet.h
-rwxr-xr-x 1 ahimmel sk 2.8K Jul 24 2011 T2KGenieReWeight.h
-rwxr-xr-x 1 ahimmel sk 8.2K Jul 24 2011 T2KGenieReWeight.cxx
-rwxr-xr-x 1 ahimmel sk 11K Aug 2 2011 JnuBeamRead.h
-rw-r--r-- 1 ahimmel sk 1.9K Aug 10 2011 T2KWeightsStorer.h
-rwxr-xr-x 1 ahimmel sk 6.8K Jan 14 2012 T2KSystSet.cxx
-rwxr-xr-x 1 ahimmel sk 2.2K Jan 18 2012 ThrowParms.h
-rwxr-xr-x 1 ahimmel sk 2.3K Jan 18 2012 ThrowParms.cxx
-rw-r--r-- 1 ahimmel sk 6.6K Jan 24 2012 T2KWeightsStorer.cxx
-rwxr-xr-x 1 ahimmel sk 2.0K Feb 8 2012 T2KGEANTUtils.h
-rwxr-xr-x 1 ahimmel sk 5.8K Feb 8 2012 T2KGEANTUtils.cxx
-rwxr-xr-x 1 ahimmel sk 1.7K Feb 8 2012 T2KGEANTRWeight.h
-rwxr-xr-x 1 ahimmel sk 6.8K Feb 8 2012 T2KGEANTRWeight.cxx
-rwxr-xr-x 1 ahimmel sk 8.1K Mar 24 2012 T2KGenieUtils.h
-rwxr-xr-x 1 ahimmel sk 43K Mar 24 2012 T2KGenieUtils.cxx
-rwxr-xr-x 1 ahimmel sk 42K Apr 25 2012 T2KSyst.h
-rwxr-xr-x 1 ahimmel sk 16K May 21 2012 SK__h1.h
-rwxr-xr-x 1 ahimmel sk 17K May 21 2012 SK__h1.cxx
drwxr-xr-x 2 ahimmel sk 4.0K Sep 1 2012 CVS
-rwxr-xr-x 1 ahimmel sk 3.2K Nov 14 2012 T2KWghtEngineI.h
-rwxr-xr-x 1 ahimmel sk 1.6K Nov 14 2012 T2KSKUtils.h
-rwxr-xr-x 1 ahimmel sk 4.7K Nov 14 2012 T2KSKUtils.cxx
-rwxr-xr-x 1 ahimmel sk 1.7K Nov 14 2012 T2KSKReWeight.h
-rwxr-xr-x 1 ahimmel sk 5.3K Nov 14 2012 T2KSKReWeight.cxx
-rwxr-xr-x 1 ahimmel sk 2.4K Nov 14 2012 T2KReWeight.h
-rwxr-xr-x 1 ahimmel sk 2.5K Nov 14 2012 T2KNIWGUtils.h
-rwxr-xr-x 1 ahimmel sk 20K Nov 14 2012 T2KNIWGUtils.cxx
-rwxr-xr-x 1 ahimmel sk 2.0K Nov 14 2012 T2KNIWGReWeight.h
-rwxr-xr-x 1 ahimmel sk 8.0K Nov 14 2012 T2KNIWGReWeight.cxx
-rwxr-xr-x 1 ahimmel sk 4.7K Nov 14 2012 T2KNeutUtils.h
-rwxr-xr-x 1 ahimmel sk 25K Nov 14 2012 T2KNeutUtils.cxx
-rwxr-xr-x 1 ahimmel sk 2.2K Nov 14 2012 T2KNeutReWeight.h
-rw-r--r-- 1 ahimmel sk 8.9K Nov 15 2012 SK__nc.cxx
-rw-r--r-- 1 ahimmel sk 9.8K Nov 15 2012 SK__nc.h
-rwxr-xr-x 1 ahimmel sk 2.2K Nov 16 2012 T2KJNuBeamReWeight.h
-rwxr-xr-x 1 ahimmel sk 8.4K Nov 16 2012 T2KJNuBeamReWeight.cxx
-rwxr-xr-x 1 ahimmel sk 2.0K Nov 16 2012 T2KJNuBeamUtils.h
-rwxr-xr-x 1 ahimmel sk 18K Nov 16 2012 T2KJNuBeamUtils.cxx
-rwxr-xr-x 1 ahimmel sk 7.9K Nov 16 2012 T2KReWeight.cxx
-rw-rw-r-- 1 ahimmel sk 557 May 7 2013 T2KVersion.h
-rw-rw-r-- 1 ahimmel sk 356 May 7 2013 T2KBuild.h
-rwxr-xr-x 1 ahimmel sk 8.0K Apr 26 2014 T2KNeutReWeight.cxx
-rw-rw-r-- 1 ahimmel sk 107K Jul 19 2014 JnuBeamRead.o
-rw-rw-r-- 1 ahimmel sk 81K Jul 19 2014 SK__h1.o
-rw-rw-r-- 1 ahimmel sk 66K Jul 19 2014 SK__nc.o

```

T2KReWeight

Mark Scott also said to make changes to genWeights_SK_2016

```

////////////////////////////////////
//
// Title: genWeights_2015.cxx
//
// Purpose: Generate weights for ND280 or SK sample, using the BANFF
//          parameters fitted central values (CVs) and covariance
//
// Usage:
//   ./genWeights_2015.exe -i <inputfile> -p <banff_parameter_file> -o <weight_outputfile>
//                          -horn <+1:nu-mode, -1:antineu-mode> -app <1 for appearance sample, 0 otherwise>
//                          -t <# of throws> -r <random seed for throws>
//                          -dslist <disable_sys_list>
//                          [--use-prefit --drop-flux --drop-xsec]
//

```

<disable_sys_list>: Text file that lists the systematic parameter dials to disable. Nominal value will be used when calculating weights.

```

// disable dials on the list
ifstream fList(fDisablSysList.Data());
if (!fList.fail()) {
    string strLine;
    while (getline(fList, strLine)) {
        for (int ipar=0; ipar<nPars; ipar++) {
            if (parNames[ipar].CompareTo(strLine.c_str())==0) {
                cout << Form("Disabling dial for %s", parNames[ipar].Data()) << endl;
                parIncluded[ipar] = 0;
                parBins[ipar] = 0;
            }
        }
    }
    fList.close();
    cout << endl;
}

```

I don't think -dslist was used by Alex

T2KReWeight

- genWeights_SK_2016.cxx

```
// Parameters as Defined in the BANFF fit
const int nPars = 25;

// Name of the tuning parameters used in the BANFF output file.
// Prepend "Flx_" to flux parameters; detector type, horn mode and bin index will be appended in the code\
  later
TString parNames[nPars] = {"Flx_Numu", "Flx_Numub", "Flx_Nue", "Flx_Nueb", "MAQE", "pF_0", "2p2h_norm_nu", "2p2h\
_norm_nubar", "2p2h_normCto0", "2p2h_shape_0", "CA5", "MARES", "ISO_BKG", "nue_numu", "nuebar_numubar", "CC_DIS", \
"CC_Coh_0", "NC_Coh", "NC_1gamma", "NC_other_far", "BeRPA_A", "BeRPA_B", "BeRPA_D", "BeRPA_E", "BeRPA_U"};

// Name of the corresponding T2KReWeight dial for each of the parameters above
// For parameters whose value default to 0, not 1, make sure to add it in the "if" statement where the tw\
eak dial is set later in the code
TString dialNames[nPars] = {"numu", "numub", "nue", "nueb", "NXSec_MaCCQE", "NIWG2014a_pF_016", "NIWGMEC_Norm_0\
16", "", "", "NIWGMEC_PDDWeight_016", "NXSec_CA5RES", "NXSec_MaFFRES", "NXSec_BgScIRES", "NIWG2012a_ccnueE0", ""\
, "NIWG2012a_dismpishp", "NIWG2012a_cccohE0", "NIWG2012a_nccohE0", "", "NIWG2012a_ncotherE0", "", "", "", "", ""};
```

NC_Coh	NIWG2012a_nccohE0
NC_1gamma	(nothing?) also, is this ND280 ncgamma?
NC_other_far	NIWG2012a_ncotherE0

turn off "NC_other_far"?

→ KEEP WORKING ON IT

Summary

- updated to flux I3a
 - tuned I3av2 histograms
 - I3a nominal histograms
- changed environment variables
 - mk_num.sh (nue, nmb)
 - neut_select/
 - Prob3++
- updated MC lowfit executable
- MC scales (waiting for Hayato-san reply)
- T2KReWeight without NCQE (just started)