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group meeting  
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# ncotherE0 dial affects NCE, as well as other modes

<http://www.t2k.org/nd280/physics/xsec/docs/xsec-niwg-doc/niwg2016>

Table of uncertainties which can be used with T2KReWeight version specified above.

Parameter name	T2KReWeight dial	Affects which NEUT channels? <u>Current NEUT code lookup</u>	Expected range, Correlations with?	Notes	Status
NC other normalization	kNIWG2012a ncotherE0	38,39, 41,42,43,44,45,46, 51,52	1+/-0.30	Need to confirm NEUT codes if T2KReWeight dial is used in any analysis. Currently normalizations done in osc code directly.	Similar to 2012/2013 for osc group (TN108) Note NCpi+ is now treated in 1pi.

# kNIWG2012a\_ncotherE0 modes

- <http://www.t2k.org/nd280/physics/t2ksk/code/neutmodes>

```

-- SINGLE GAMMA FROM DELTA RESONANCE --
38 : NEU,N --> NEU,N,GAMMA
39 : NEU,P --> NEU,P,GAMMA

-- MULTI PI (1.3 GeV < W < 2.0 GeV) --
41 : NEU,(N OR P) --> NEU,(N OR P),MULTI PI

-- SINGLE ETA FROM DELTA RESONANCE --
                                     (added 97/12/01 J.Kameda)
42 : NEU,N --> NEU,N,ETA0
43 : NEU,P --> NEU,P,ETA0

-- SINGLE K FROM DELTA RESONANCE --
                                     (added 98/02/20 J.Kameda)
44 : NEU,N --> NEU,LAMBDA,K0
45 : NEU,P --> NEU,LAMBDA,K+

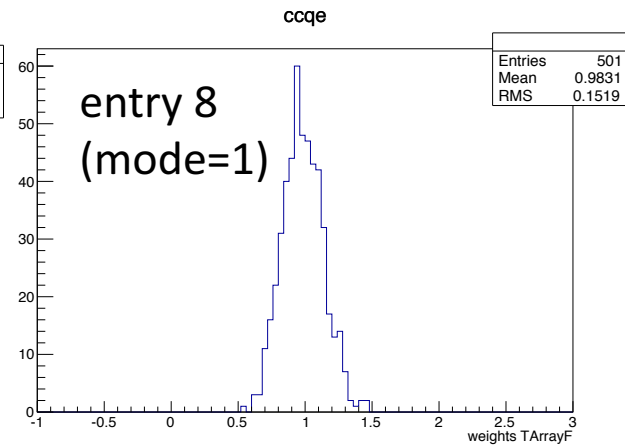
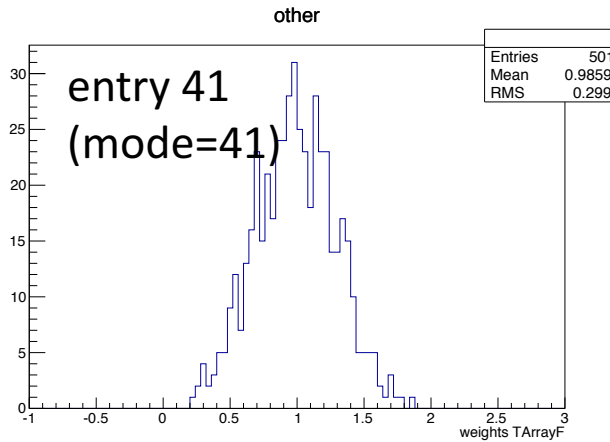
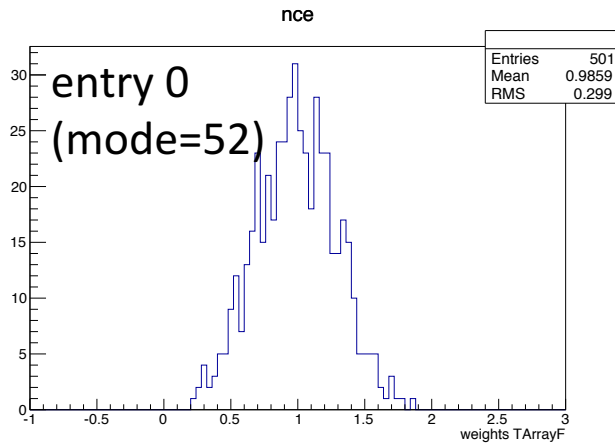
-- DEEP INELASTIC (2.0 GeV < W , JET set) --
46 : NEU,(N OR P) --> NEU,(N OR P),MESONS

-- ELASTIC --
51 : NEU,P --> NEU,P
52 : NEU,N --> NEU,N

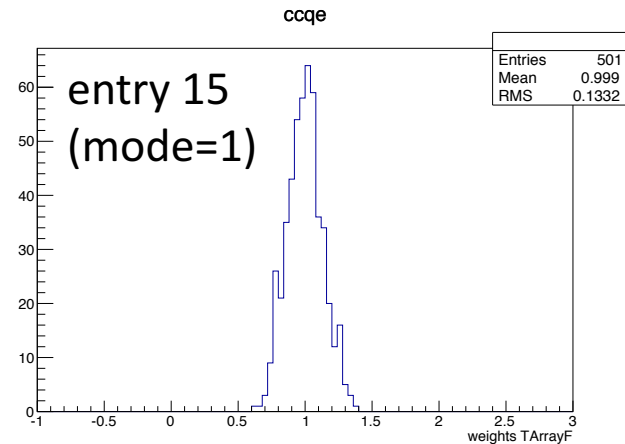
```

- 736 events in numu 1
- 122 ccqe events (1)
- 352 nce events (51,52)
- 5 other events (38,39,41–46)
  - mode = 41 entry = 41
  - mode = 45 entry = 204
  - mode = 41 entry = 251
  - mode = 41 entry = 350
  - mode = 41 entry = 604

# weights default



- nce and other are exactly the same
- ccqe events are different from (nce & other) and from each other

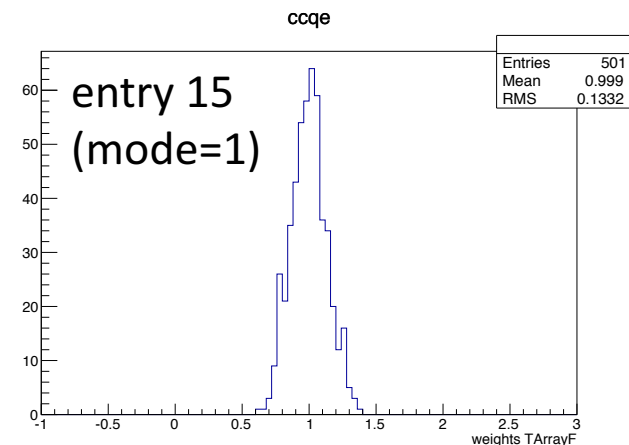
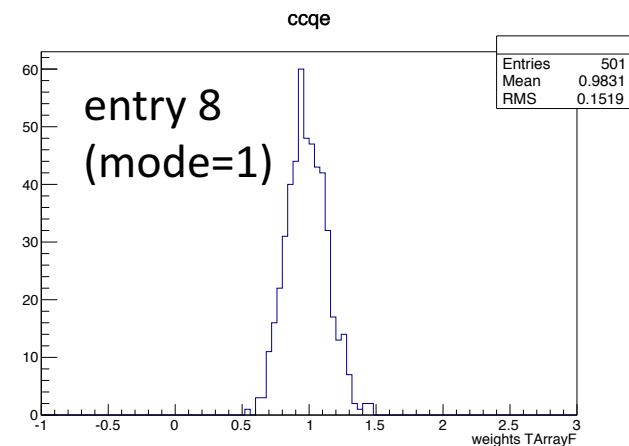
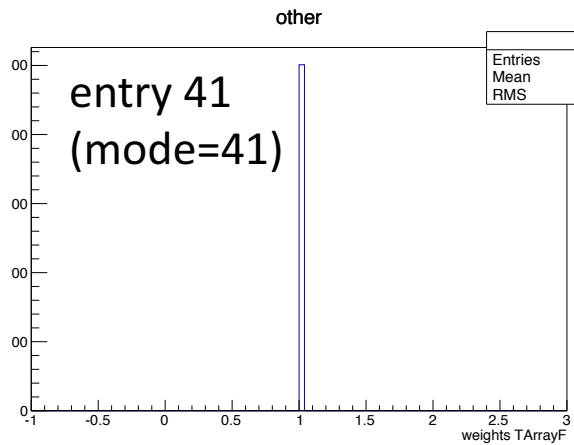
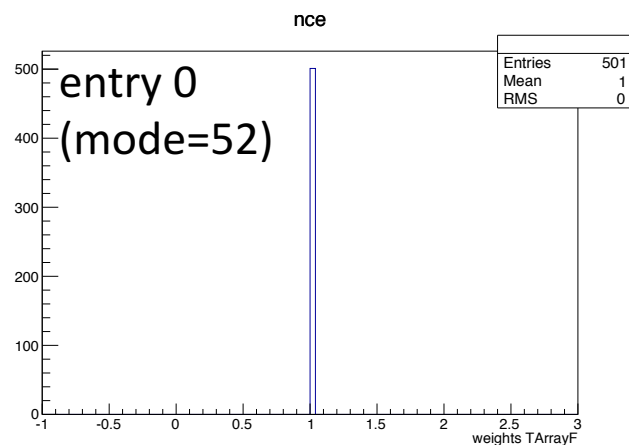


# weights

## disable ncother

genWeights\_SK\_2016.cxx

```
rw.Systematics().Include(t2krew::kNIWG2012a_ncotherE0);
rw.Systematics().SetTwkDial(t2krew::kNIWG2012a_ncotherE0,0.);
```

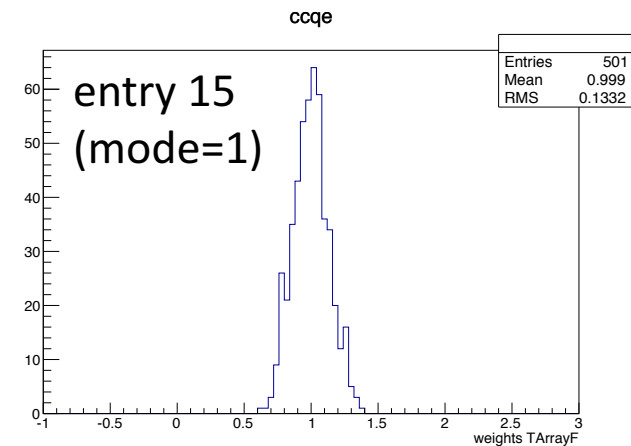
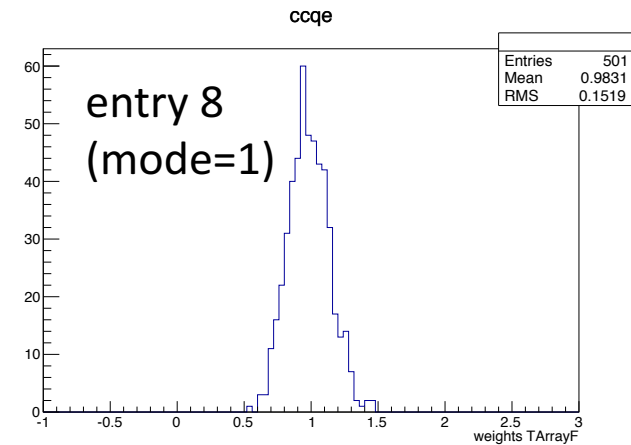
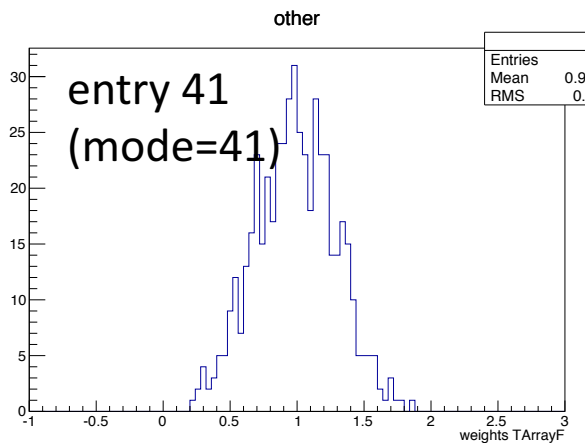
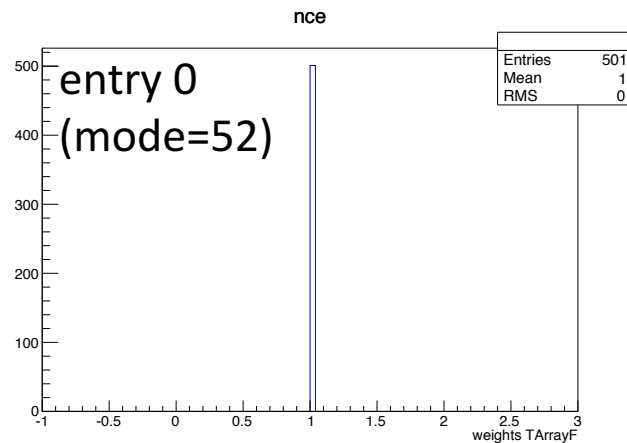


- nce and other are set to 1
- ccqe events unchanged

# weights

## remove nce from ncother

NIWGRWeight\_v1r23p2/NIWGRWeight2012a.cc  
remove isNCEL



- nce is set to 1, other is default
- ccqe events default

```
double NIWGRWeight2012a::CalcWeightXsecEnuStep(const NIWGEvent & event)
```

```
{
  double weight = 1;

  if (isCC(event.neutmde) && abs(event.nuid)==12) {
    int imode = ccnue_2012a;
    int ibin = axis[imode]->FindBin(event.truenu)-1;
    weight *= TMath::Max(0., fCurr_enu[imode][ibin]);
  }
}
```

NIWGRWeight\_v1r23p2/NIWGRWeight2012a.cc  
remove isNCEL

```
int imode = -1;
if (isCCQE(event.neutmde)) imode=ccqe_2012a;
else if (isCC1PI(event.neutmde)) imode=cc1pi_2012a;
else if (isNC1PI0(event.neutmde)) imode=nc1pi0_2012a;
else if (isNC1PI(event.neutmde)) imode=nc1pi_2012a;
else if (is1GAM(event.neutmde)) imode=ccnc1gam_2012a;
else if (isCCMPI(event.neutmde)) imode=ccmultipi_2012a;
else if (isCCDIS(event.neutmde)) imode=ccd1s_2012a;
else if (isCCCOH(event.neutmde)) imode=ccc1s_2012a;
else if (isNCCOH(event.neutmde)) imode=nc1s_2012a;
else if (isNCDIS(event.neutmde) || isNCMPI(event.neutmde) ||
         isNCKaonEta(event.neutmde) || isNCEL(event.neutmde) ||
         isNC1GAM(event.neutmde) )
  imode=nc1s_2012a;
```

```
// This mode is not varied in 2012a
```

```
if (imode<0) return weight;
```

```
int ibin = axis[imode]->FindBin(event.truenu)-1;
```

```
weight *= TMath::Max(0., fCurr_enu[imode][ibin]);
```

```
#ifdef _NIWG_REWEIGHT_2012A_DEBUG_
```

```
  cout << "NIWGRWeight2012a::CalcWeightXsecEnuStep() = " << weight << endl;
```

```
#endif
```

```
return weight;
```

```
}
```

```
else if (isNCDIS(event.neutmde) || isNCMPI(event.neutmde) ||
         isNCKaonEta(event.neutmde) ||
         isNC1GAM(event.neutmde) )
  imode=nc1s_2012a;
```

# Compare to previous iteration of analysis

- 07 January 2016
- 3 files: flux, xsec, and niwg
- now, v1r27p3
- 2 files: flux and xsec
- ncother is in 07 Jan 2016 niwg, not xsec

07Jan2016	v1r27p3
<p><b>xsec</b>            7 branches            (nweights)            weights            brNIWG2012a_cc1piE0            brNIWG2012a_ccqeE0            brNIWG2012a_nc1pi0E0            brNXSec_MaCCQE            brNXSec_MaRES</p>	<p>16 branches            (nweights)            weights            brNIWG2012a_cccohE0            brNIWG2012a_ccnueE0            brNIWG2012a_dismpishp            brNIWG2012a_nccohE0  <b>brNIWG2012a_ncotherE0</b>            brNIWG2014a_SF_RFG            brNIWG2014a_pF_O16            brNIWGMEC_Norm_O16            brNIWGMEC_PDDWeight_O16            brNXSec_BgSciRES            brNXSec_CA5RES            brNXSec_MaCCQE            brNXSec_MaNFRES            brNXSec_VecFFCCQE</p>
<p><b>niwg</b>            11 branches            (nweights)            weights            brNIWG2012a_cc1piE1            brNIWG2012a_cccohE0            brNIWG2012a_ccnueE0            brNIWG2012a_ccqeE1            brNIWG2012a_ccqeE2            brNIWG2012a_dismpishp  <b>brNIWG2012a_nccohE0</b>            brNIWG2012a_ncotherE0            brNIWGDeltaMass_width</p>	



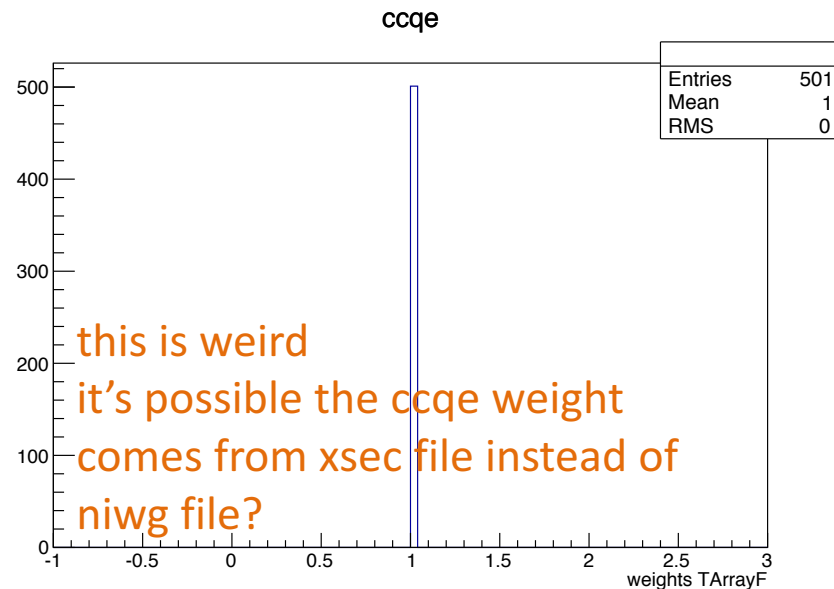
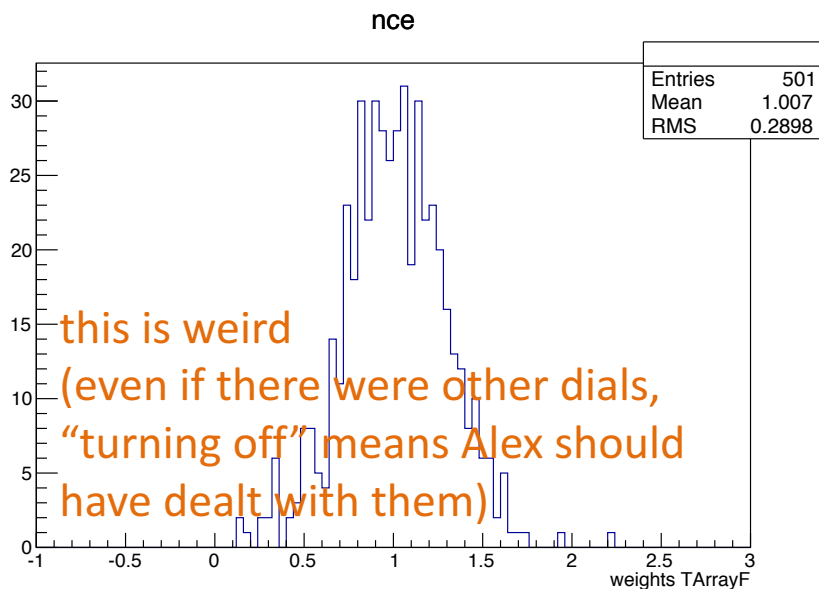
# 07 Jan 2016

## niwg

nce (mode=51–52) weight is not 1?

ccqe (mode=1) weight is 1???

(all nce events are the same, and all ccqe events are the same)



07 Jan 2016  
**xsec**

as expected,

- nce weight is 1
- ccqe weight is not 1
  
- maybe this is the reweight that is used in ncgamma (and not niwg, where ncotherE0 is...)
- look at ncgamma code!

