New dataset studied in WH

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Outline

- 1. RunIIb1-2-3-4 data comparison
- 2. Trigger epoch dependence
- 3. New and default Jet treatment
- 4. Alpgen RW comparison

1. RunIIb1-2-3-4 data comparison

Configuration

Vjet CAFe v05-05-12d

–switched to latest dq_defs v2010-12-25

–updated vjets_cafe/lumi-dq with head version

–caf trigger/parameters/runvstiglistX100.txt by caf_trigger/parameters/mkruntrigvlist.py

SAM definition

– CSG_CAF_EMinclusive_PASS6_p21.20.00_p20.18.02b_fix

– CSG_CAF_EMinclusive_PASS6_p21.20.00_p20.18.02b_winter2011

–CSG_CAF_Muoninclusive_PASS6_p21.20.00_p20.18.02b_fix

–CSG_CAF_Muoninclusive_PASS6_p21.20.00_p20.18.02b_winter2011

Selection

Muon: CC: Point1, EC: Point2, pT > 15 GeV

Electron: CC: Point1, EC: Point2, pT > 15 GeV W transverse mass >60 GeV

MET: MET>15 GeV

Jet: pT>20 GeV, |eta|<2.5 vertex confirmed jet

NJets==2

|PVz| < 60 cm

- No other cuts (triangle cut, HT)

No btagging part.

Compare distributions normalized by luminosity:

Run2b1 vs Run2b2

Run2b2 vs Run2b3

Run2b3 vs Run2b4

Run2b4 vs Run2b1

Using the following integrated luminosities:

Run2b1: 1.2 fb-1

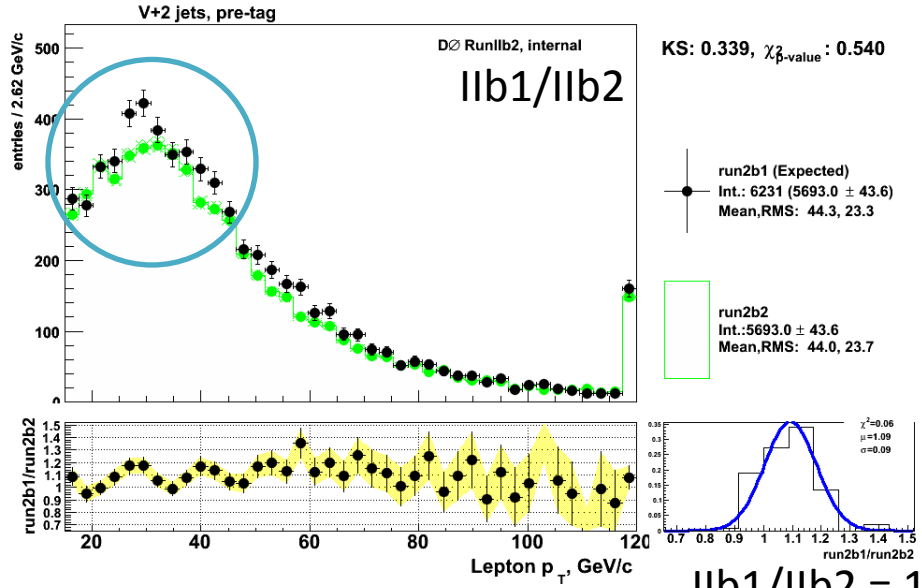
Run2b2: 3.0 fb-1

Run2b3: 2.0 fb-1

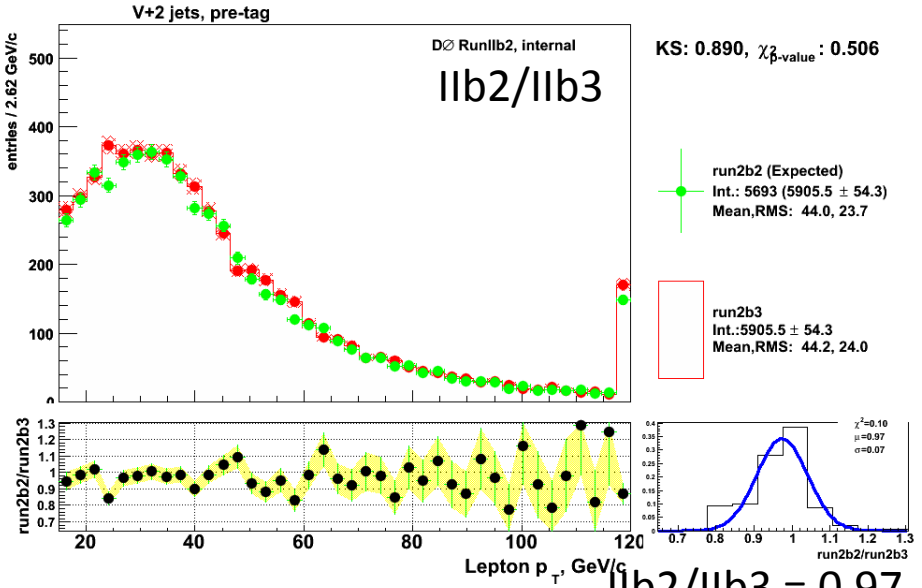
Run2b4: 0.8 fb-1

Muon channel

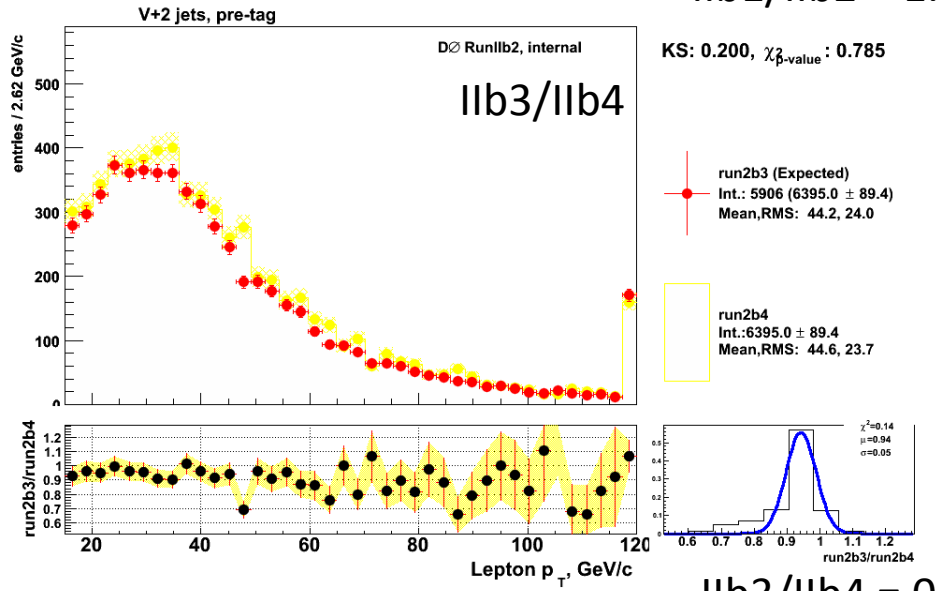
Lepton pT



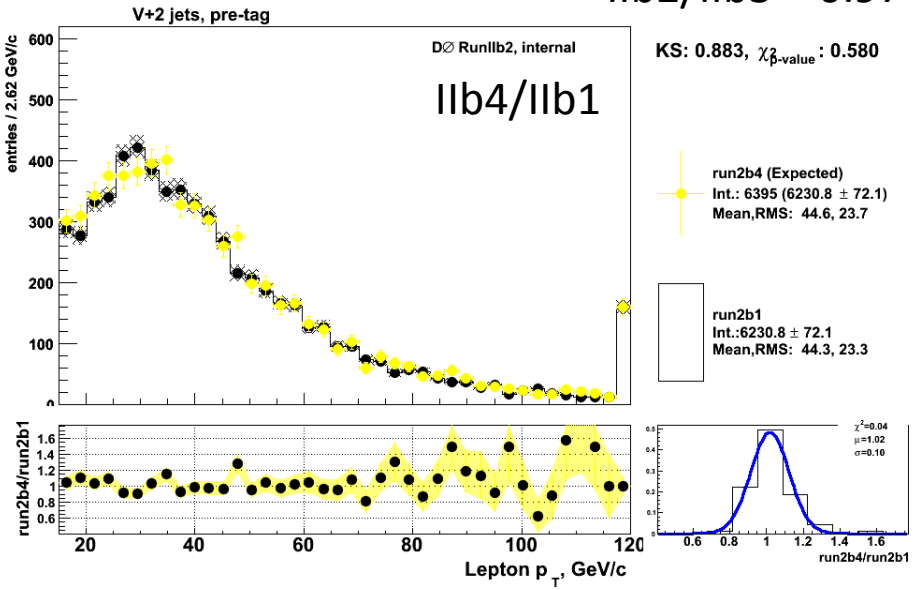
IIb1/IIb2 = 1.09



IIb2/IIb3 = 0.97



IIb3/IIb4 = 0.94

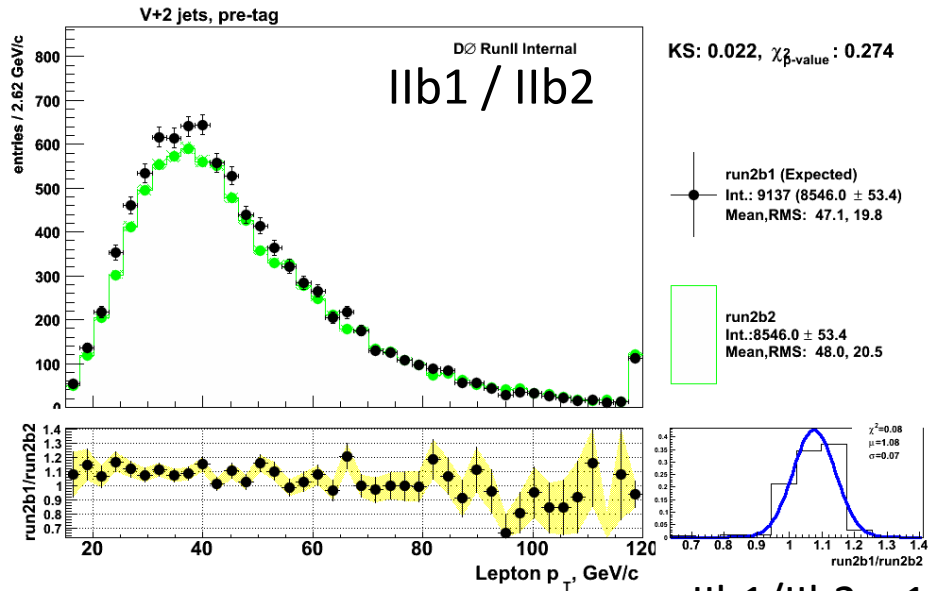


IIb4/IIb1 = 1.02

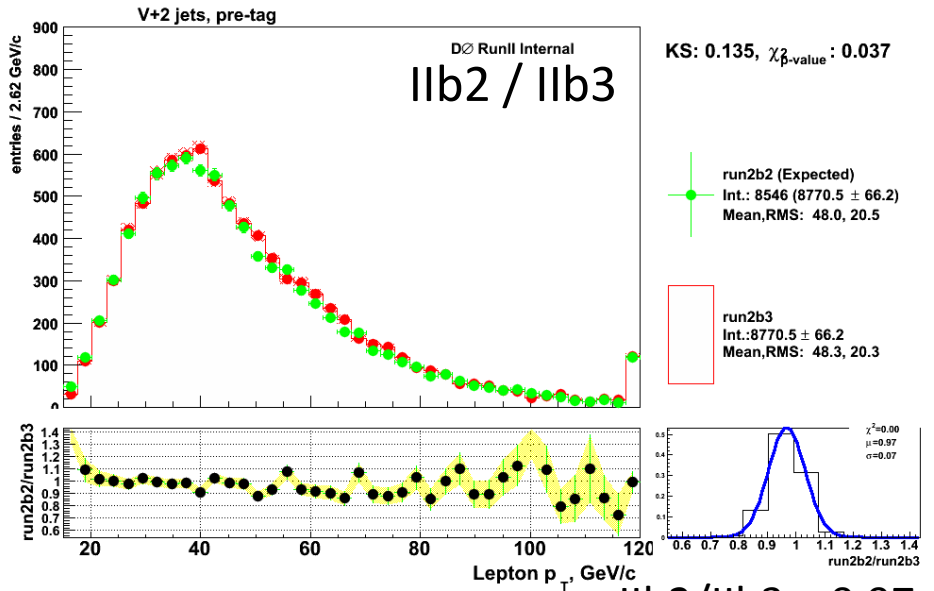
IIb2 and IIb3 is less efficient compared to IIb1. IIb4 seems to recover efficiency.

Lepton pT

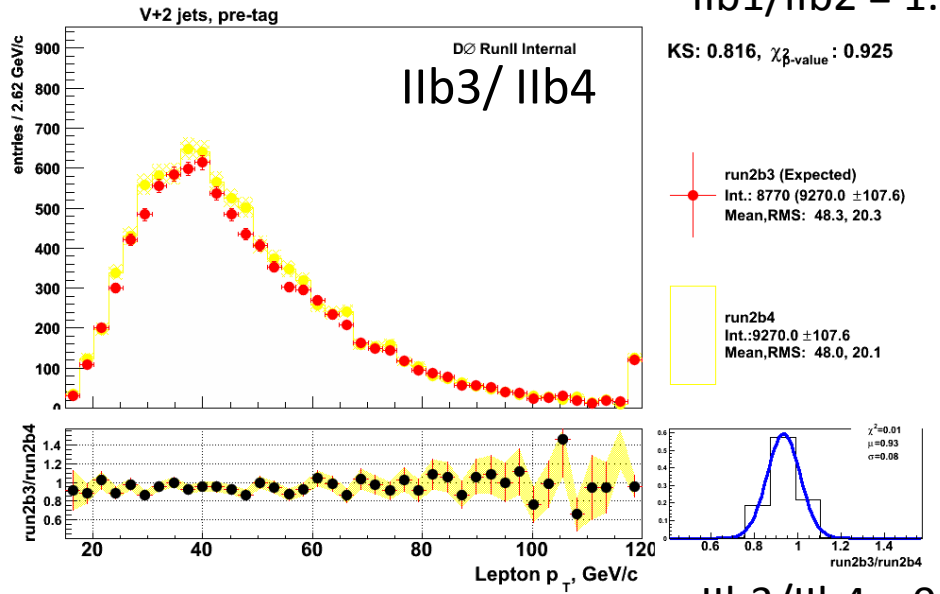
Electron channel



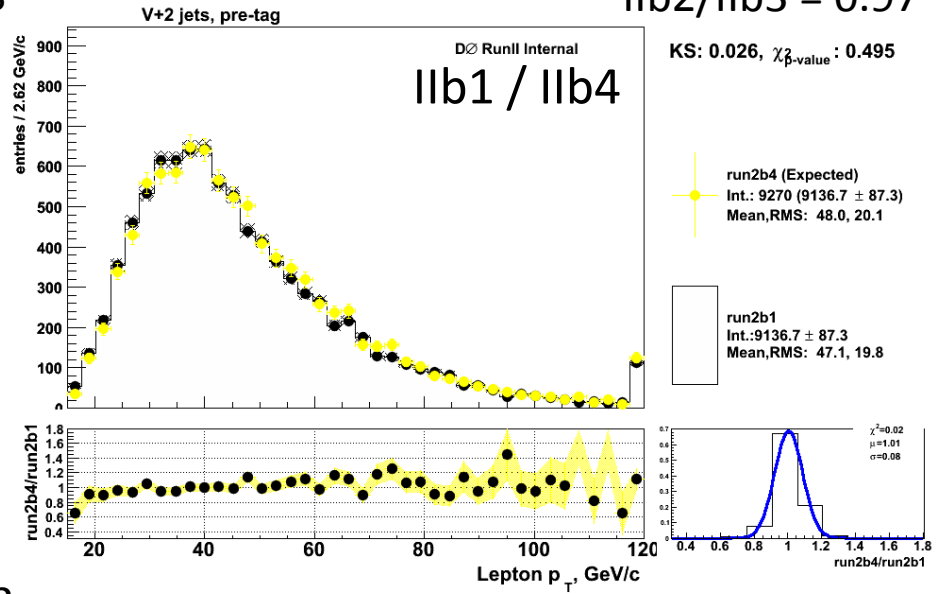
IIb1/IIb2 = 1.08



IIb2/IIb3 = 0.97



IIb3/IIb4 = 0.93

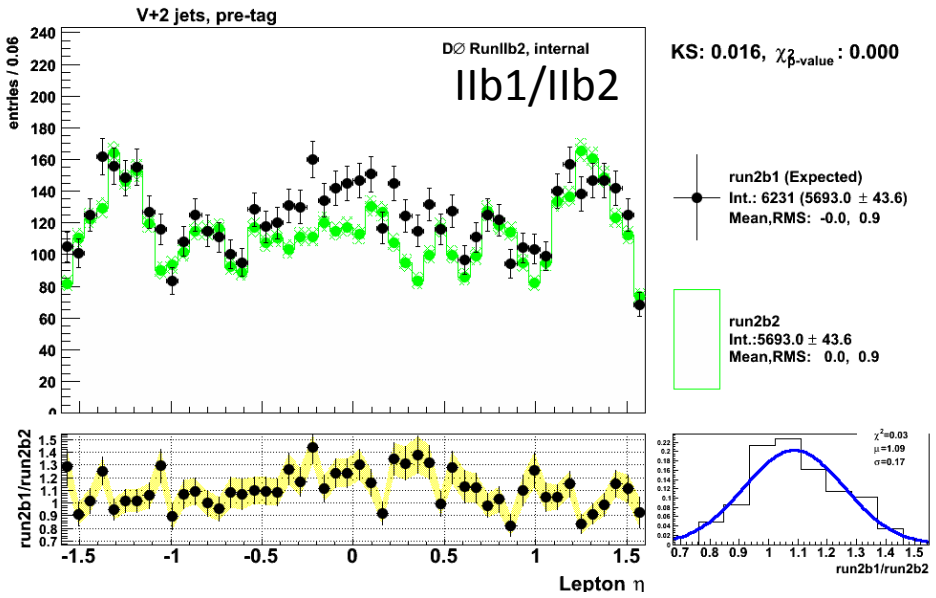


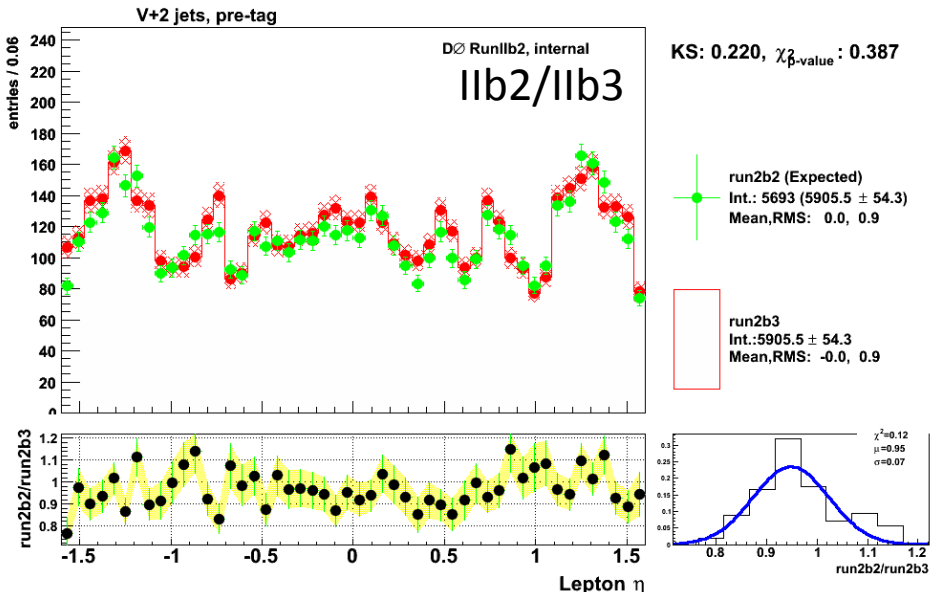
IIb4/IIb1 = 1.01

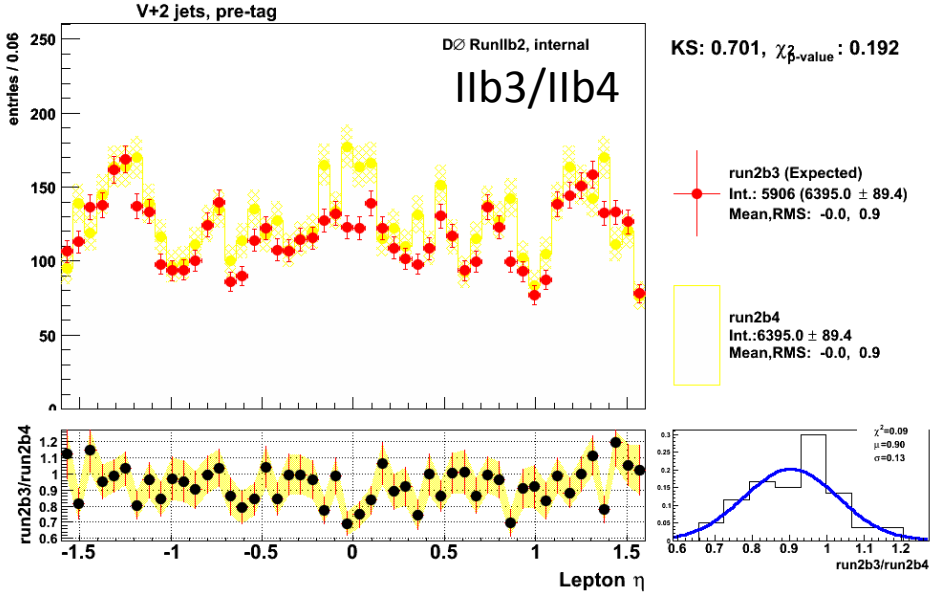
IIb2 and IIb3 is less efficient compared to IIb1. IIb4 seems to recover efficiency.

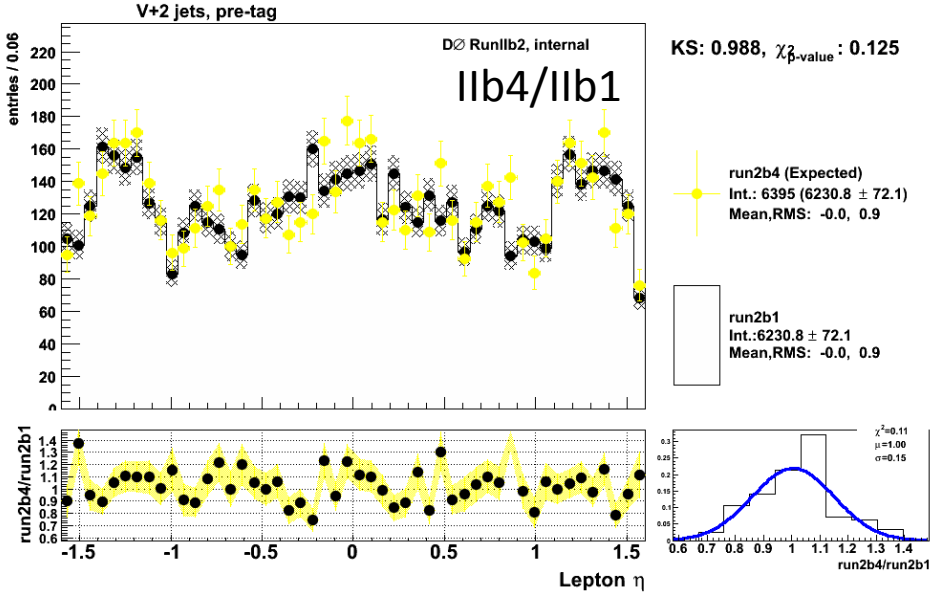
Muon channel

Lepton η





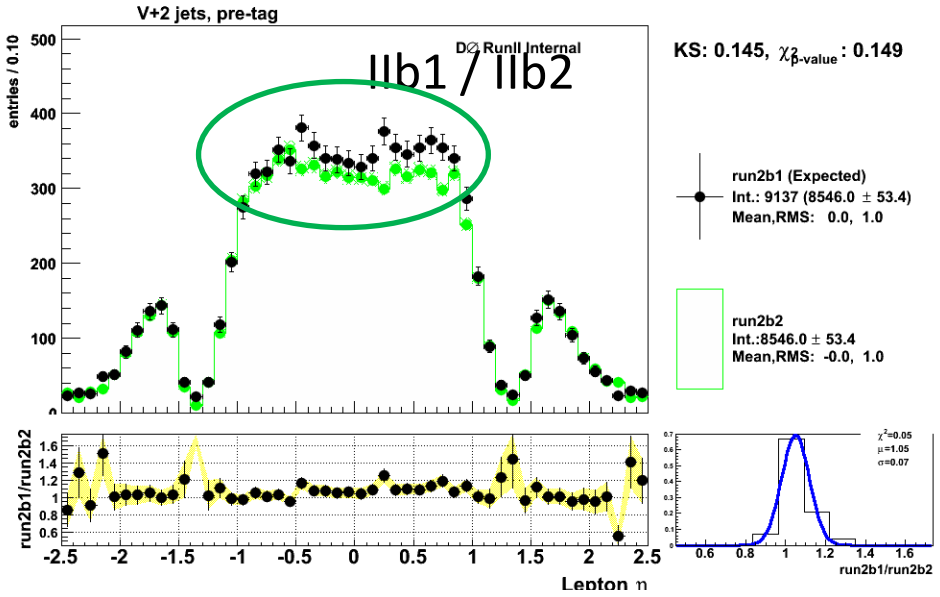


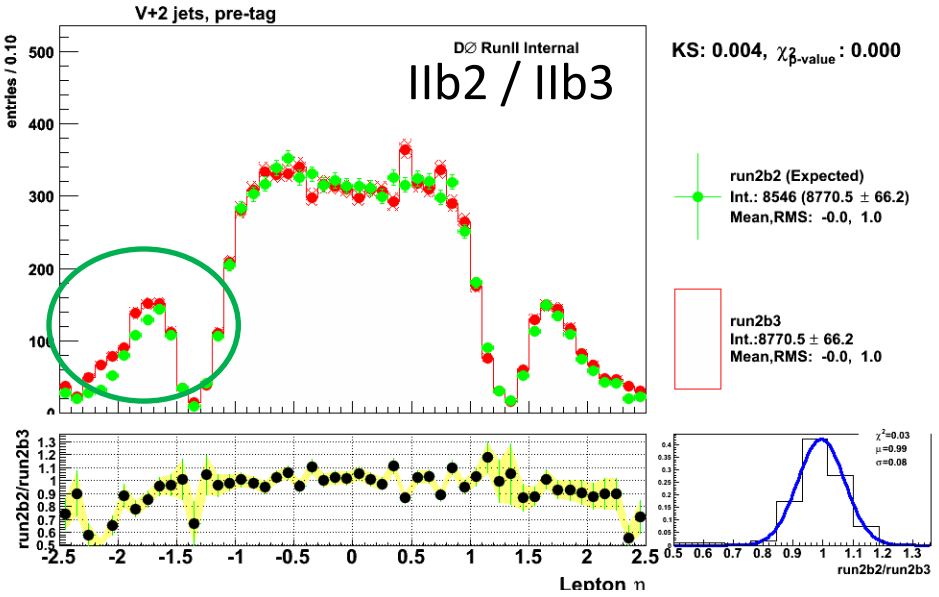


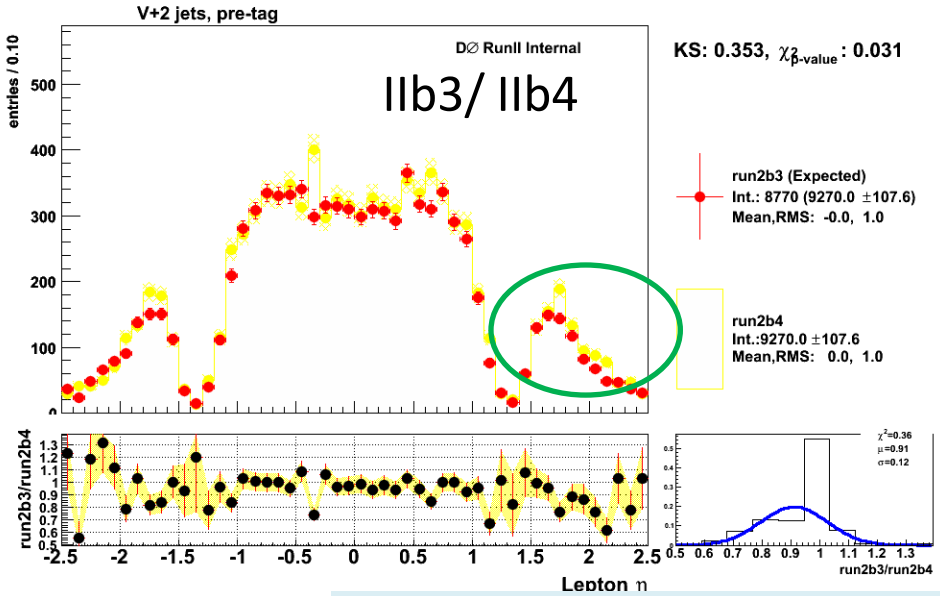
IIb4 case, it's difficult to identify which part is recovered.

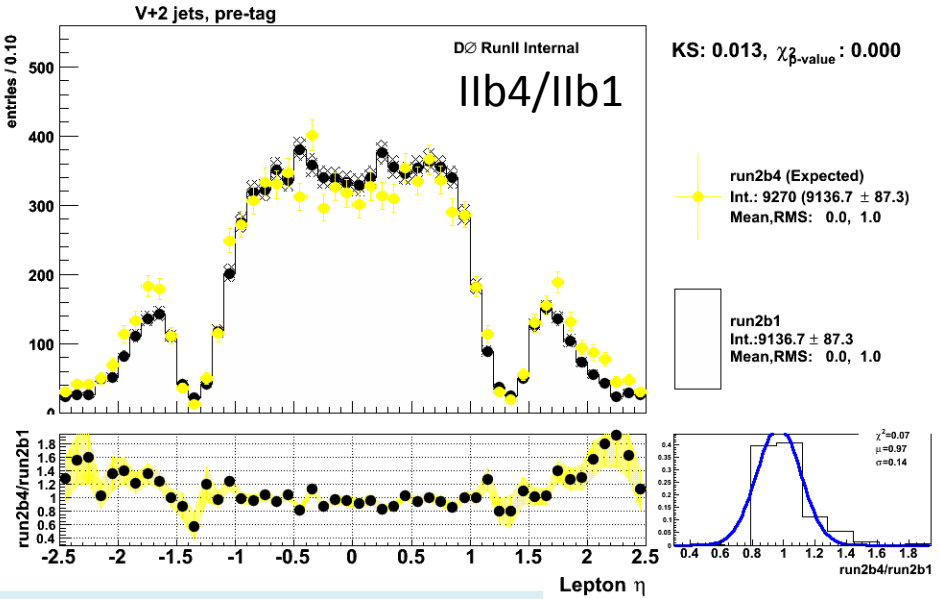
Lepton η

Electron channel





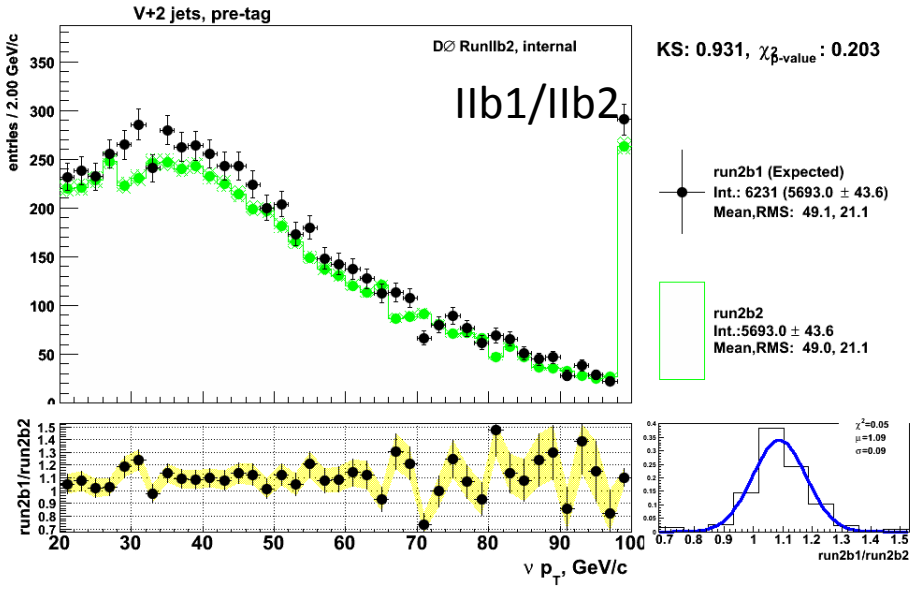


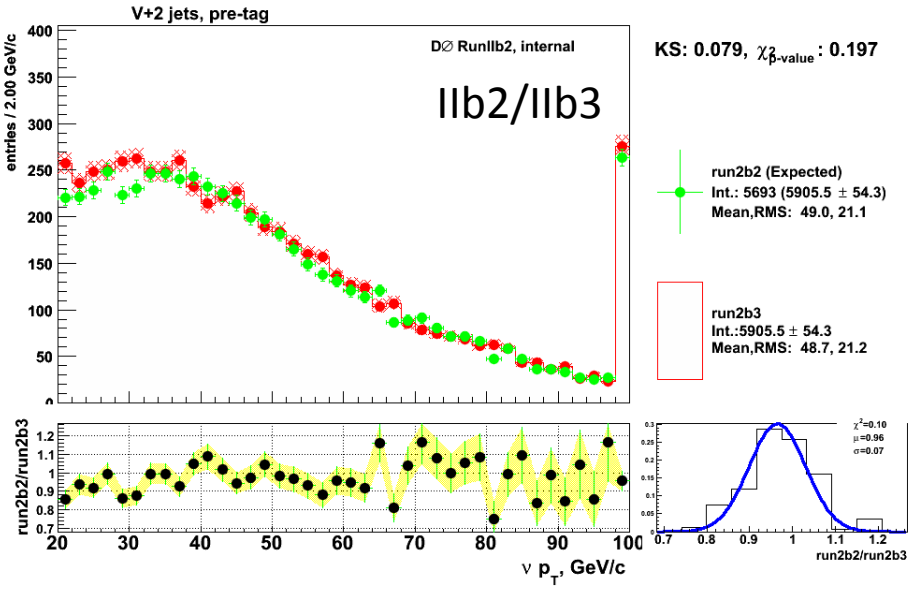


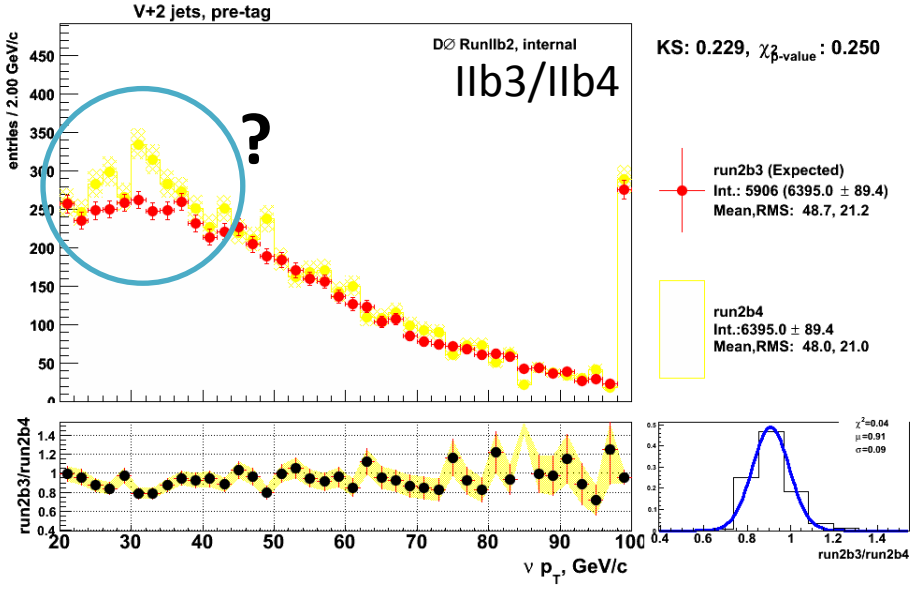
CC region has changed between 2b1 to 2b2, EC region has changed between 2b2 to 2b3, and 2b3 to 2b4

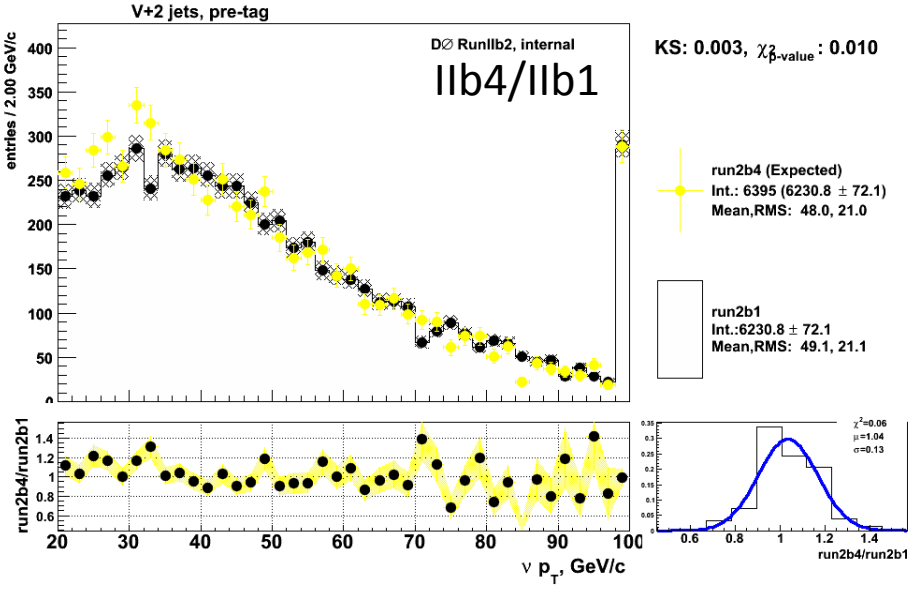
Muon channel

Missing ET





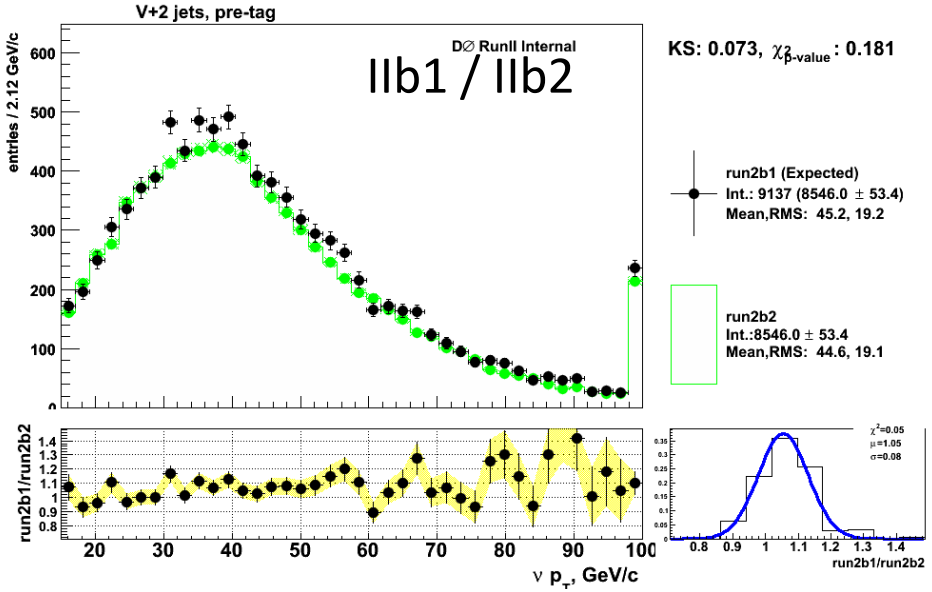


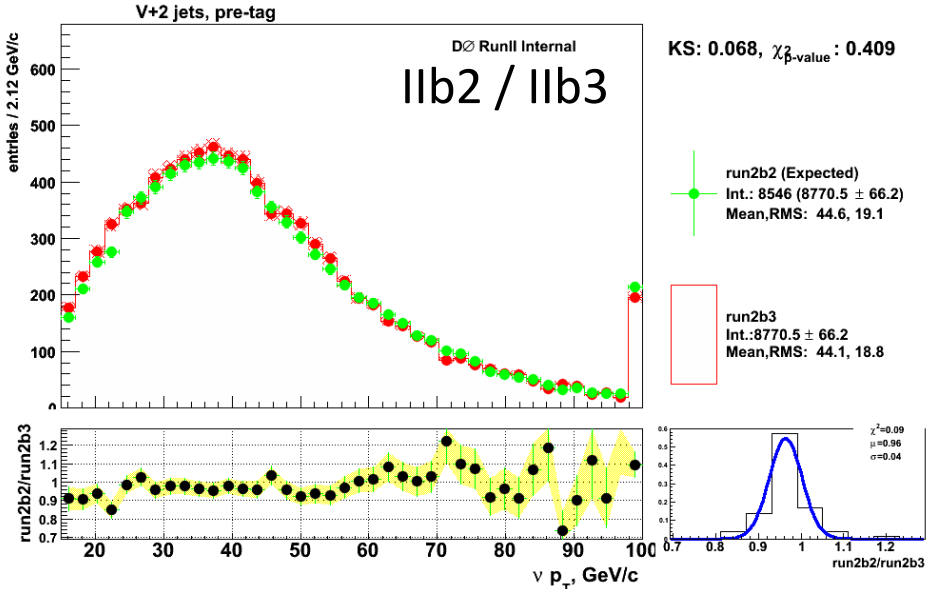


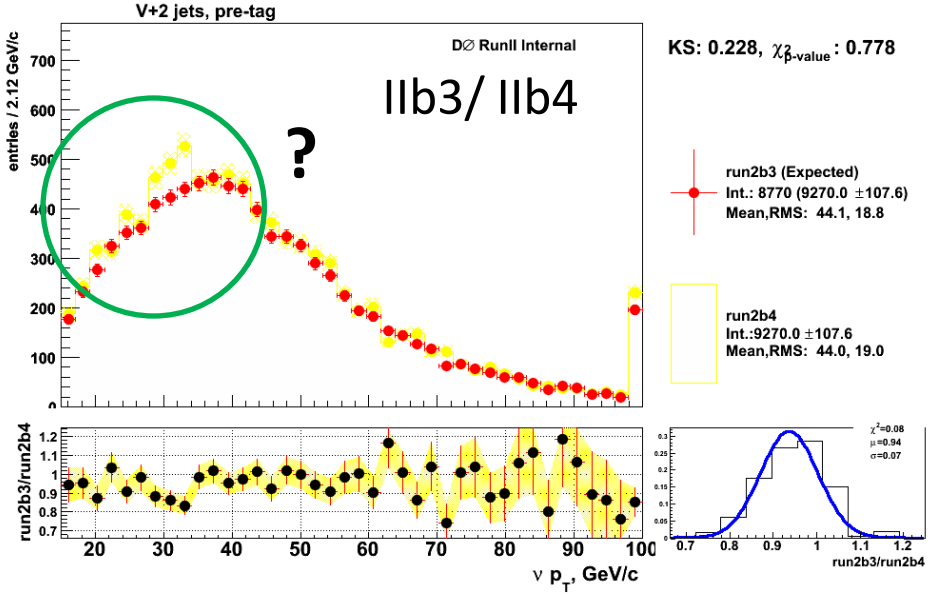
Similar strange behavior in electron channel

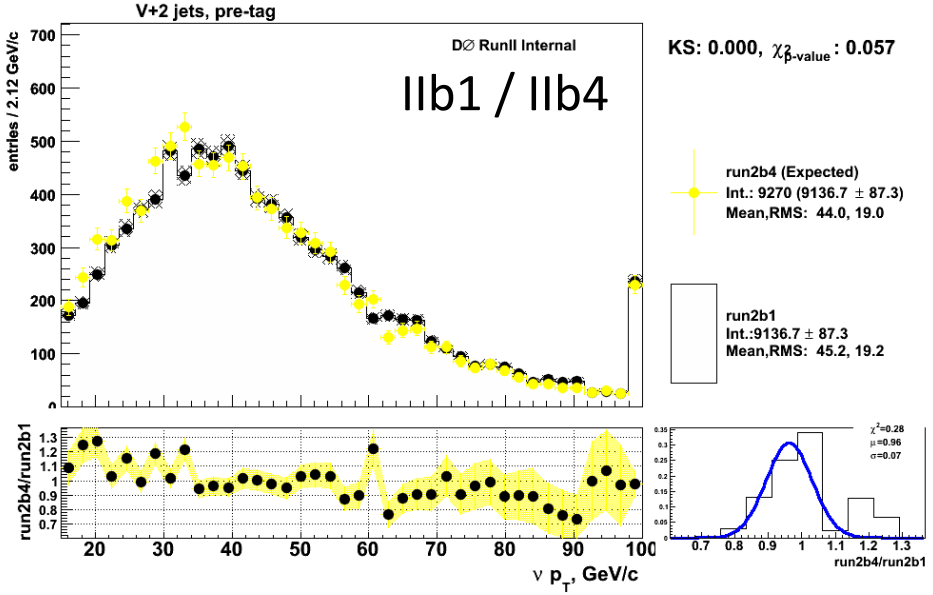
Missing ET

Electron channel



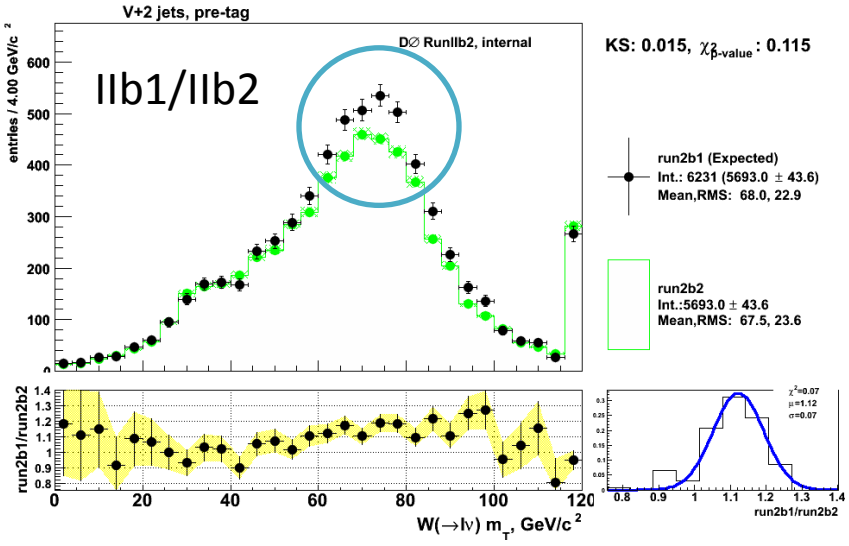




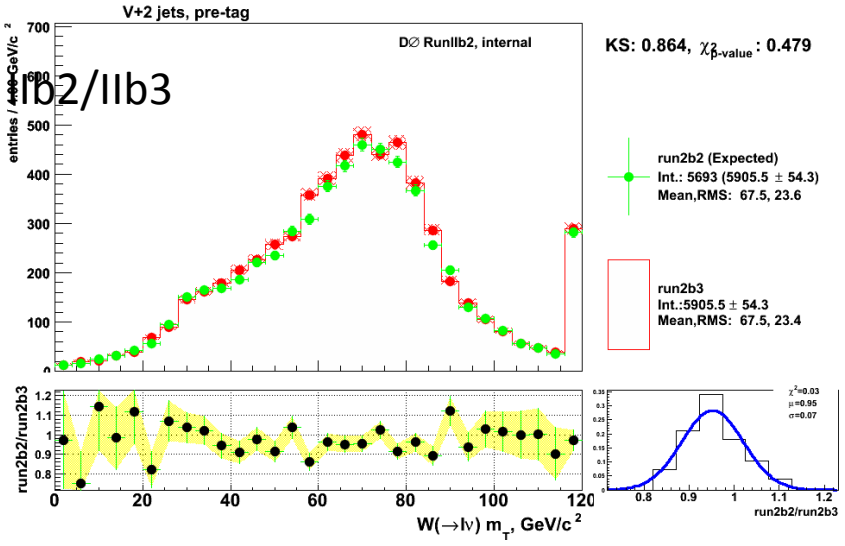


Muon channel

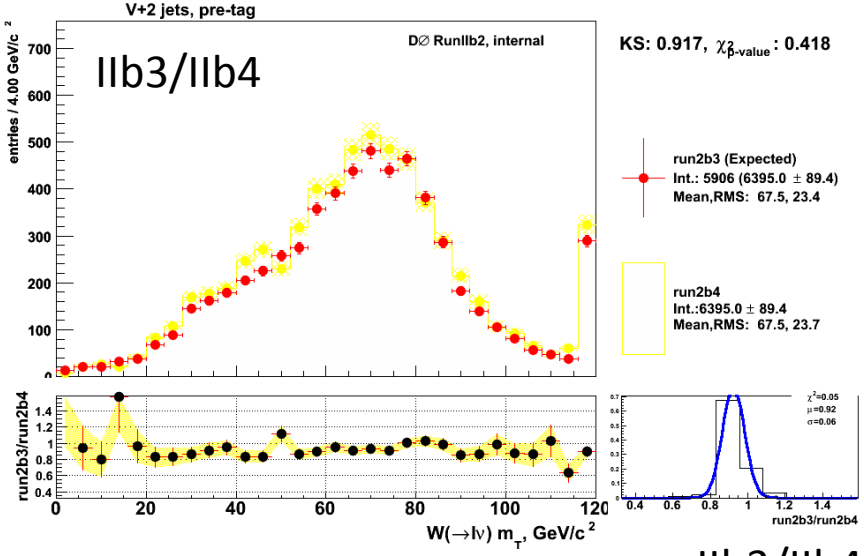
W transverse mass



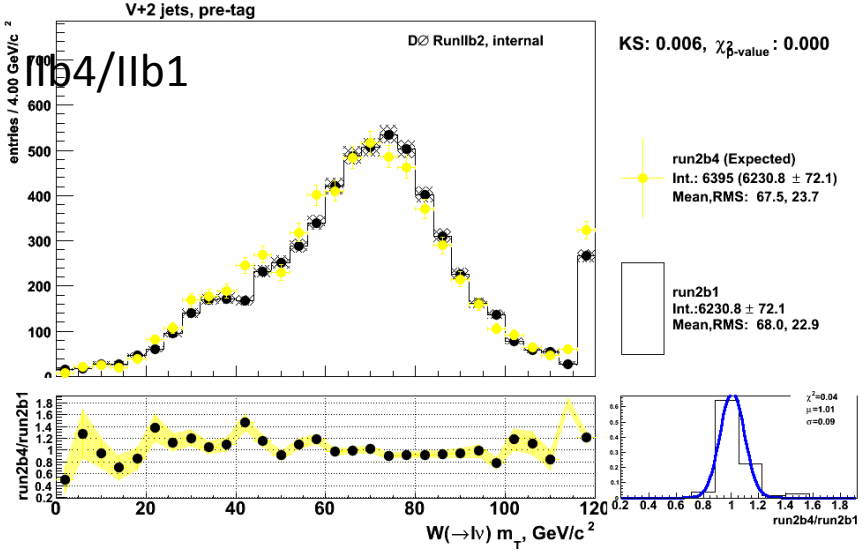
IIb1/IIb2 = 1.12



IIb2/IIb3 = 0.95



IIb3/IIb4 = 0.92

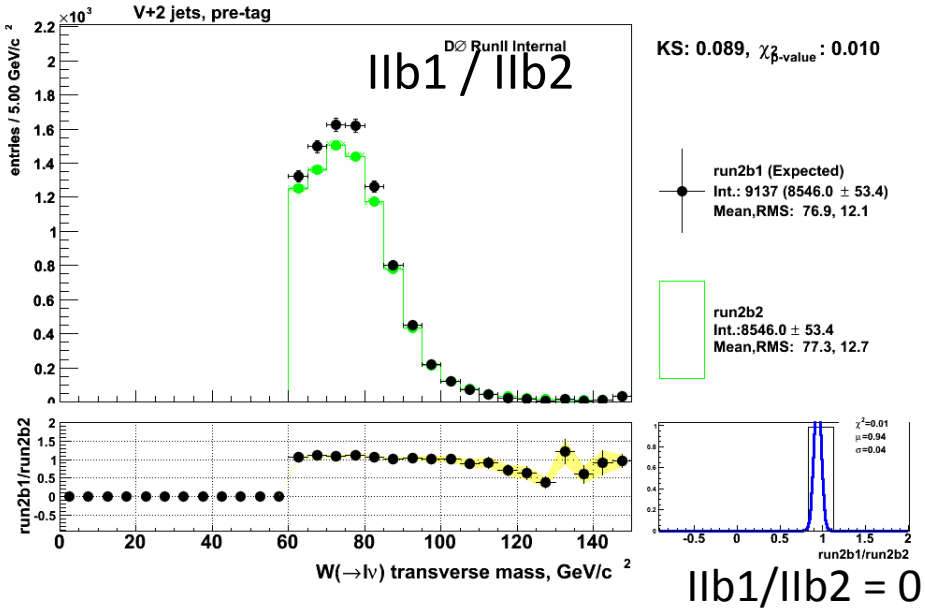


IIb4/IIb1 = 1.01

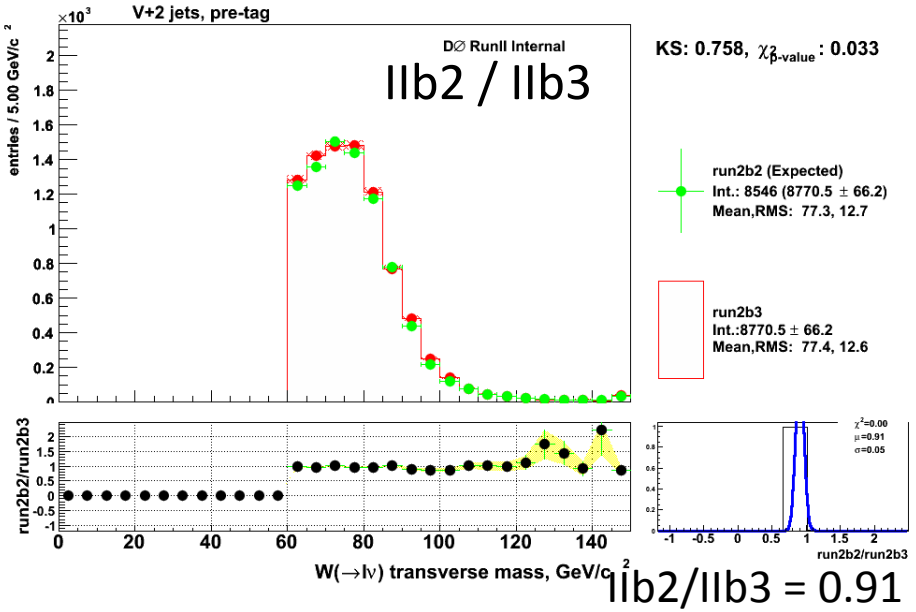
IIb2 and IIb3 is less efficient compared to IIb1. IIb4 seems to recover efficiency.

W transverse mass

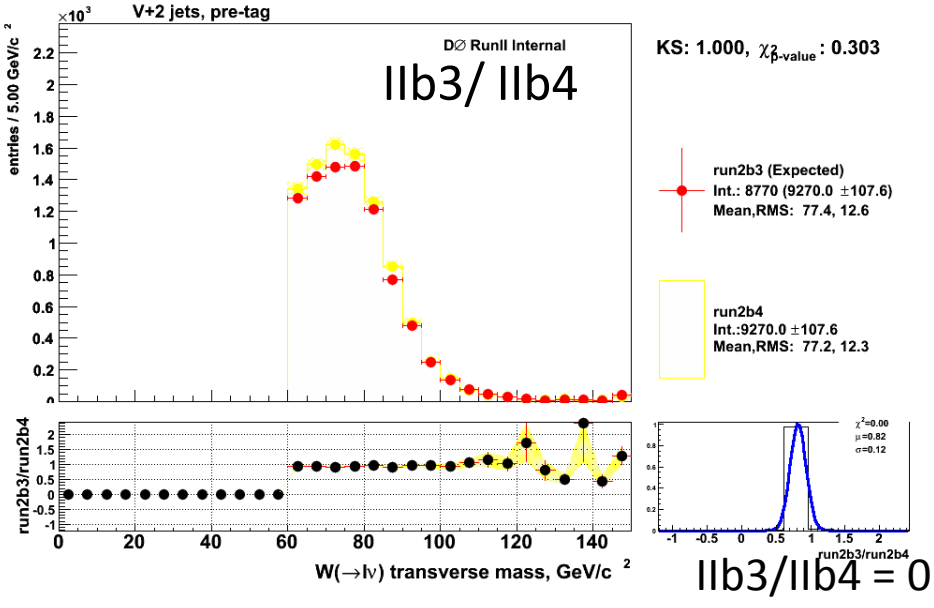
Electron channel



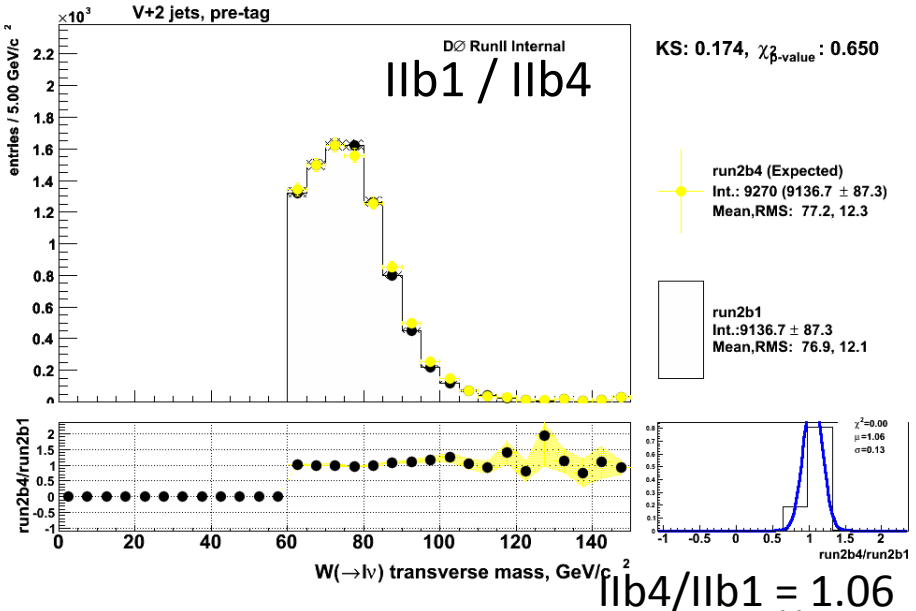
IIb1/IIb2 = 0.94



IIb2/IIb3 = 0.91



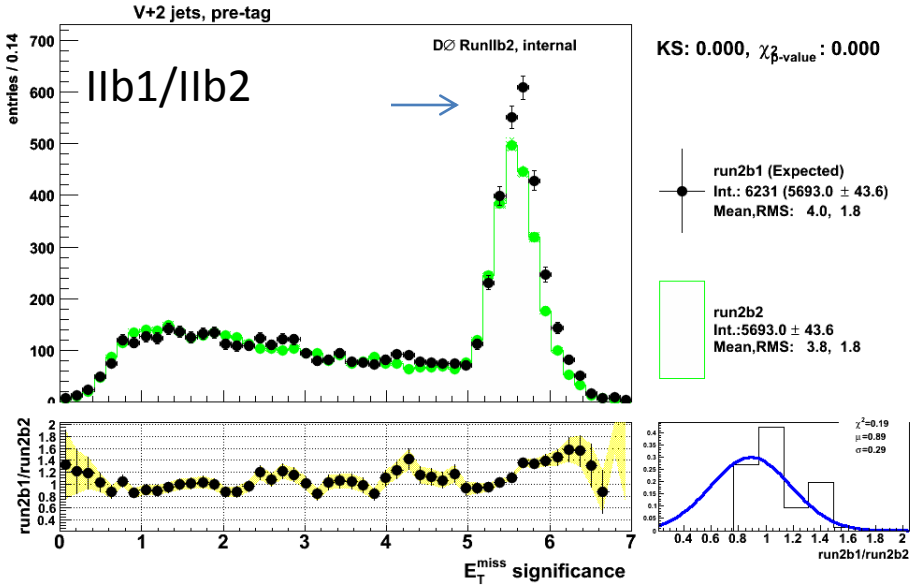
IIb3/IIb4 = 0.82

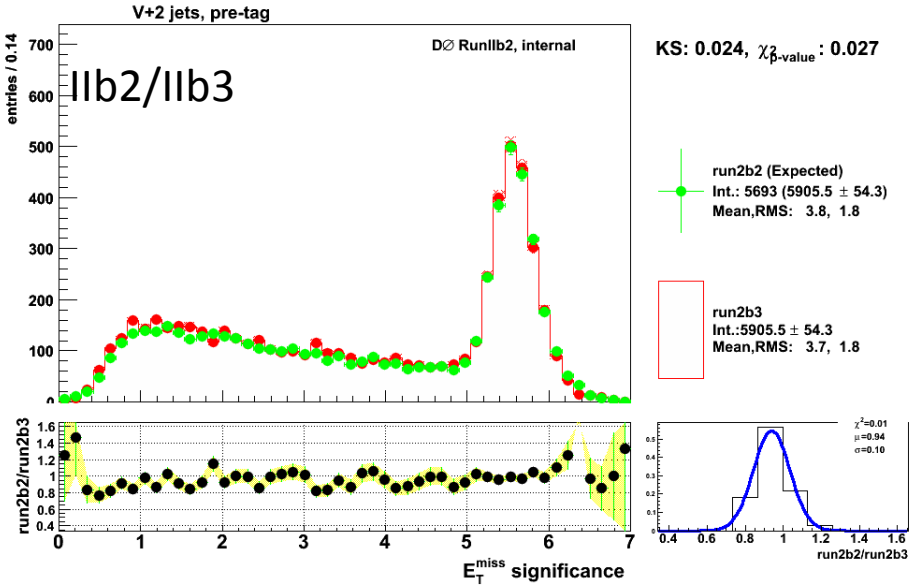


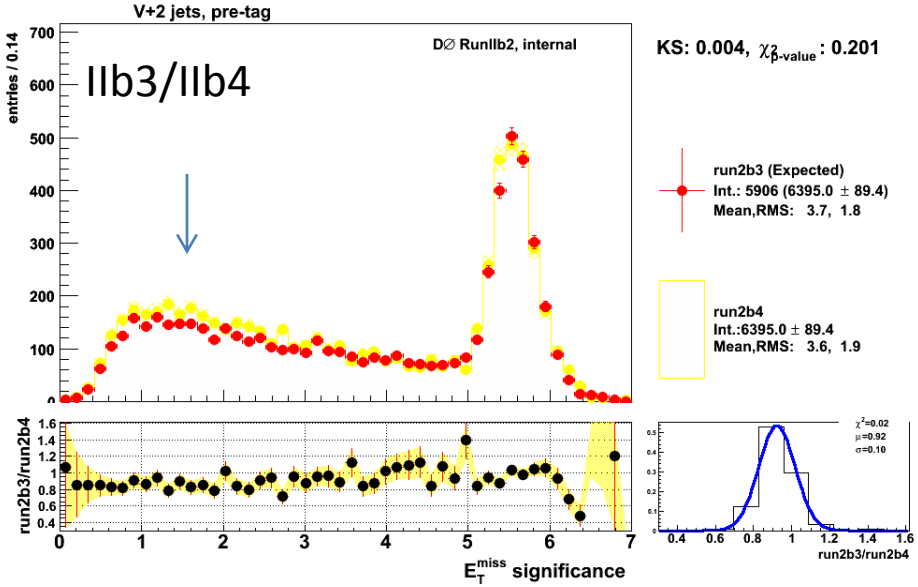
IIb4/IIb1 = 1.06

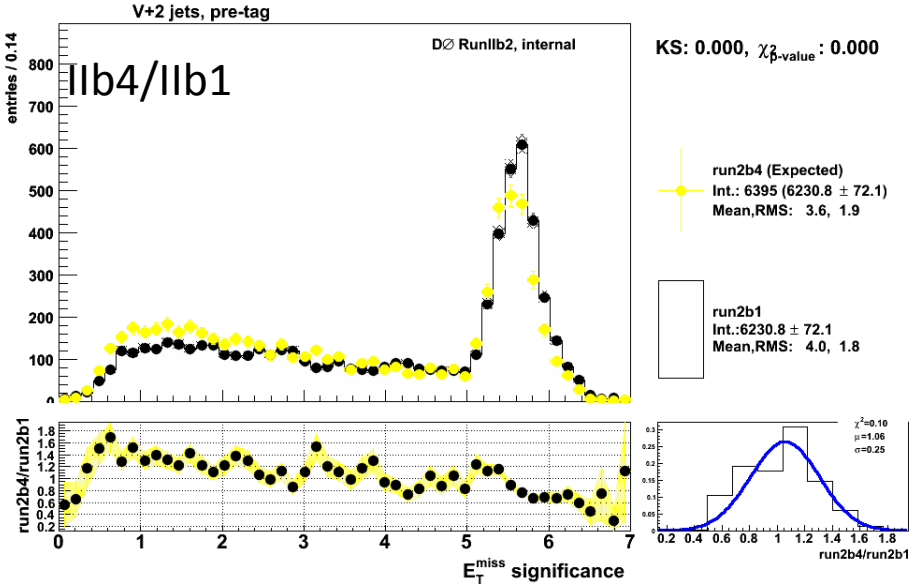
Muon channel

Missing ET significance





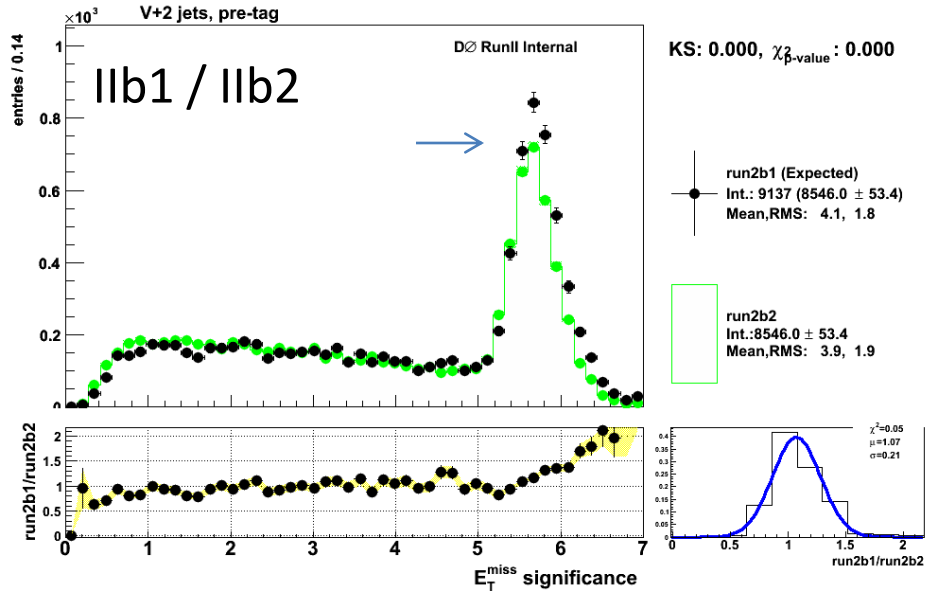


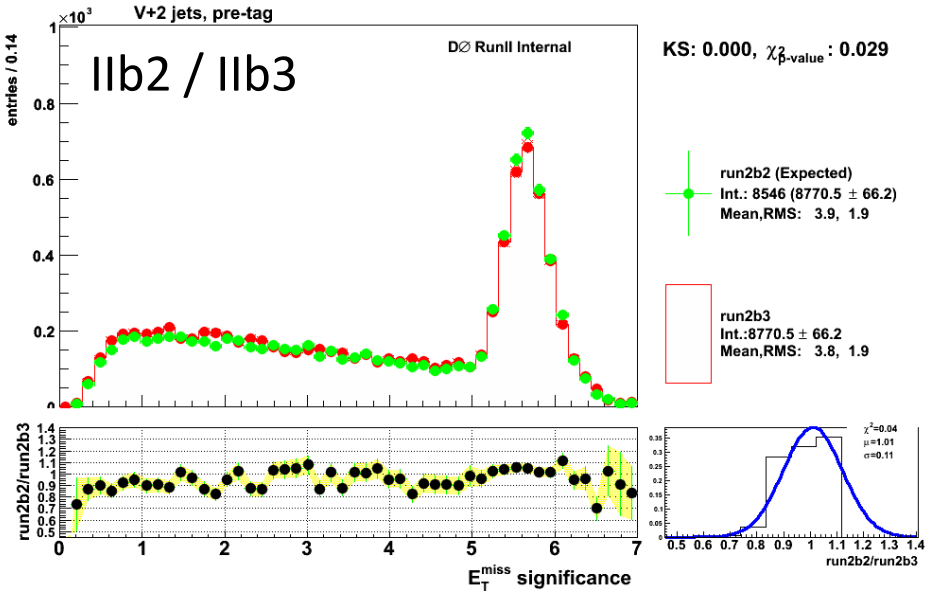


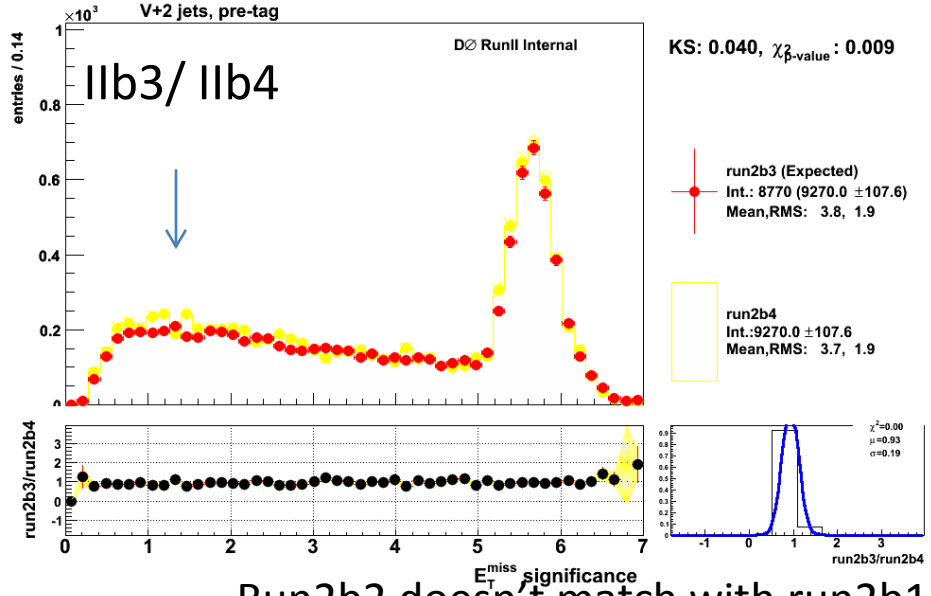
Similar behavior like in electron channel

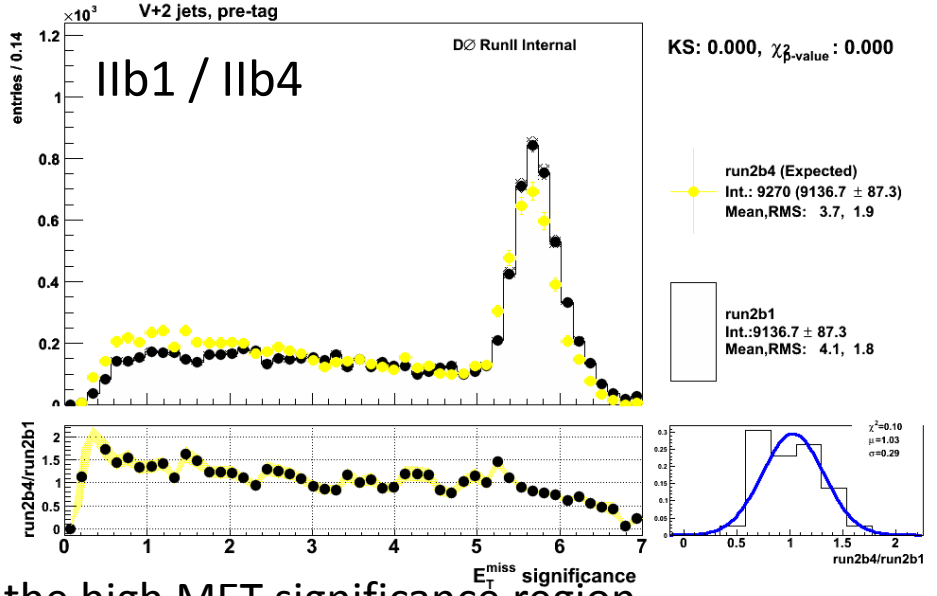
Missing ET significance

Electron channel





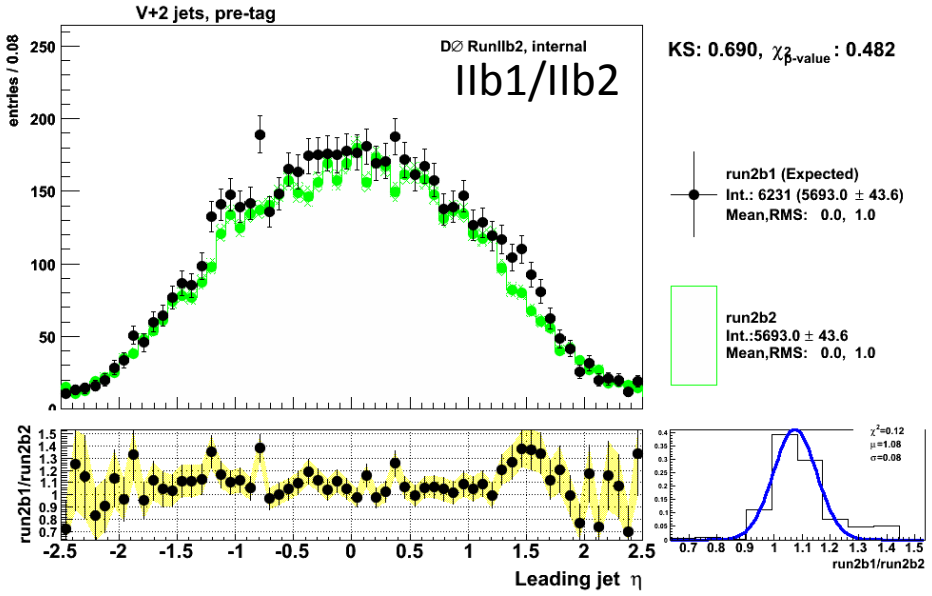


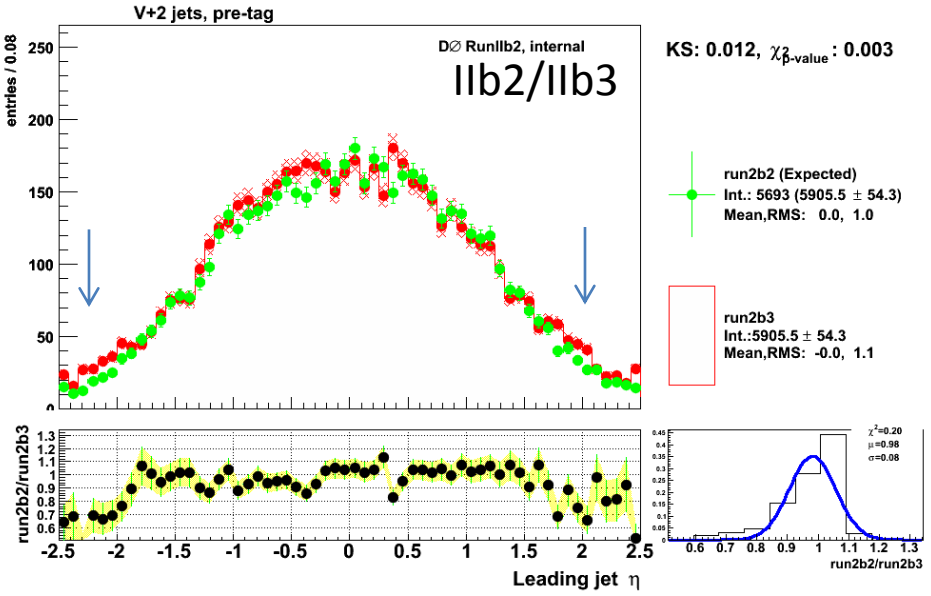


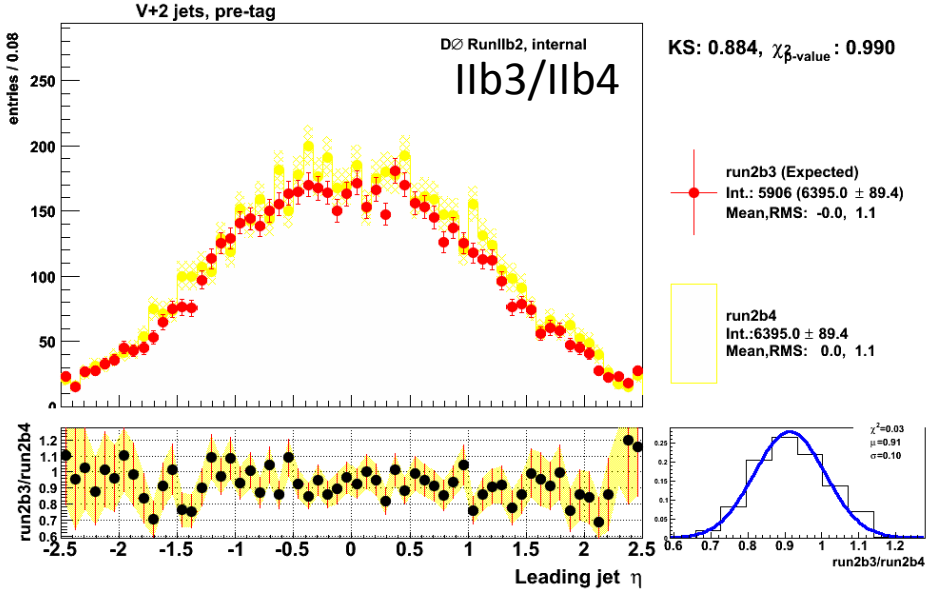
Run2b2 doesn't match with run2b1 in the high MET significance region, run2b3 doesn't match with run2b4 in the low MET significance region.

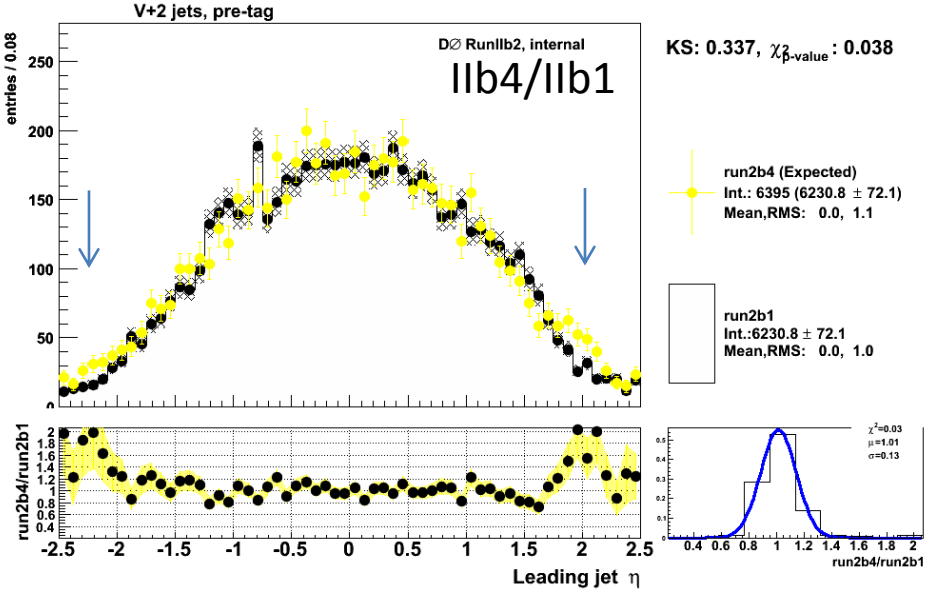
Muon channel

Leading jet η



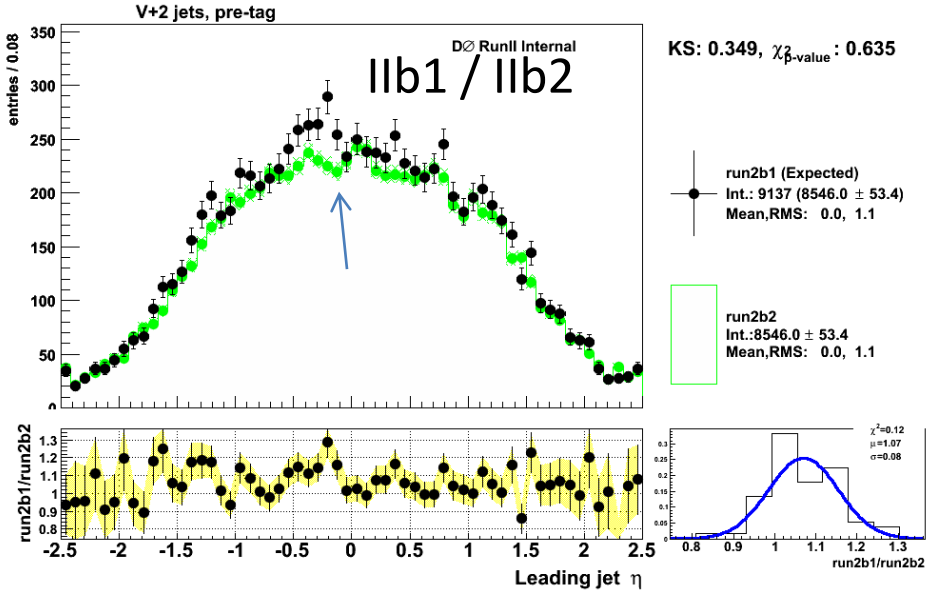


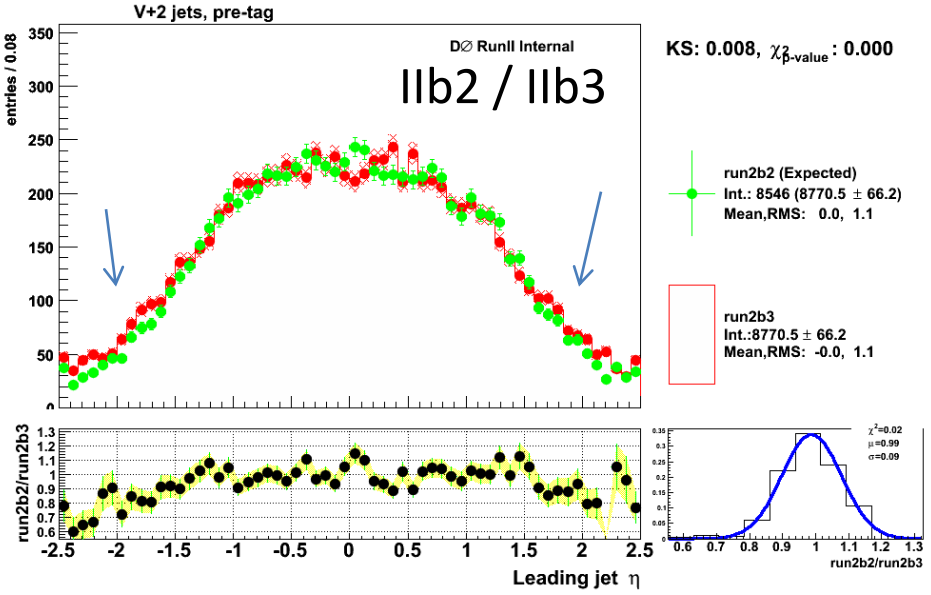


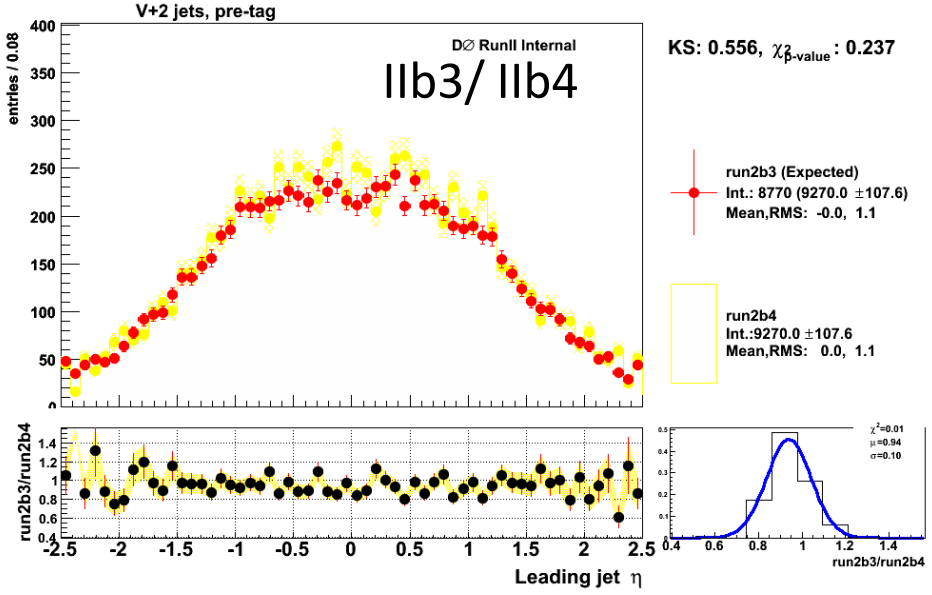


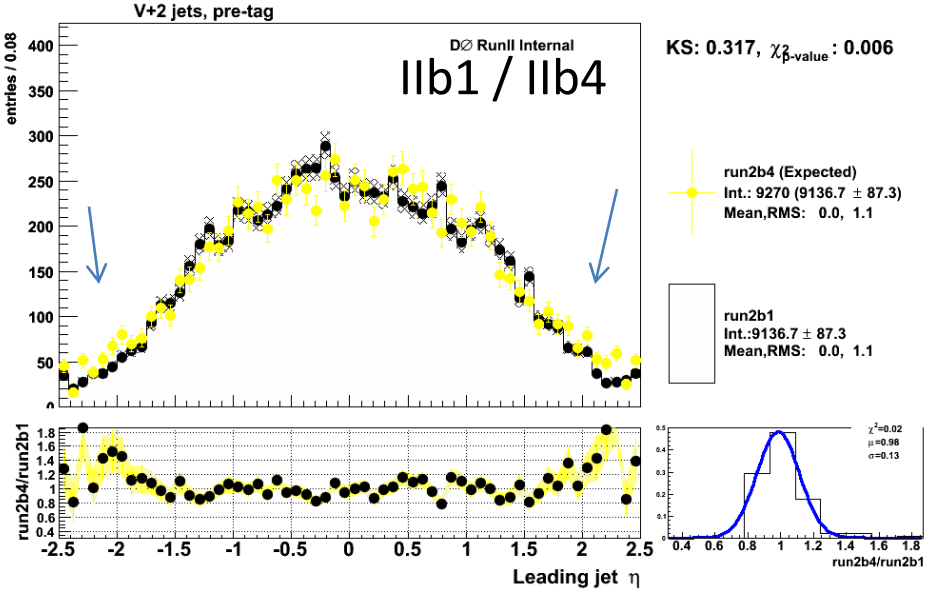
Leading jet η

Electron channel



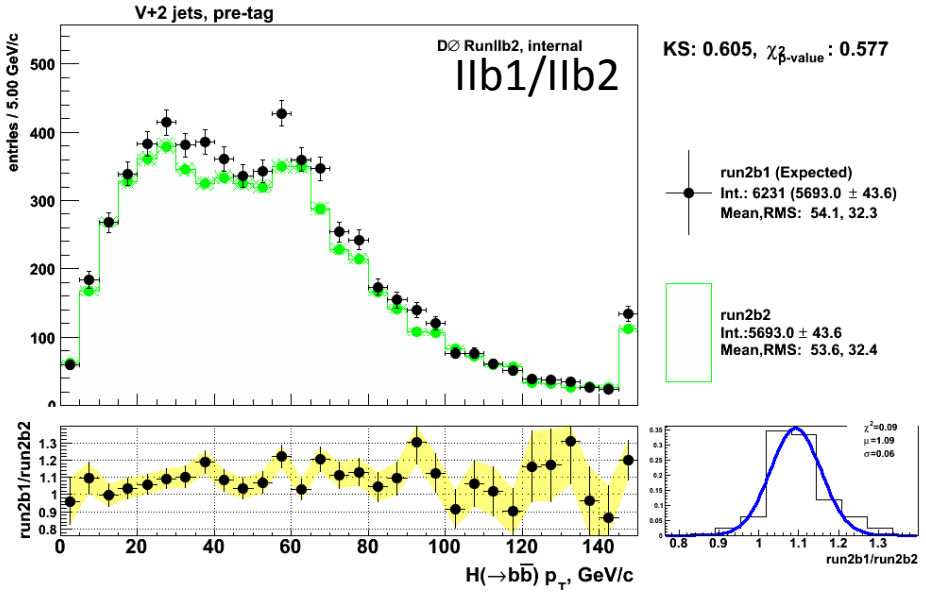


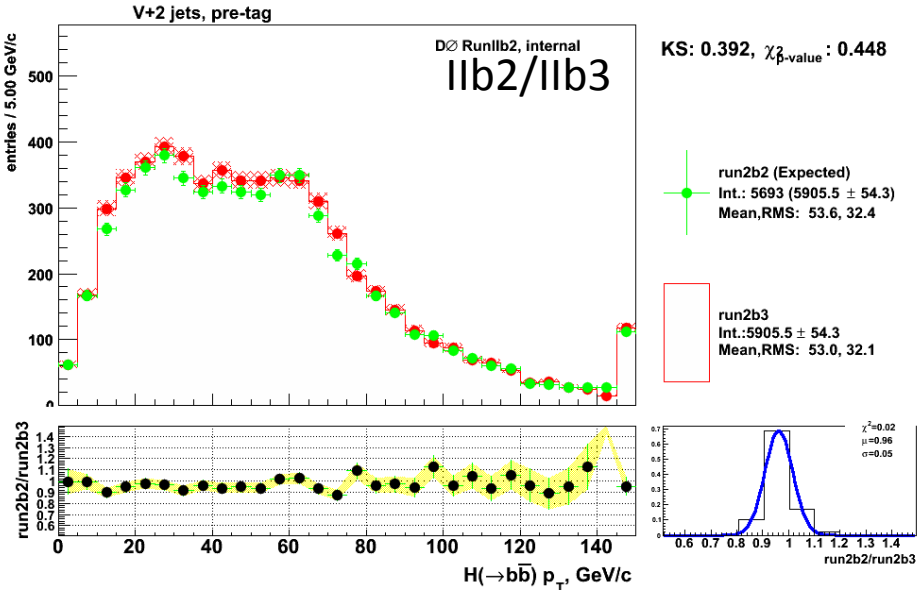


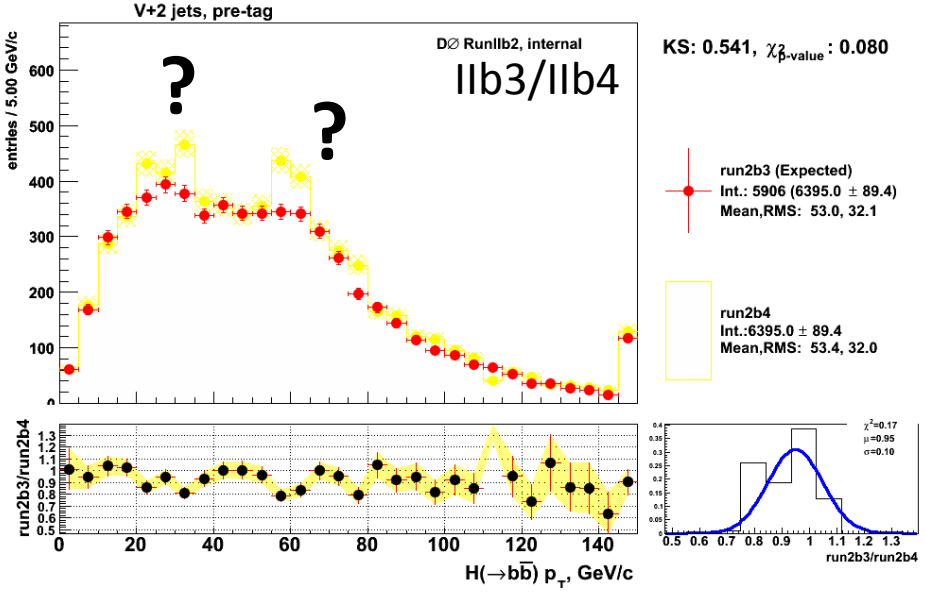


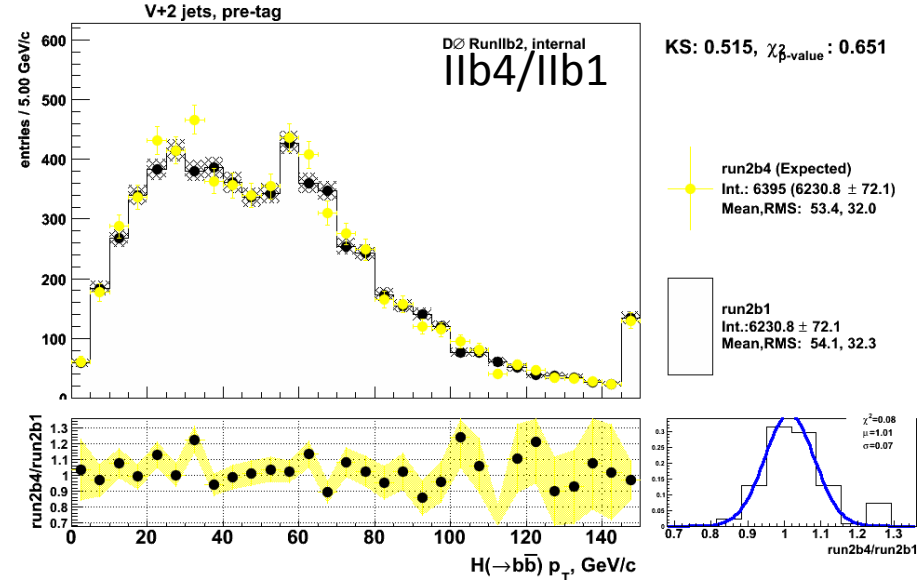
Muon channel

pT of di-jet system



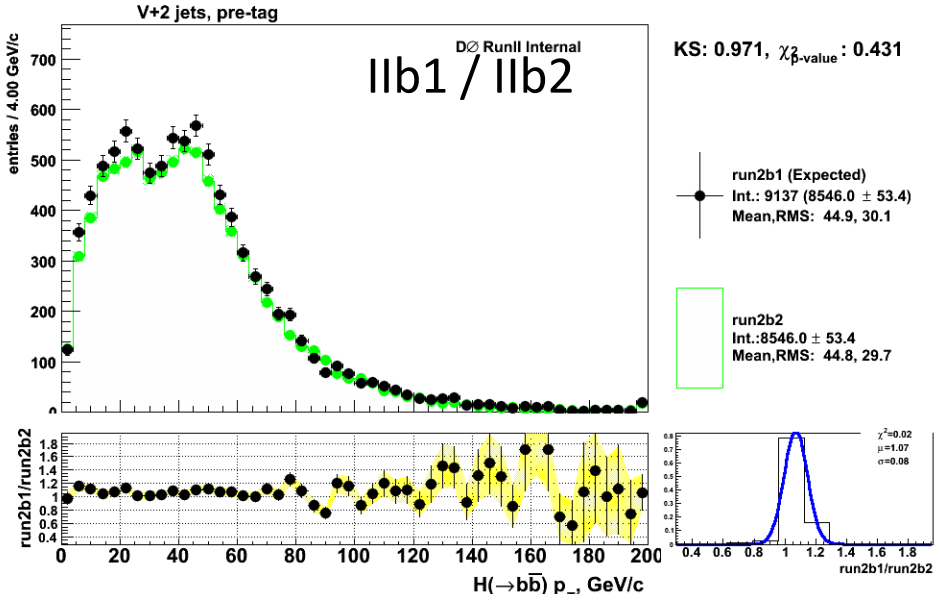


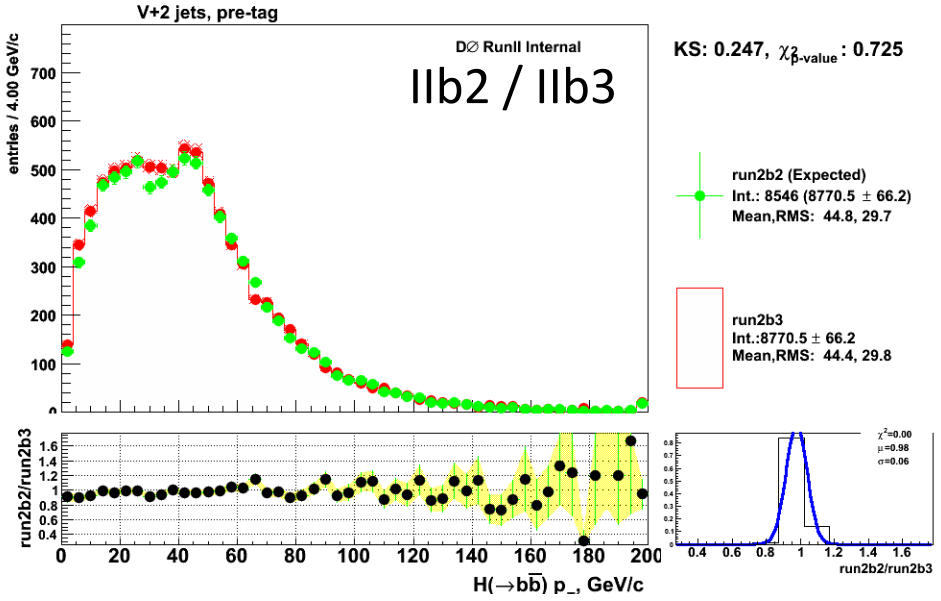


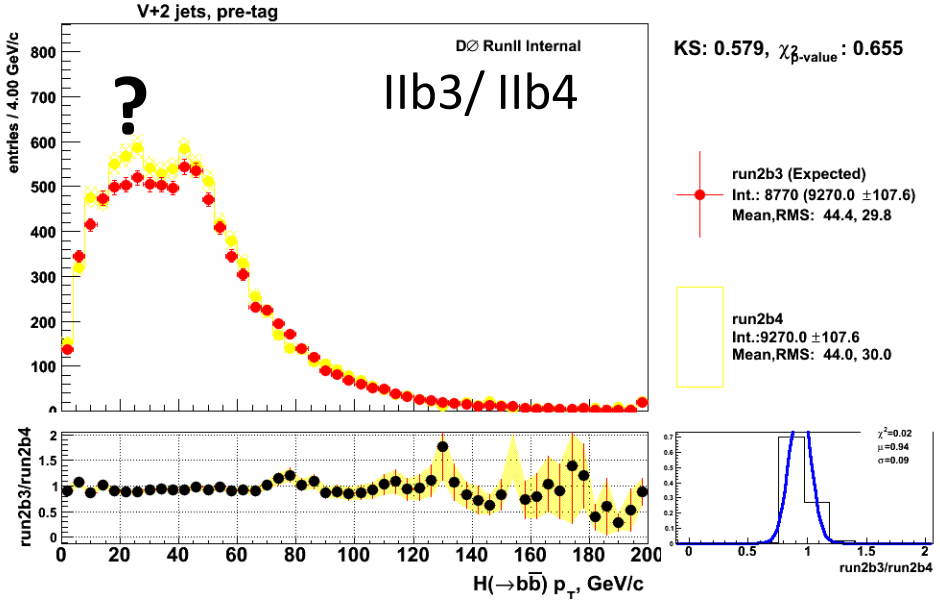


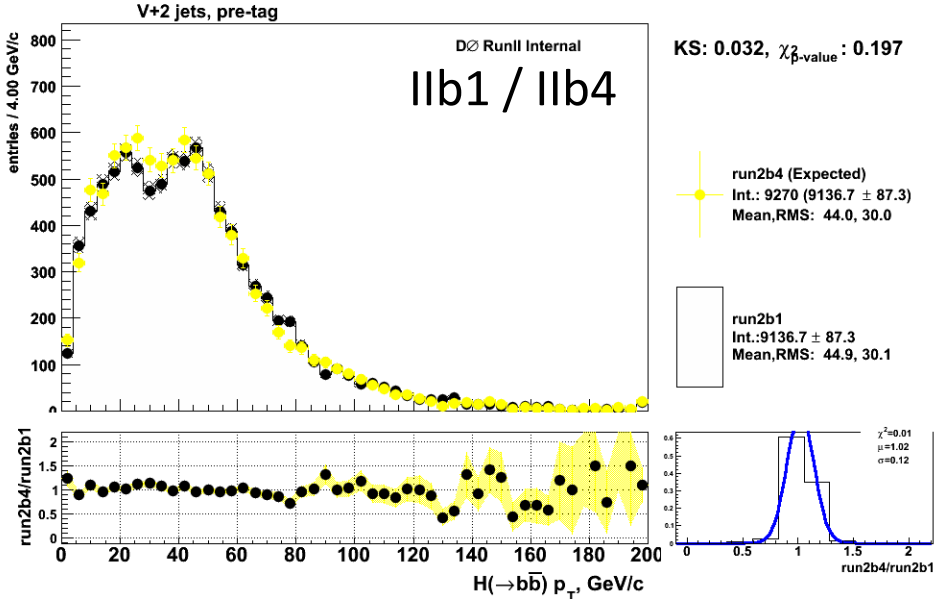
pT of di-jet system

Electron channel









Since the trigger level changes among Run period, we need to check whether trigger epoch affect the data set or not

2 Trigger epoch dependence

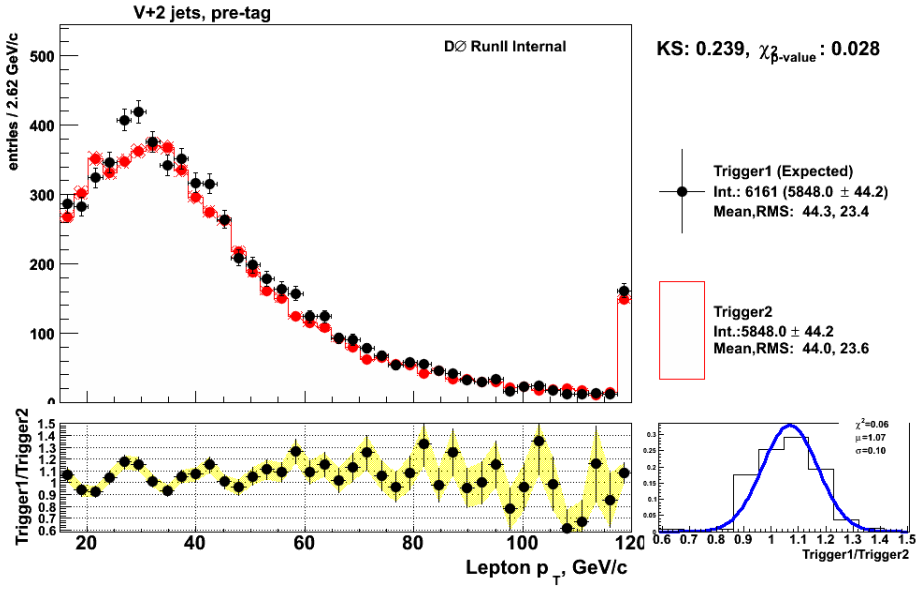
Compare distributions normalized by luminosity/normarlized to 1:

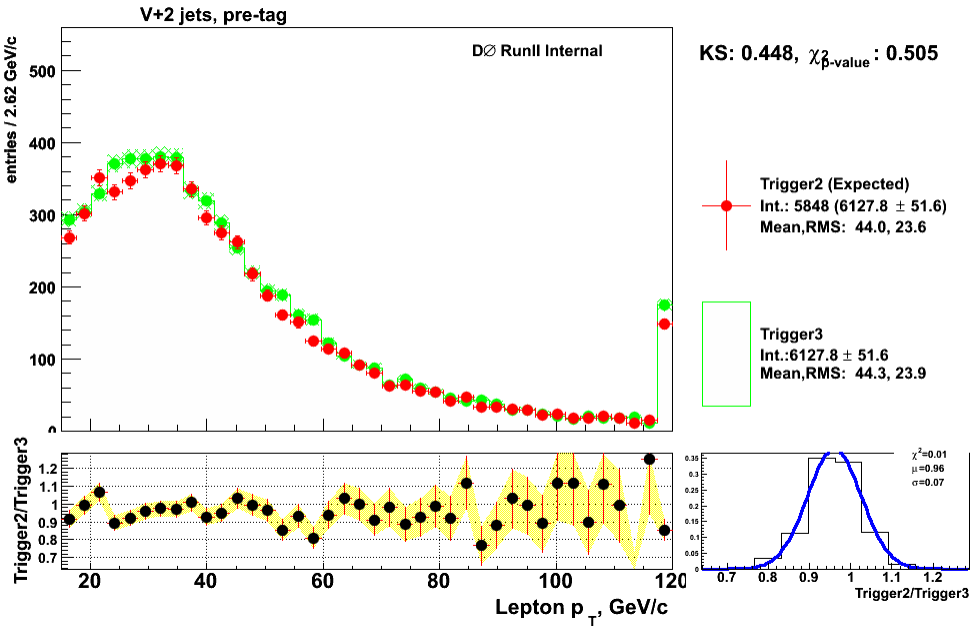
- Trigger 1: v15.0-v15.9 (221993-240743)
- Trigger 2: v16.0-v16.5 (240762-257675)
- Trigger 3: v16.5- (257684-)
- Trigger 3-IIb3: (257684- 262856)
- Trigger 3-IIb4: (264071-)

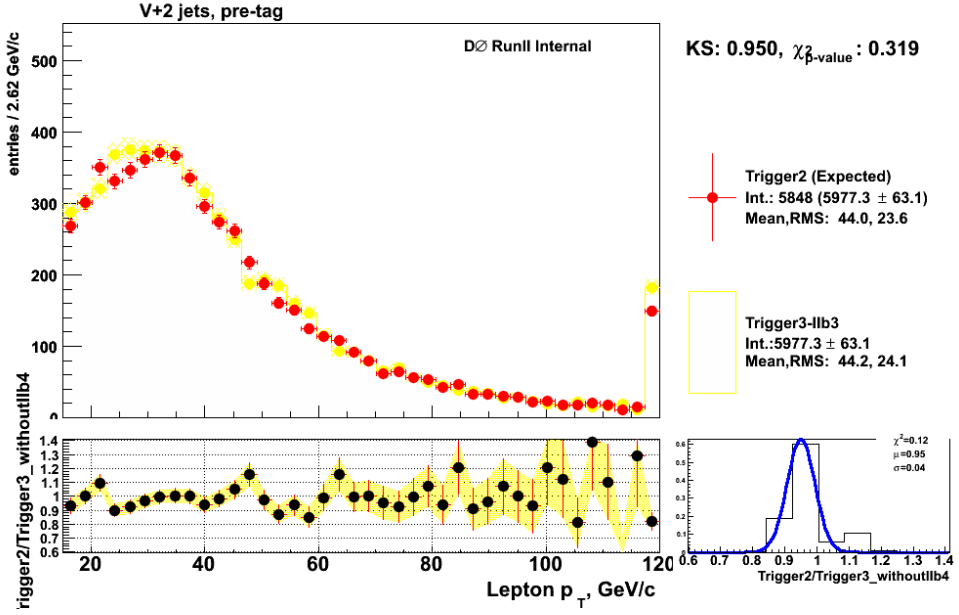
Using the following integrated luminosities:
Trigger 1: 1.6 fb-1
Trigger 2: 3.0 fb-1
Trigger 3: 2.3 fb-1
Trigger 3-IIb3: 2.5 fb-1
Trigger 3-IIb4: 0.8 fb-1

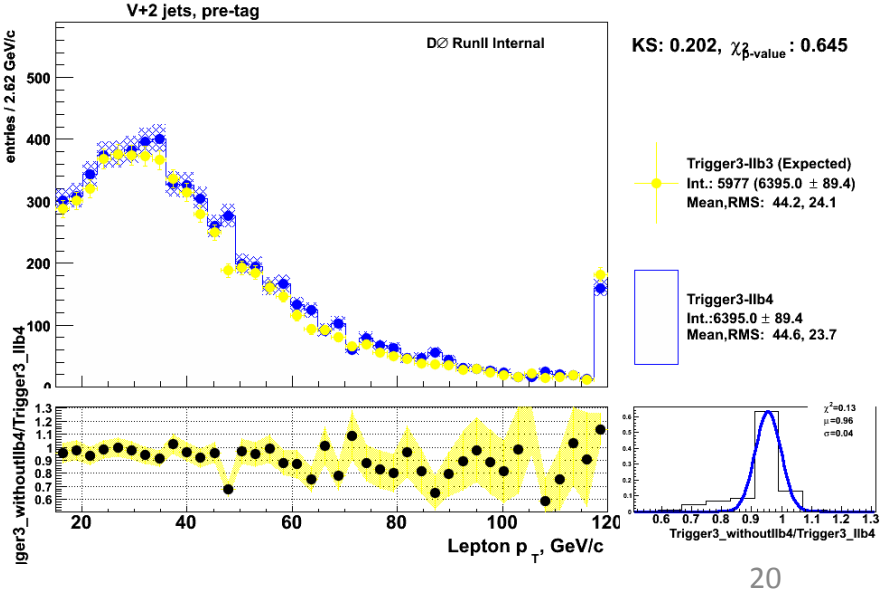
normalized by luminosity

Lepton pT



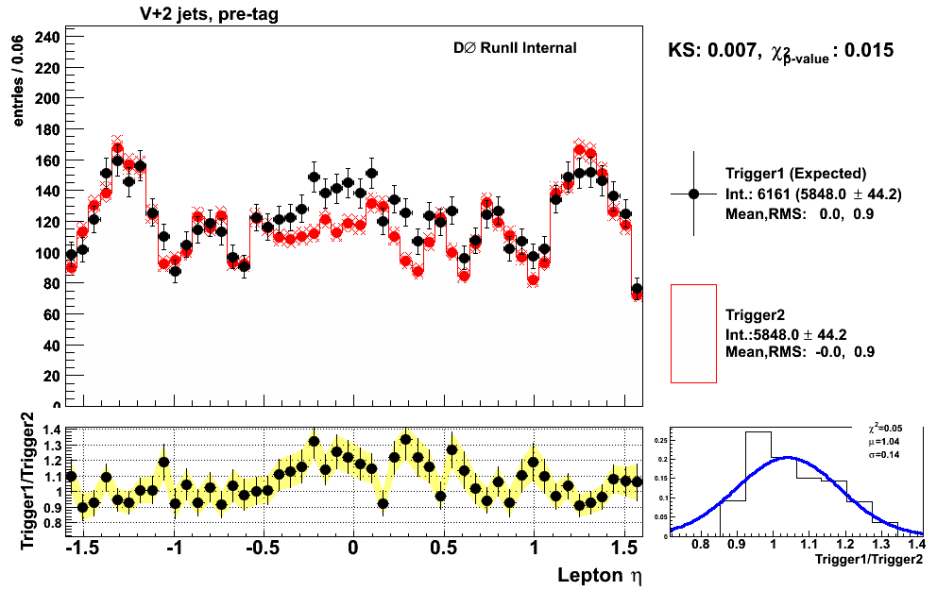


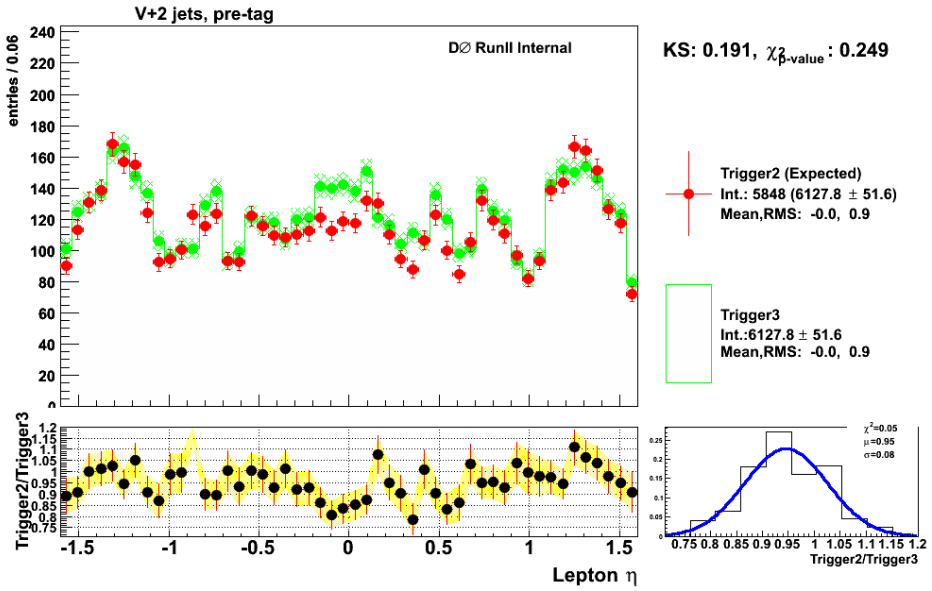


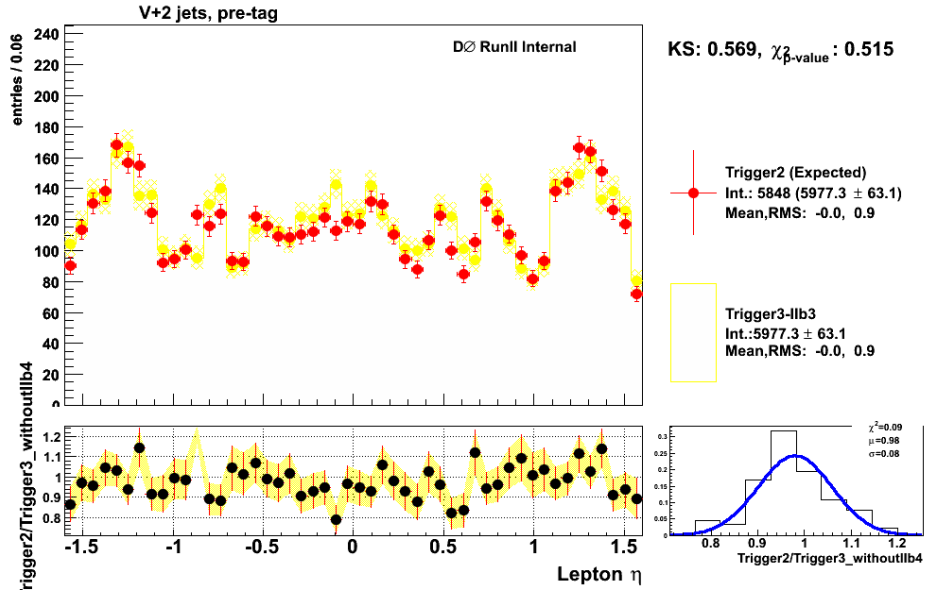


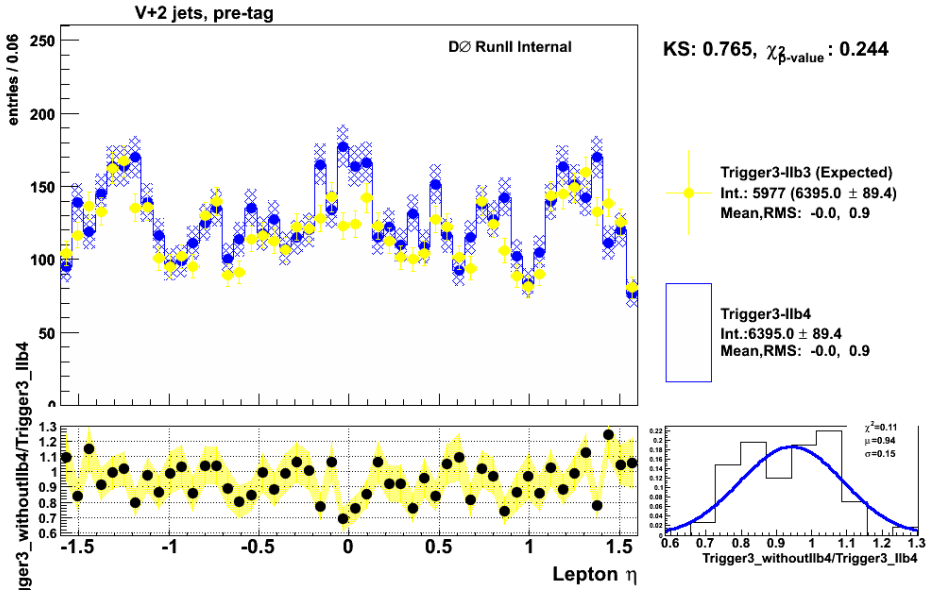
normalized by luminosity

Lepton η



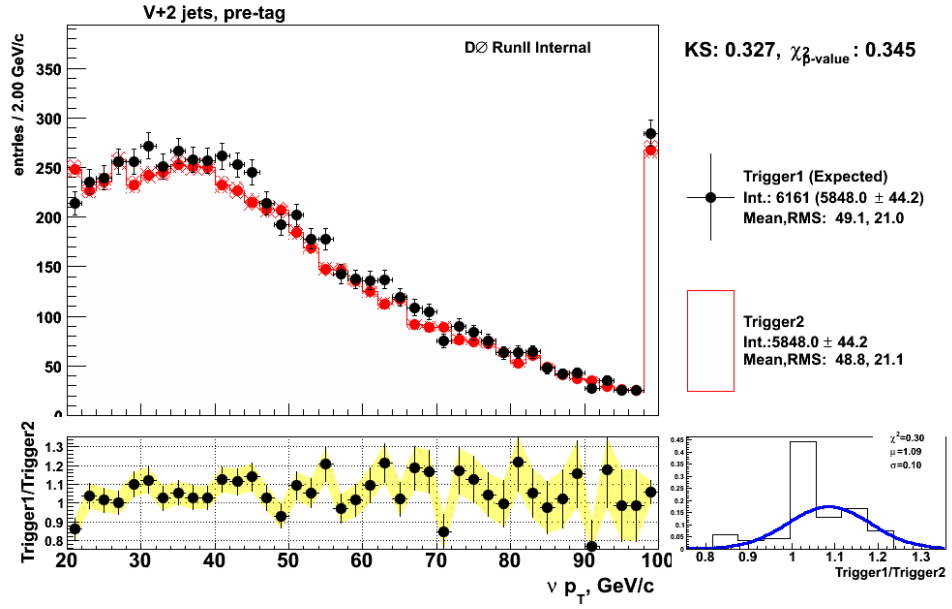


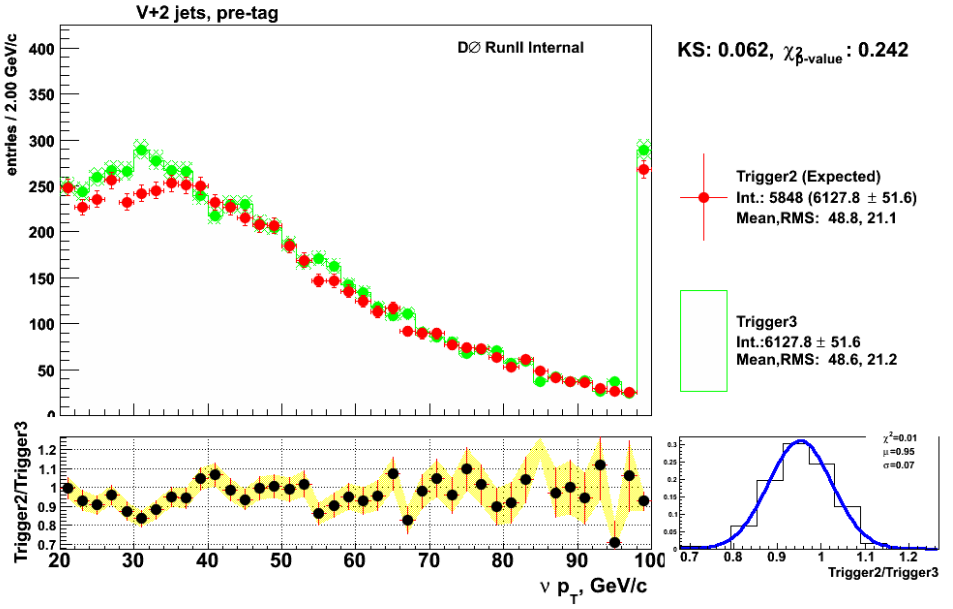


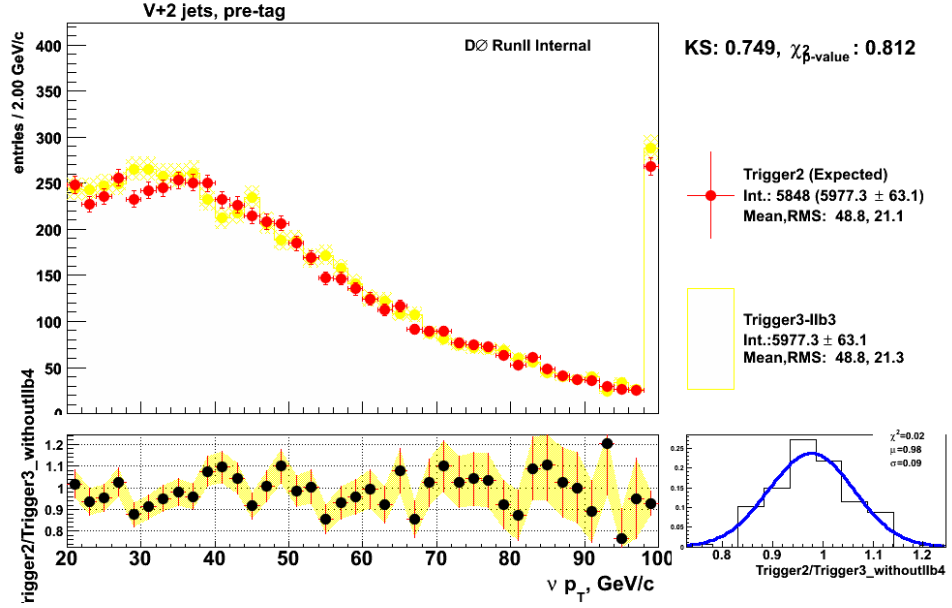


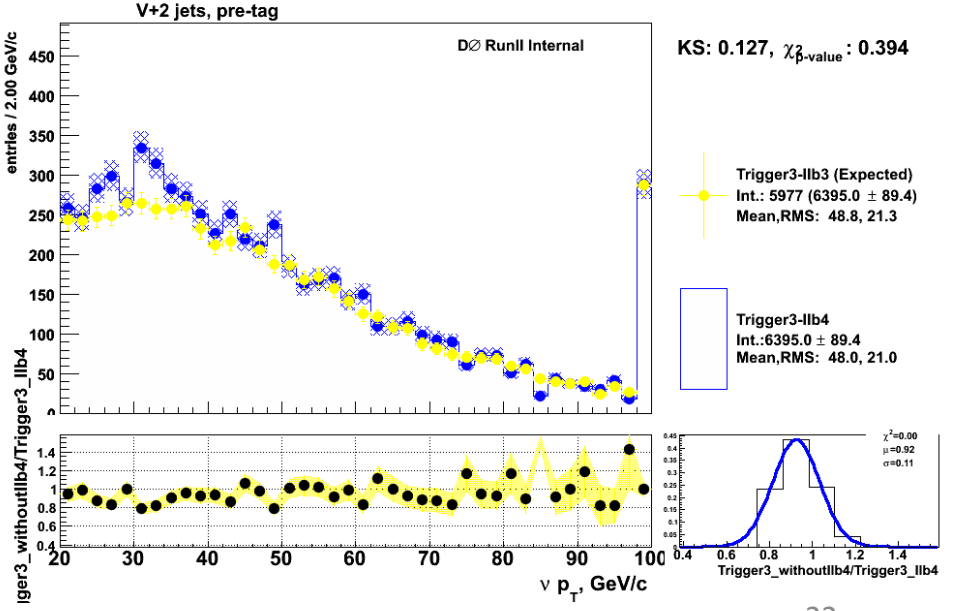
normalized by luminosity

Missing ET



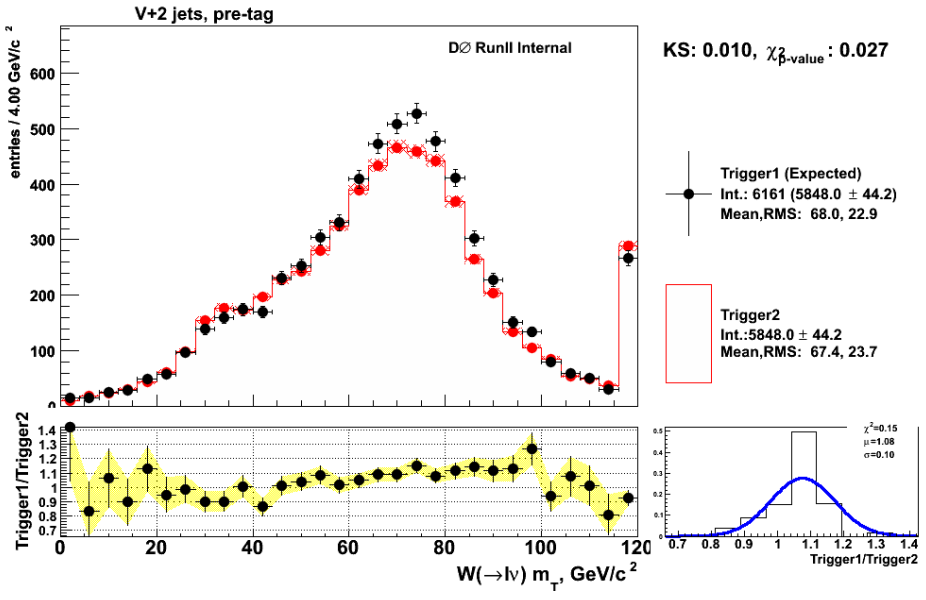


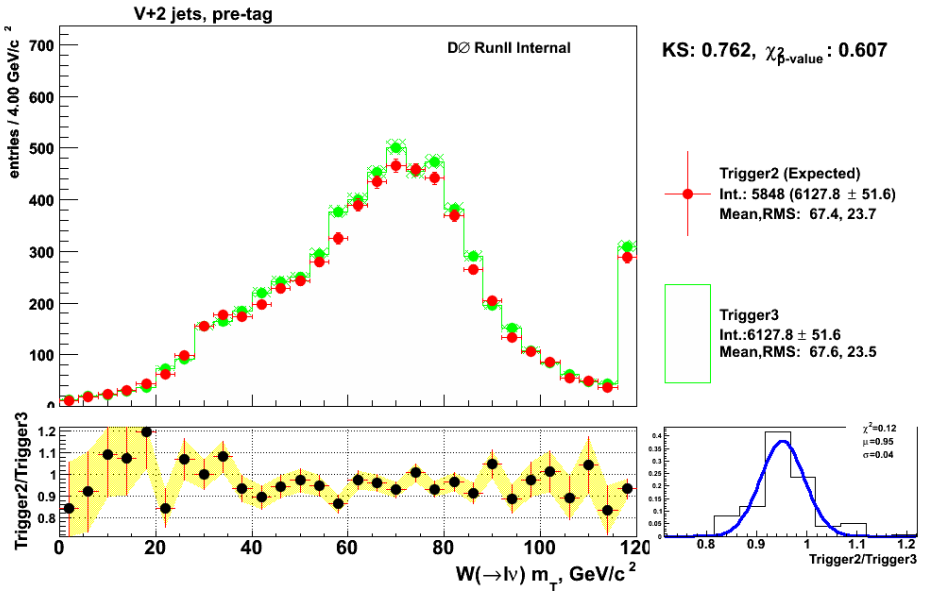


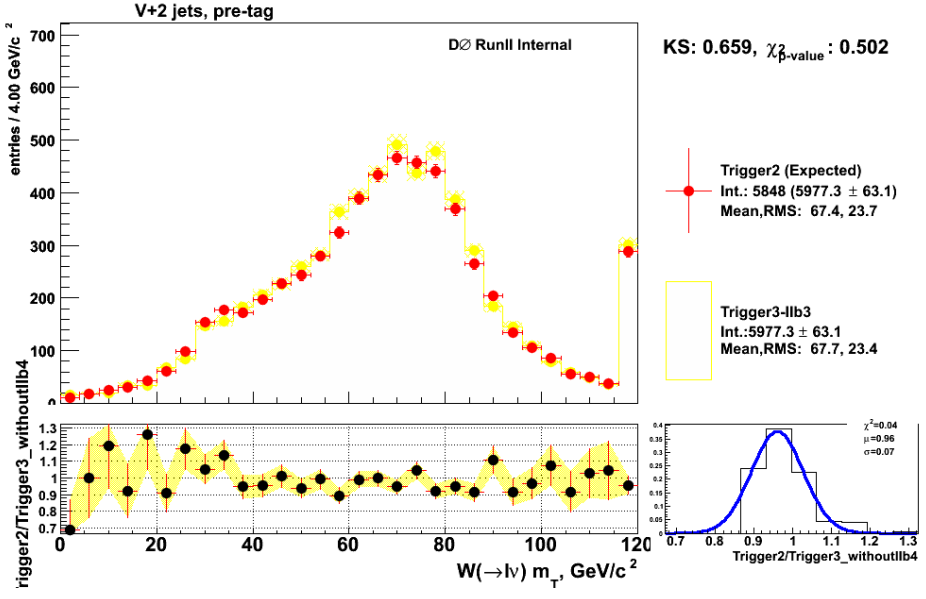


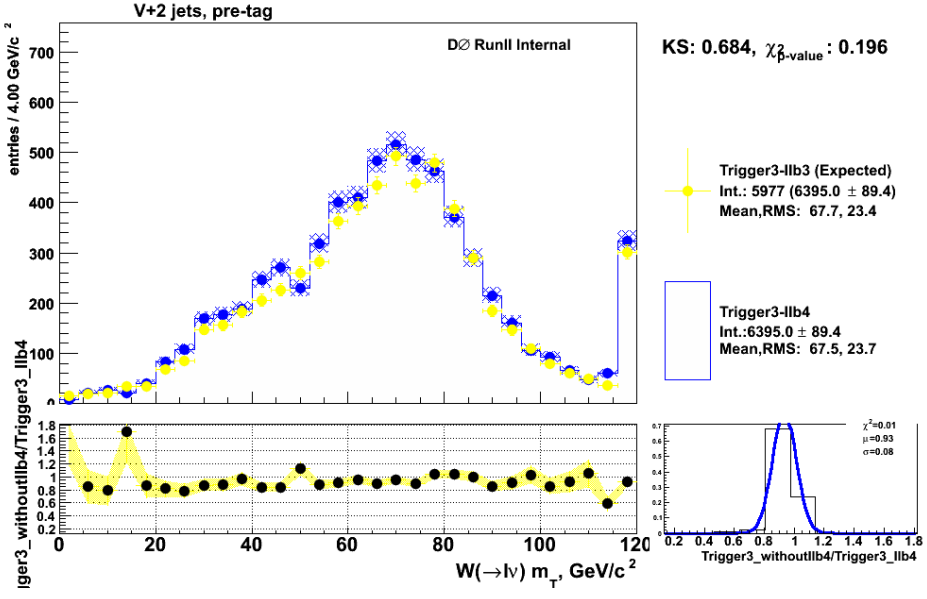
normalized by luminosity

W transverse mass



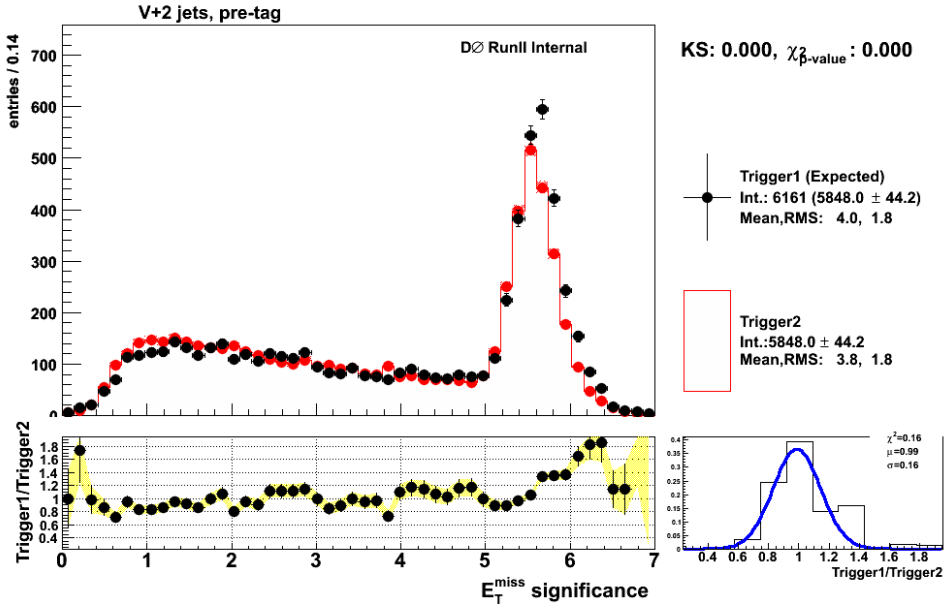


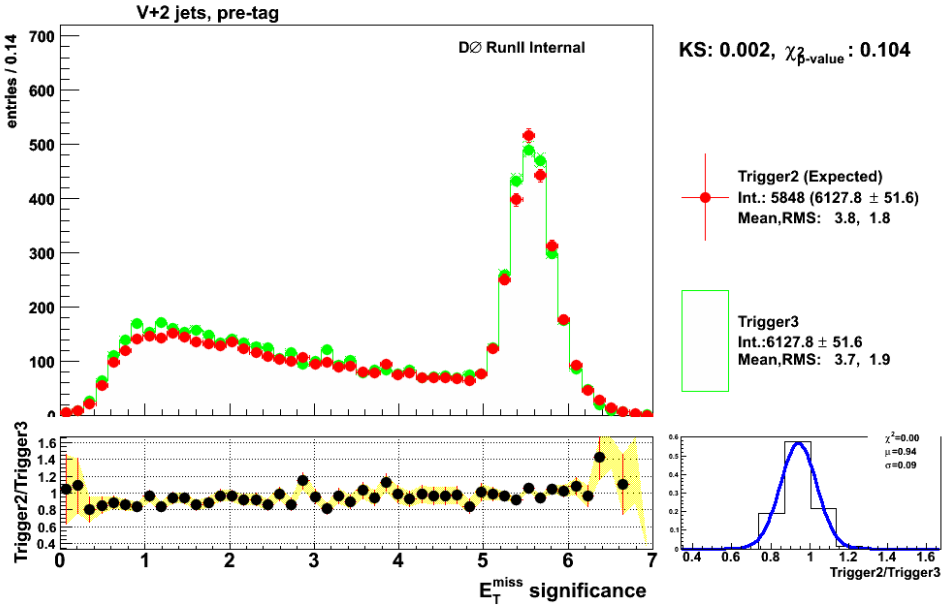


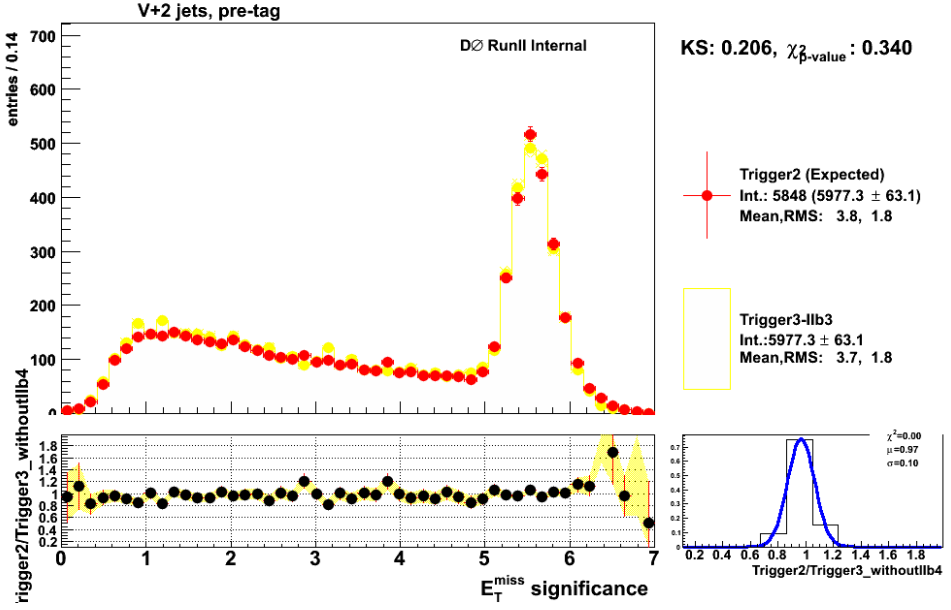


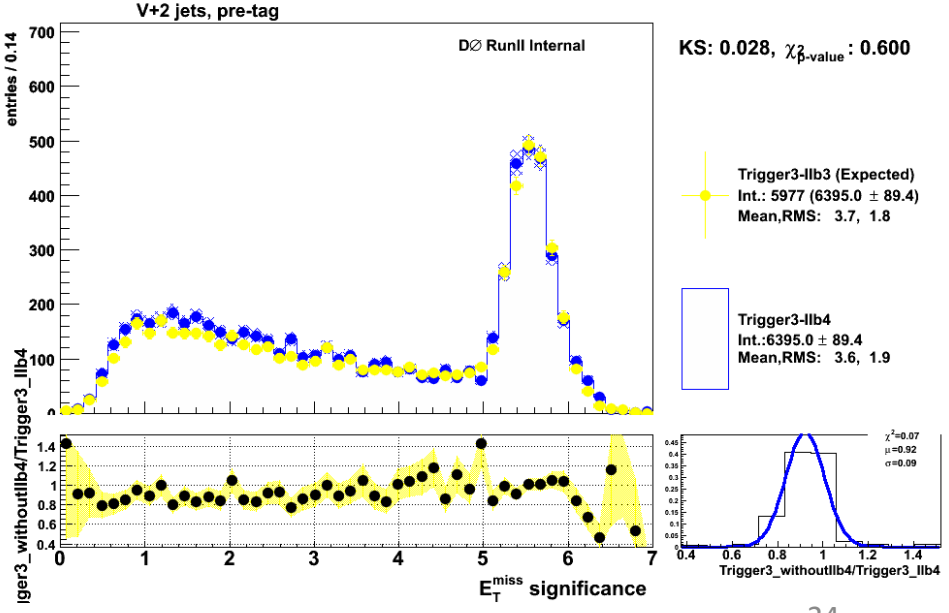
normalized by luminosity

Missing ET significance



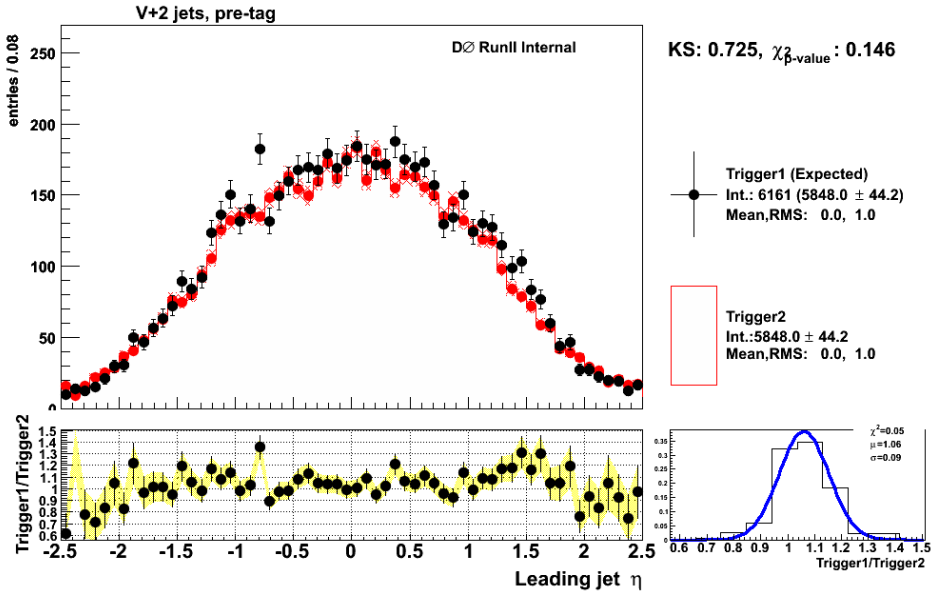


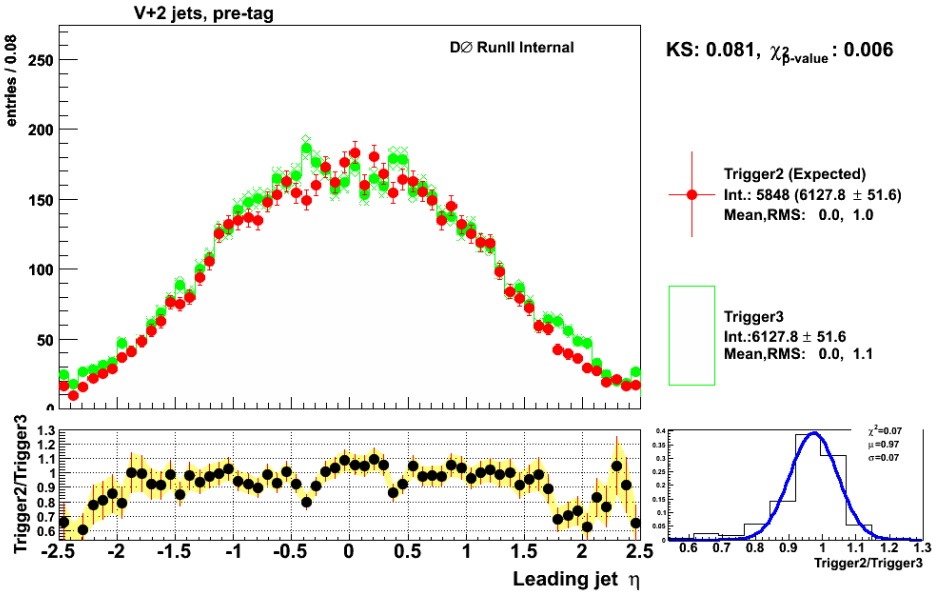


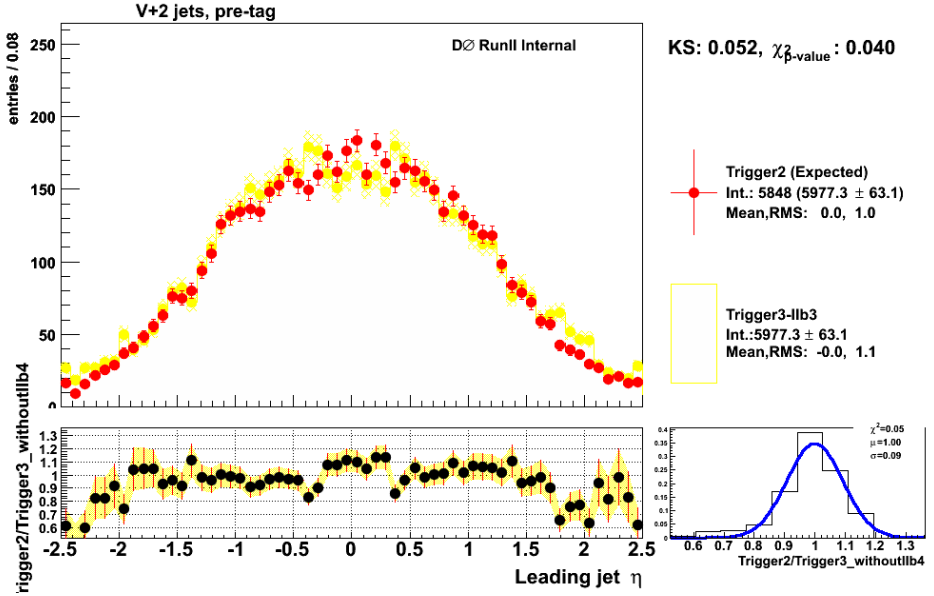


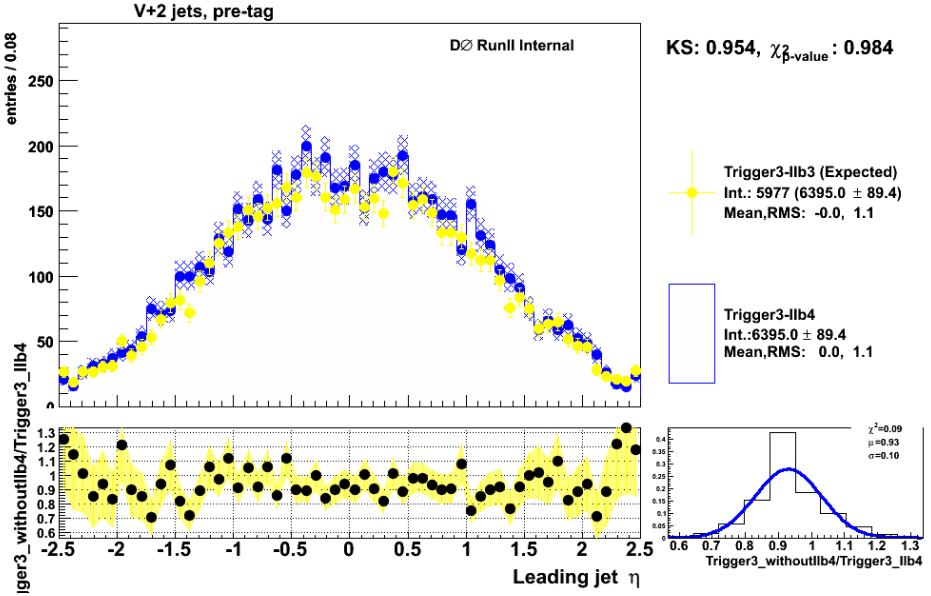
normalized by luminosity

Leading jet η



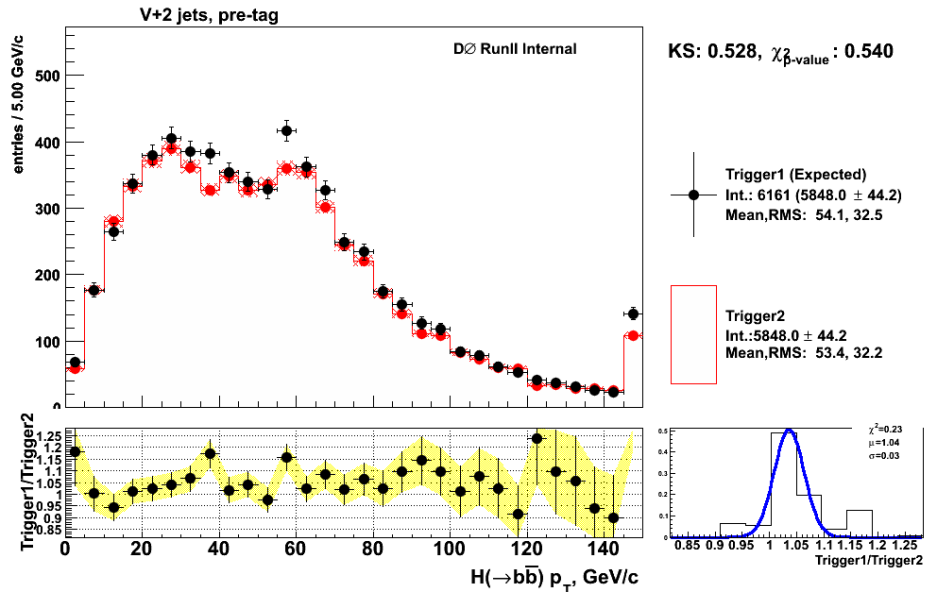


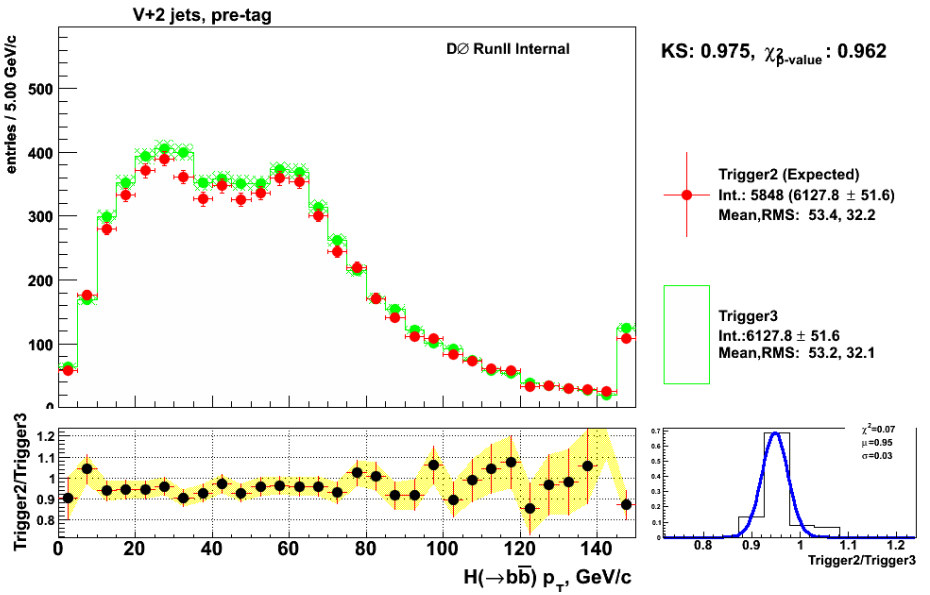


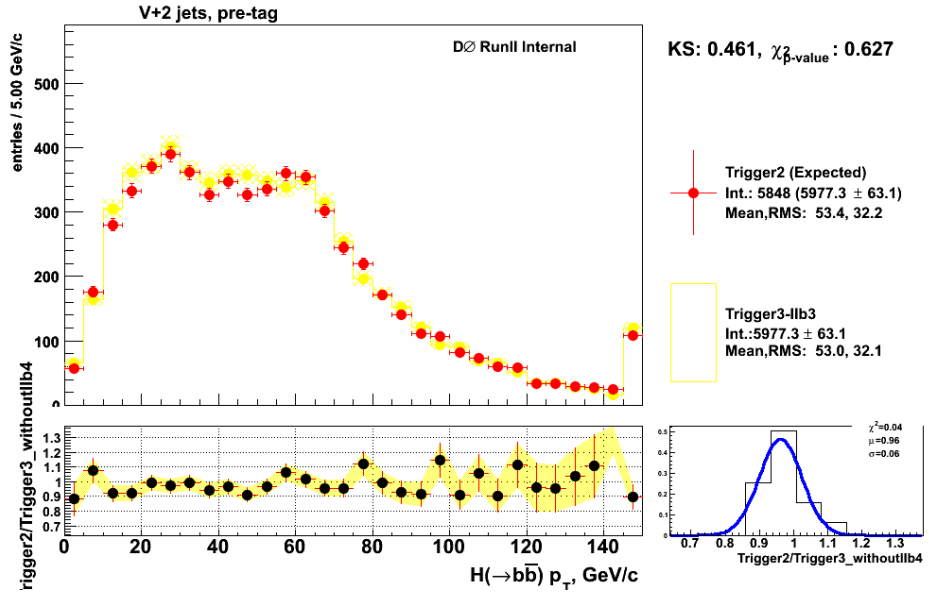


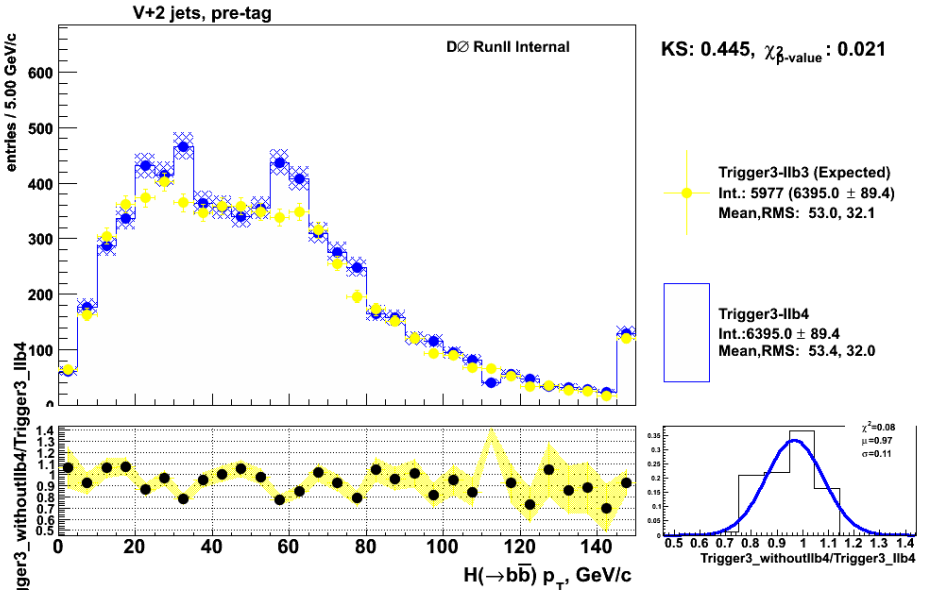
normalized by luminosity

pT of di-jet system









3 Comparison of default/new Jet treatment

Configuration

- Data set: IIb2+3 data, IIb2 MC
  vjets: v05-05-12d (checked codes are identical between v05-05-12e.)
  selection:
  Electron: pT>15 GeV, Point1(Point2) for CC(EC)
  MET> 20 GeV
  WTrMass>60 GeV (in order to kill Multi-jet background)
  Jet: VCJet pT>20 GeV, |eta|<2.5, Njet>= 2 (2jet inclusive)
  Additional correction on top of vjets
  - Lepton eta correction (from WH pub.)
  - NO Wpt-DeltaR correction (from WH pub.)
  - NO jet eta reweighting.

Experimental scale factors --2 jet inclusive

default

Multijet (tight): 0.71±0.18
W+jets (tight): 1.09±0.02

- Multi-jet scale factor:

trial version is higher than default one.

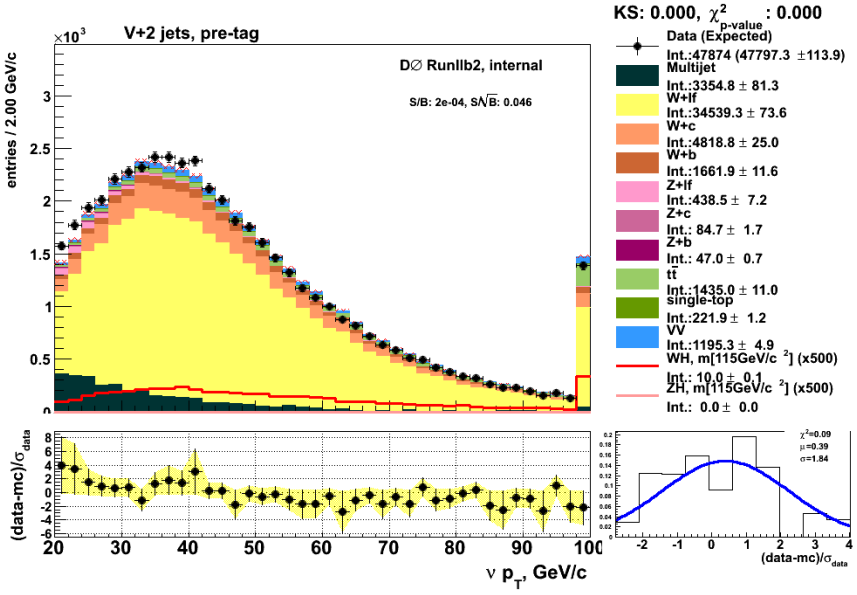
- Wjet scale factor:

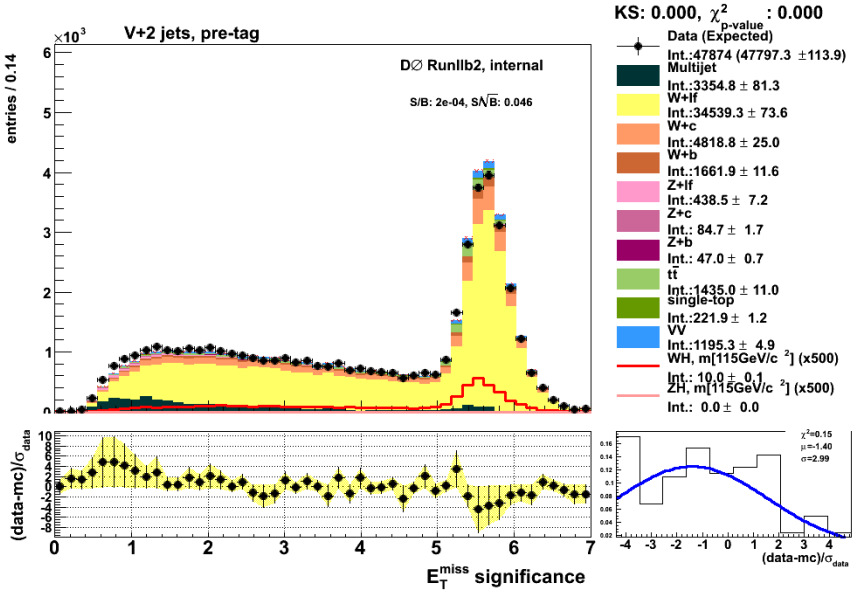
trial version is lower than default one.

trial

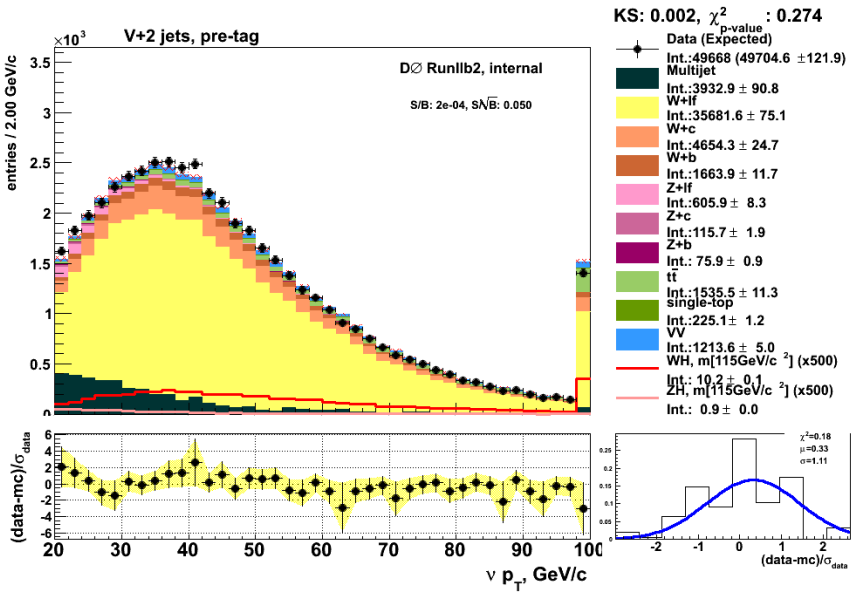
Multijet (tight): 0.74±0.17
W+jets (tight): 1.07±0.02

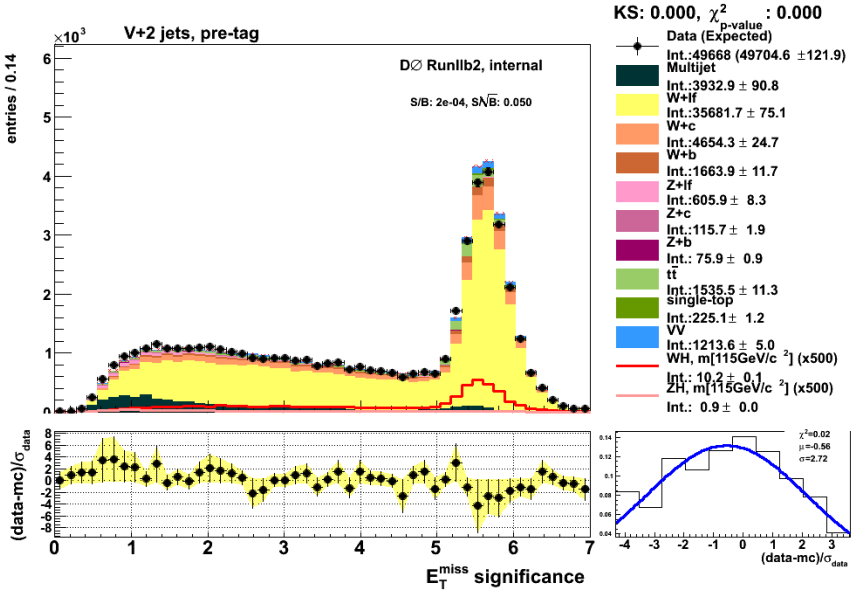
default





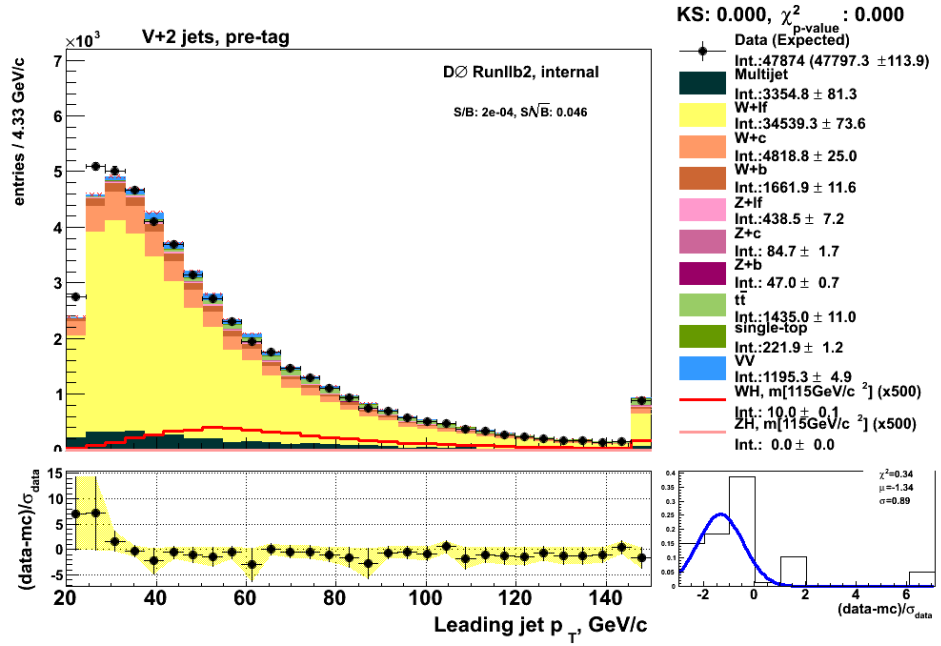
trial

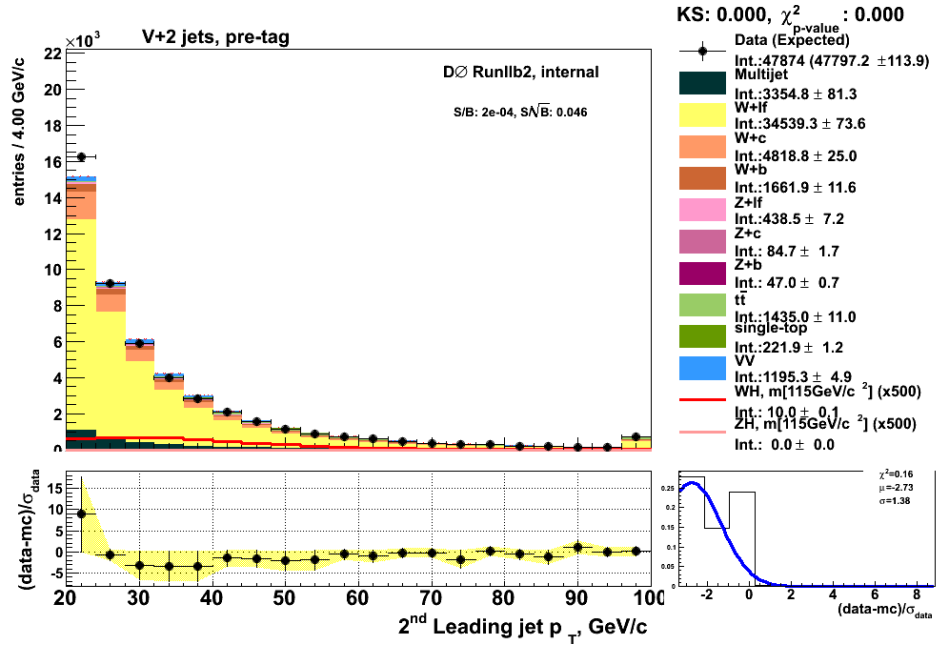




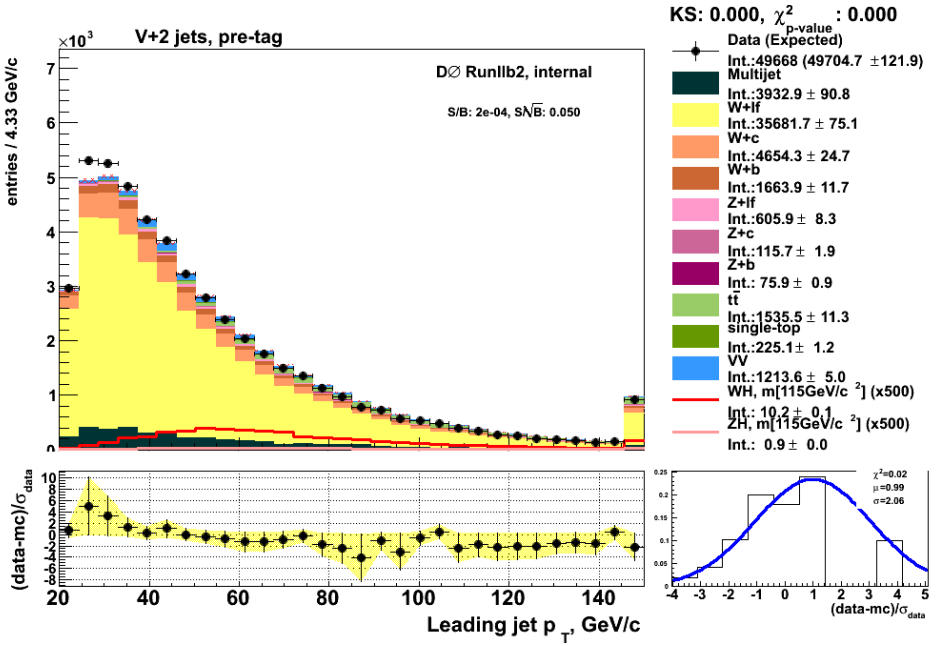
The χ2 of MET: 0.000 → 0.274

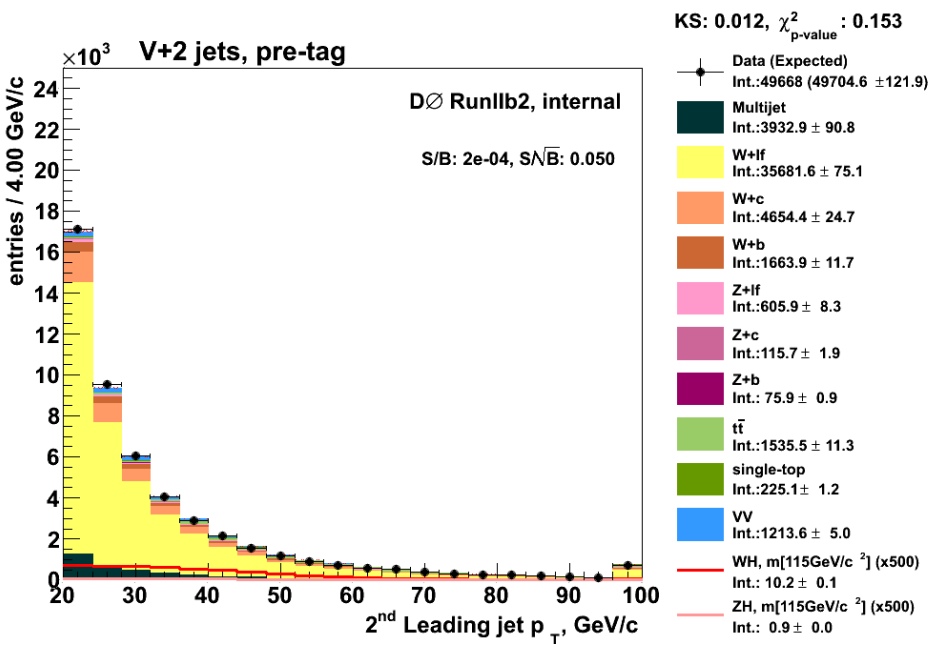
default

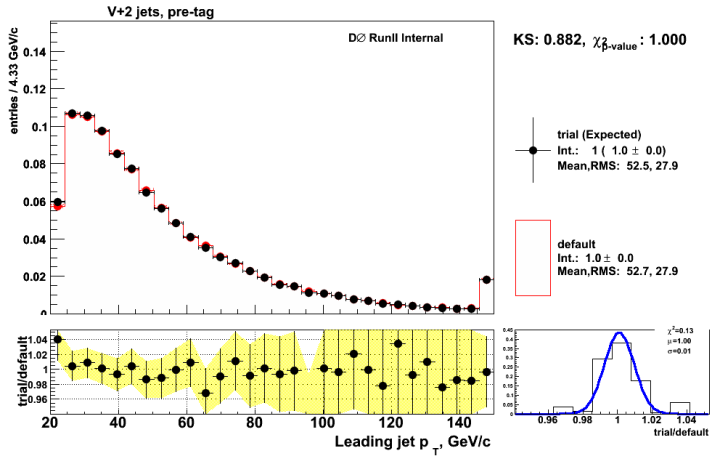


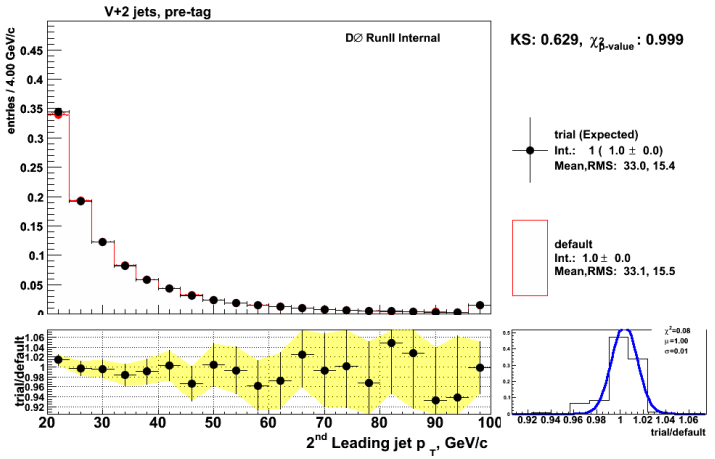


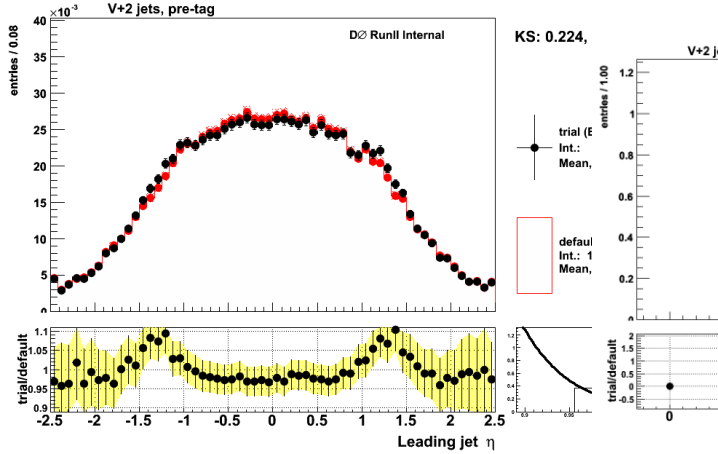
trial

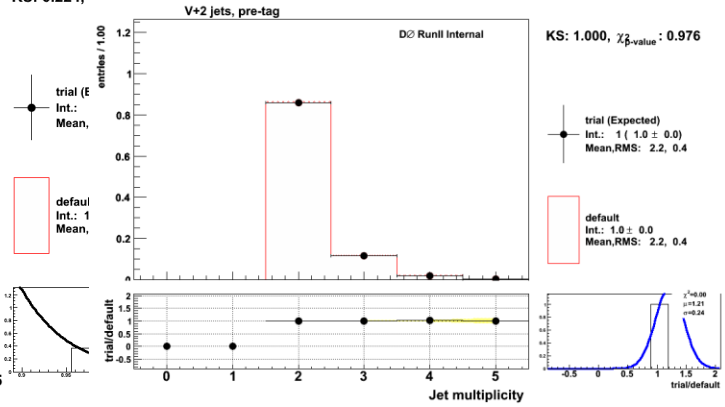


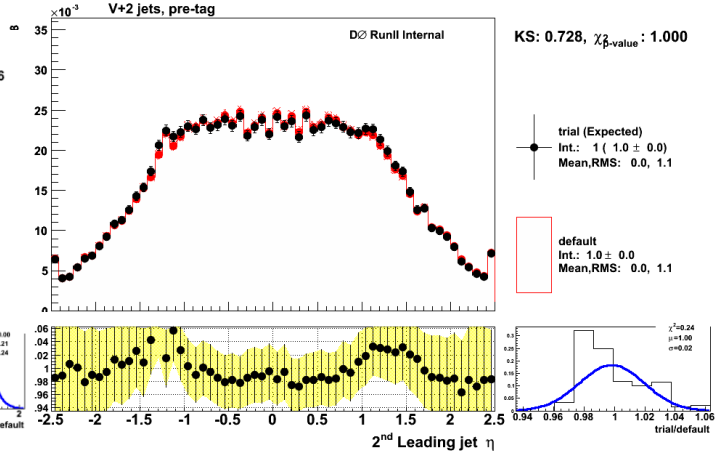


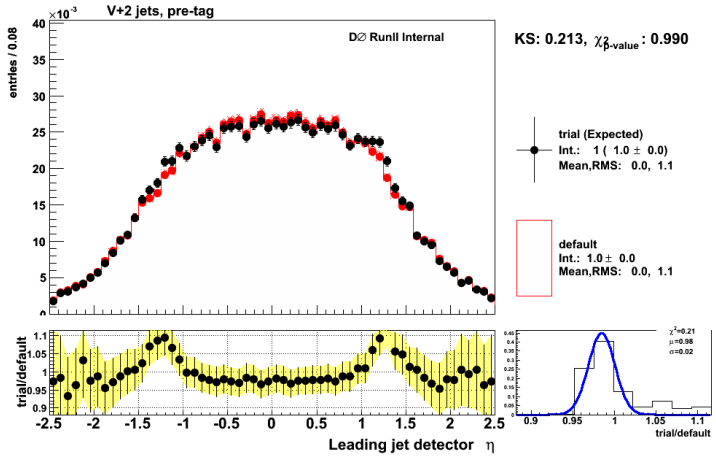

V+2 jets, pre-tag
DØ RunII Internal
KS: 0.882, $\chi^2_{\beta\text{-value}}$: 1.000
trial (Expected)
Int.: 1 (1.0 ± 0.0)
Mean,RMS: 52.5, 27.9
default
Int.: 1.0 ± 0.0
Mean,RMS: 52.7, 27.9
entries / 4.33 GeV/c
trial/default
Leading jet p_T, GeV/c

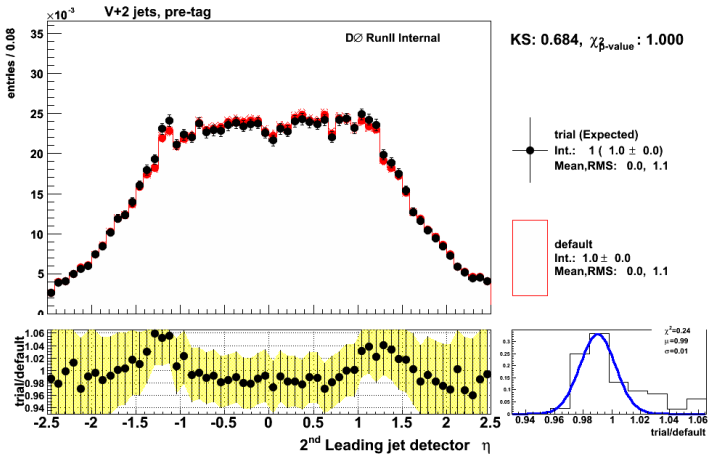

V+2 jets, pre-tag
DØ RunII Internal
KS: 0.629, $\chi^2_{\beta\text{-value}}$: 0.999
trial (Expected)
Int.: 1 (1.0 ± 0.0)
Mean,RMS: 33.0, 15.4
default
Int.: 1.0 ± 0.0
Mean,RMS: 33.1, 15.5
entries / 4.00 GeV/c
trial/default
2^{nd} Leading jet p_T, GeV/c


V+2 jets, pre-tag
DØ RunII Internal
KS: 0.224,
entries / 0.08
trial/default
Leading jet η


V+2 jets, pre-tag
DØ RunII Internal
KS: 1.000, $\chi^2_{\beta\text{-value}}$: 0.976
trial (Expected)
Int.: 1 (1.0 ± 0.0)
Mean,RMS: 2.2, 0.4
default
Int.: 1.0 ± 0.0
Mean,RMS: 2.2, 0.4
entries / 1.00
trial/default
Jet multiplicity


V+2 jets, pre-tag
DØ RunII Internal
KS: 0.728, $\chi^2_{\beta\text{-value}}$: 1.000
trial (Expected)
Int.: 1 (1.0 ± 0.0)
Mean,RMS: 0.0, 1.1
default
Int.: 1.0 ± 0.0
Mean,RMS: 0.0, 1.1
trial/default
2^{nd} Leading jet η


V+2 jets, pre-tag
DØ RunII Internal
KS: 0.213, $\chi^2_{\beta\text{-value}}$: 0.990
trial (Expected)
Int.: 1 (1.0 ± 0.0)
Mean,RMS: 0.0, 1.1
default
Int.: 1.0 ± 0.0
Mean,RMS: 0.0, 1.1
entries / 0.08
trial/default
Leading jet detector η


V+2 jets, pre-tag
DØ RunII Internal
KS: 0.684, $\chi^2_{\beta\text{-value}}$: 1.000
trial (Expected)
Int.: 1 (1.0 ± 0.0)
Mean,RMS: 0.0, 1.1
default
Int.: 1.0 ± 0.0
Mean,RMS: 0.0, 1.1
entries / 0.08
trial/default
2^{nd} Leading jet detector η

4 Alpgen RW comparison

Configuration

- EPS
- New jet treatment
- Electron:
  2jet inclusive skim with MET>60 GeV
- Muon:
  2jet inclusive skim with MET>60 GeV

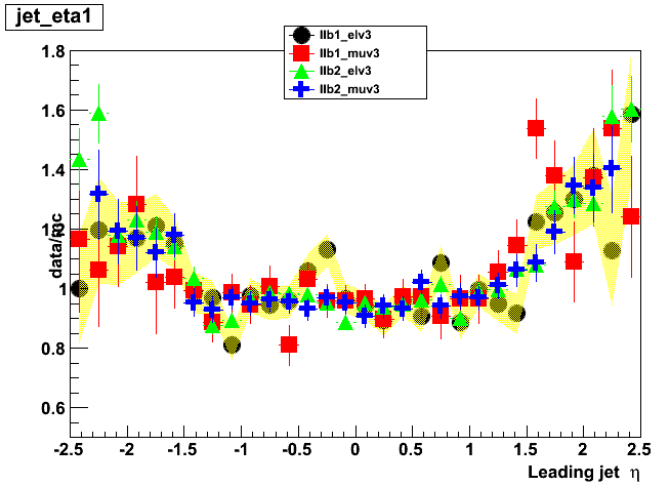
Alpgen setting:

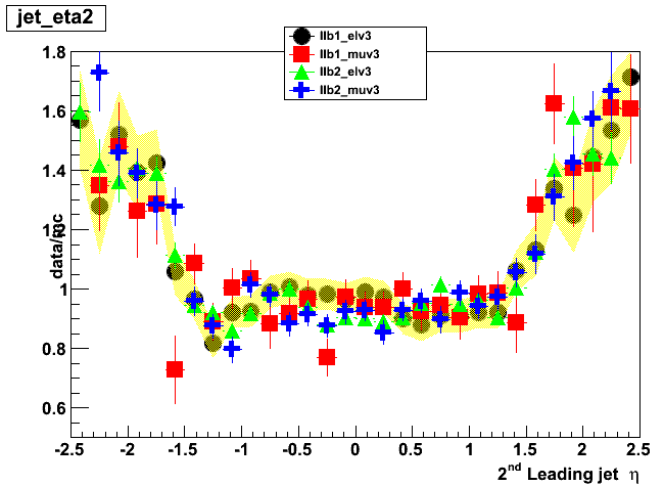
corr.jet.eta.horns:	none
corr.alpgen.lep.eta:	Pub2010
corr.alpgen.jet.eta:	none
corr.alpgen.lnu.pt:	none
corr.alpgen.j12.dr:	none
corr.alpgen.lnujj.pt	
corr.alpgen.ule:	Pub2010
corr.alpgen.scale:	Pub2010
corr.alpgen.mlm:	Pub2010

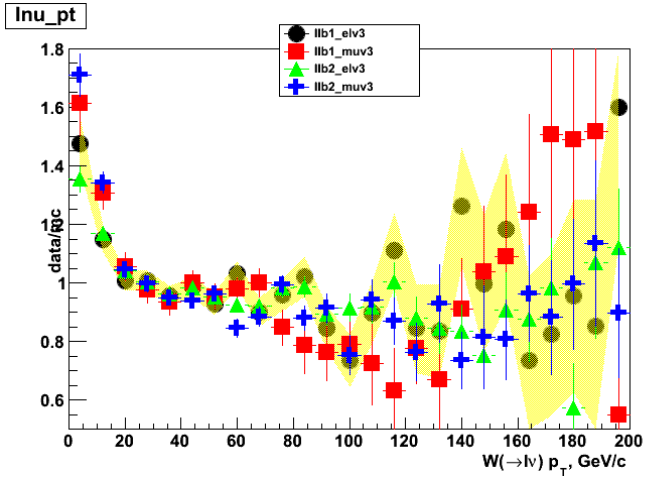
Calculate:

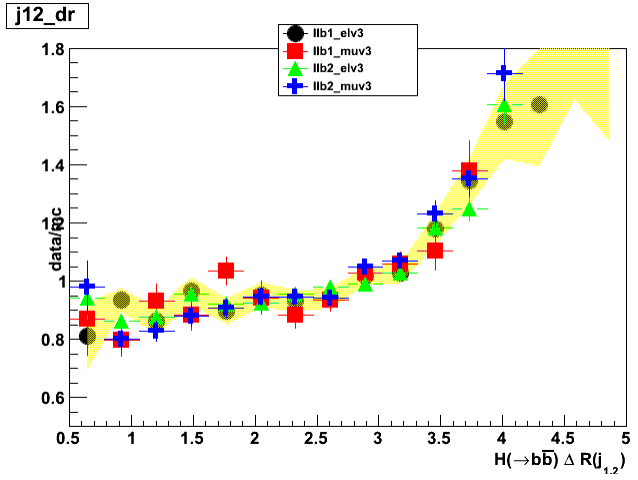
$$\frac{Data - (Multijet + ttbar + single\ top + di - boson)}{(W + Jet) + (Z + Jet)}$$

For a perfect detector simulator, after applied the Alpgen correction, this ratio should be flat. And this ratio helps checking whether the current Alpgen correction consistent in each data set, and in each lepton channel.









IIb1 & IIb2, EM & MU channel consistent to each other, so we can combine the alpgen corrections.

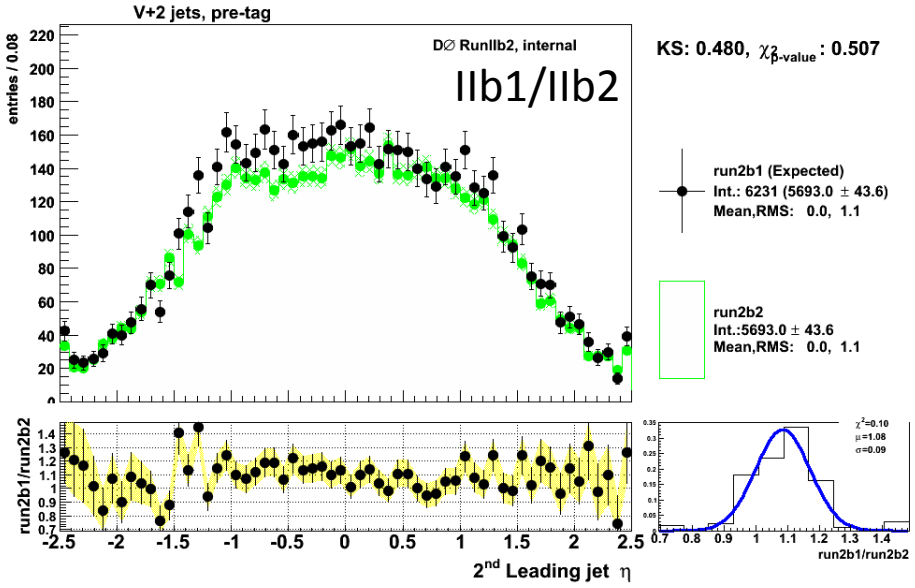
Summary

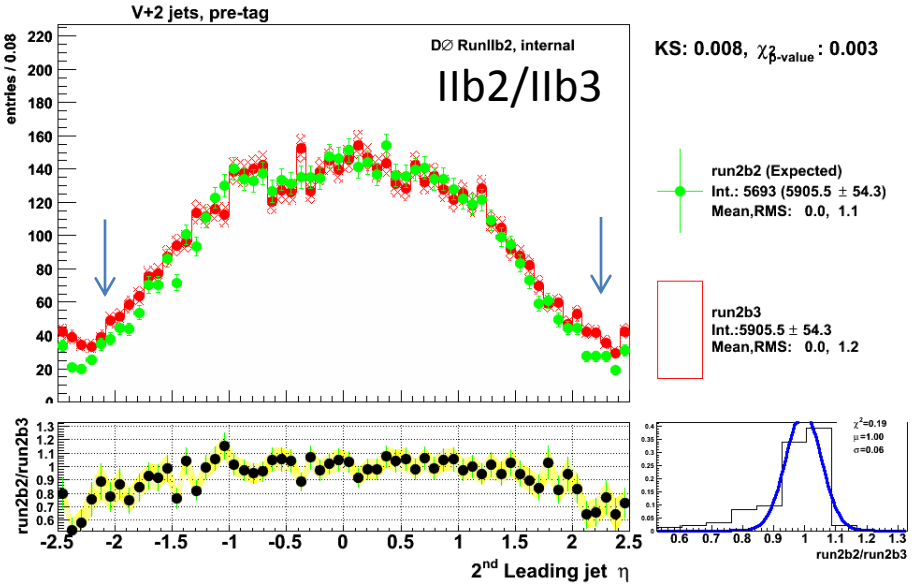
- 1. RunIIb4 seems to recovery efficiency, and shows strange behavior in MET.
- 2. RunIIb4's strange behavior has no trigger epoch dependence.
- 3. New jet treatment gives better MC-Data agreement.
- 4. Alpgen correction seems good, and it's proper to combine IIb1 & IIb2, EM and MU.

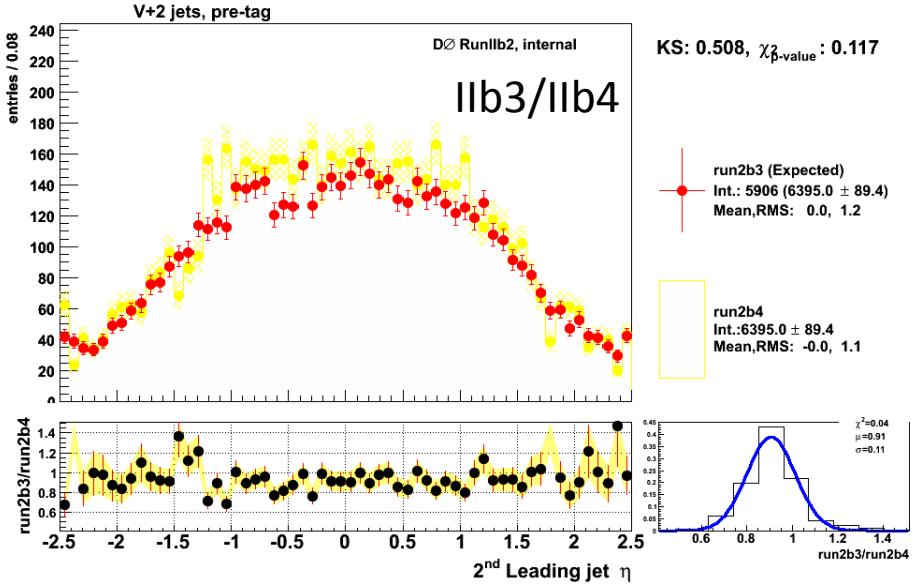
BACKUP

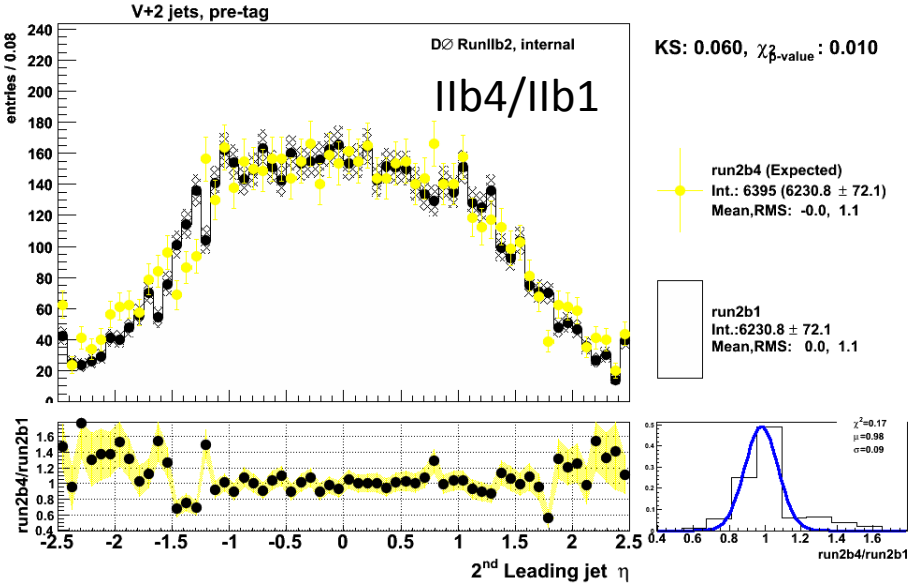
Muon channel

2nd Leading jet η



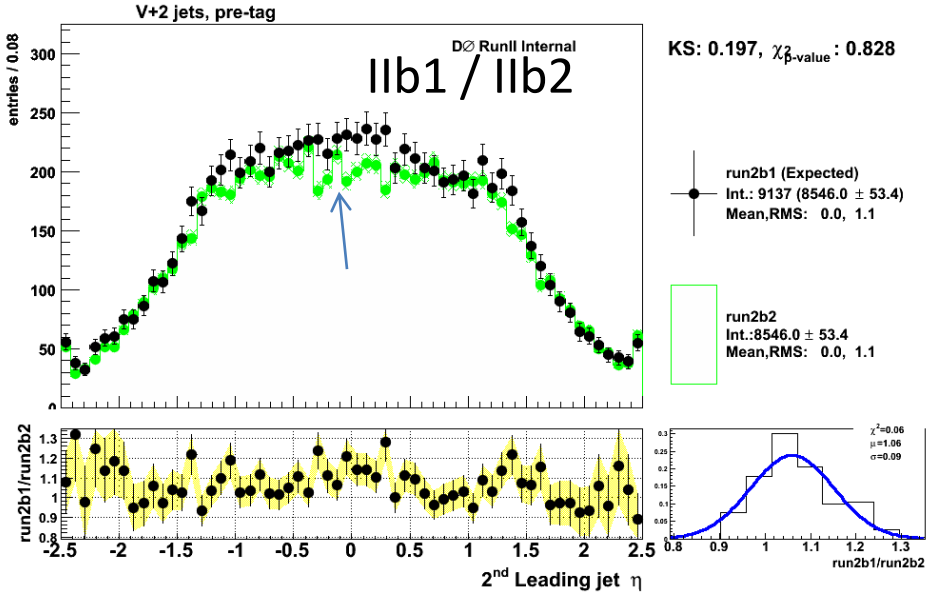


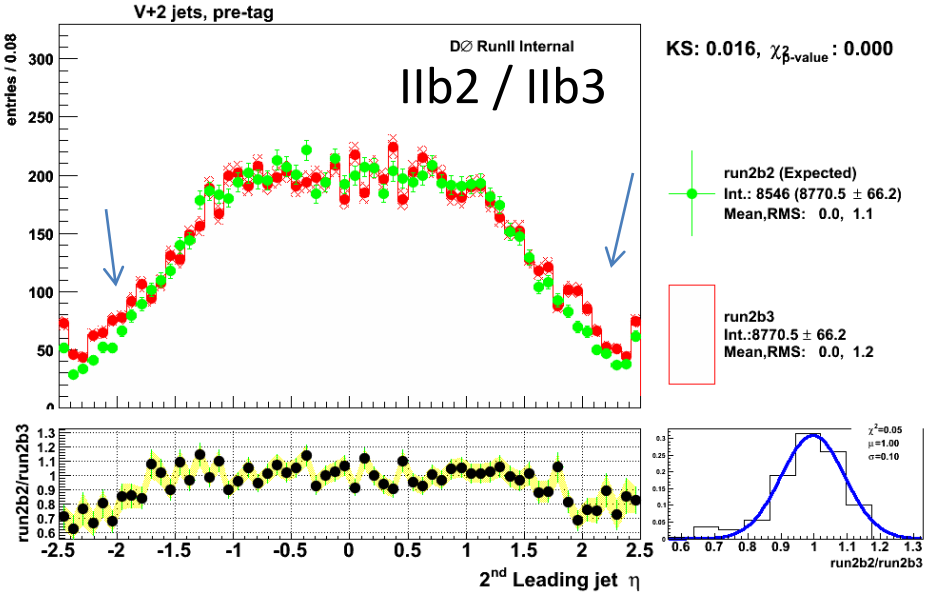


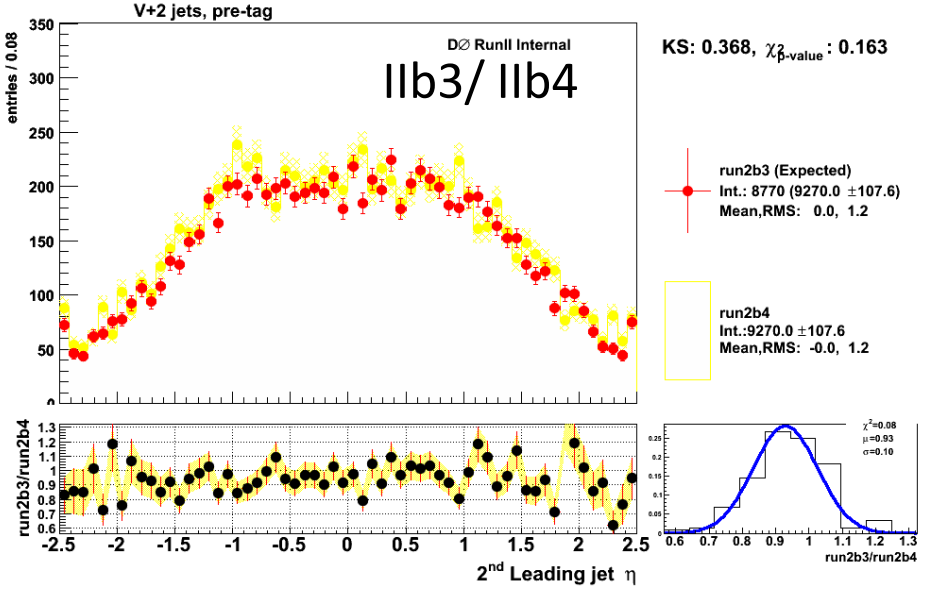


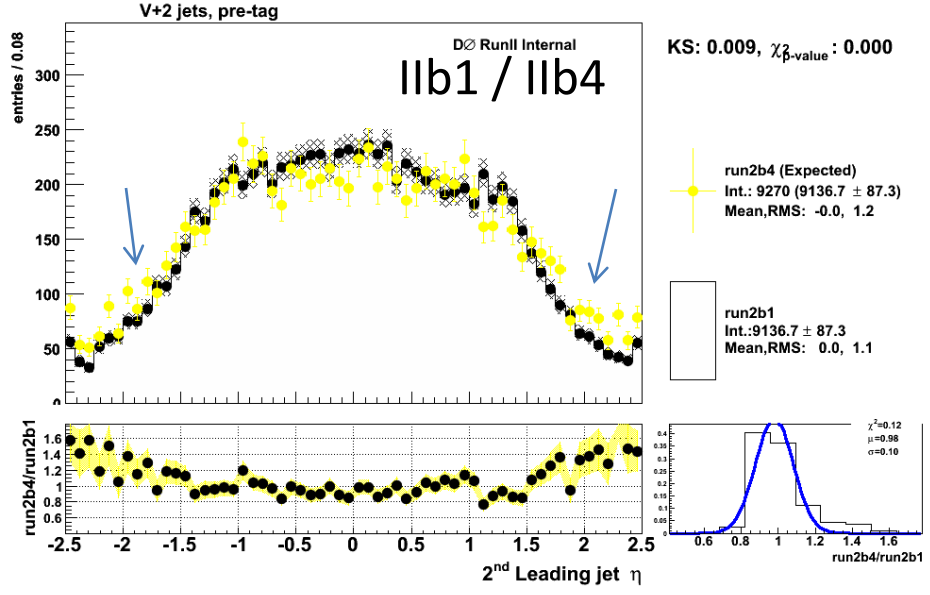
2nd Leading jet η

Electron channel



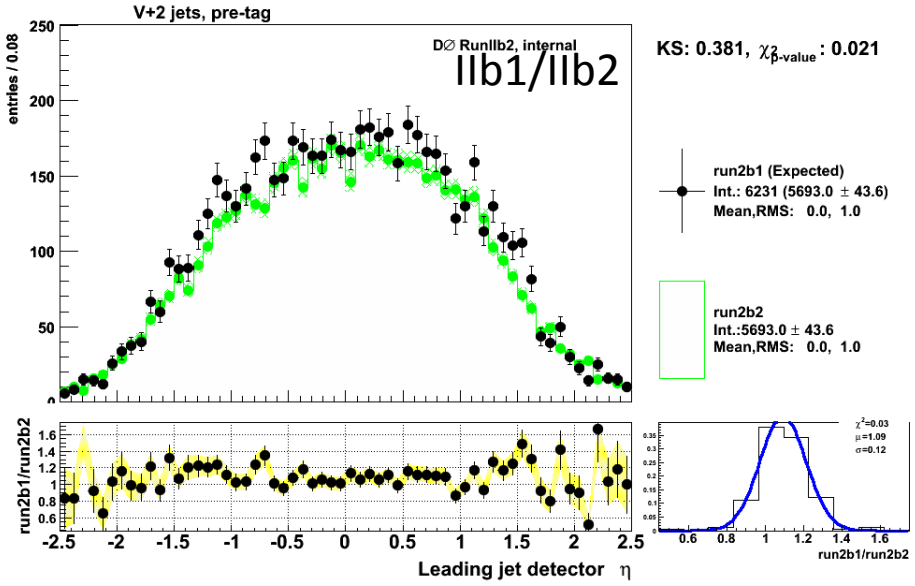


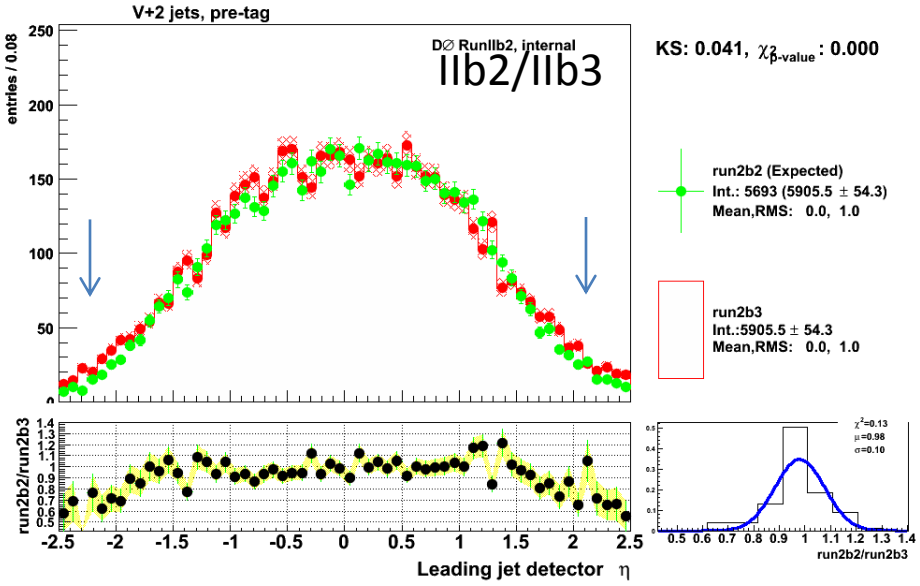


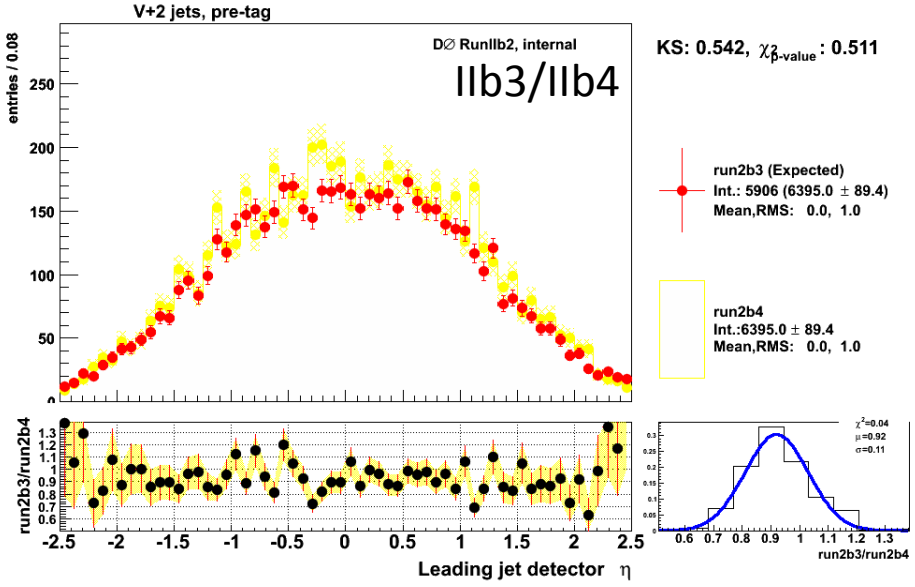


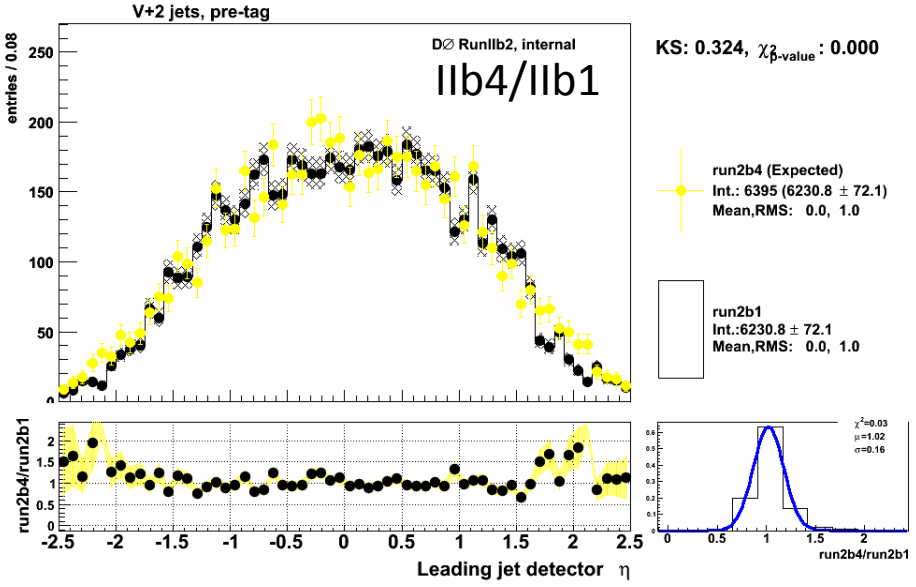
Muon channel

Leading jet detector η



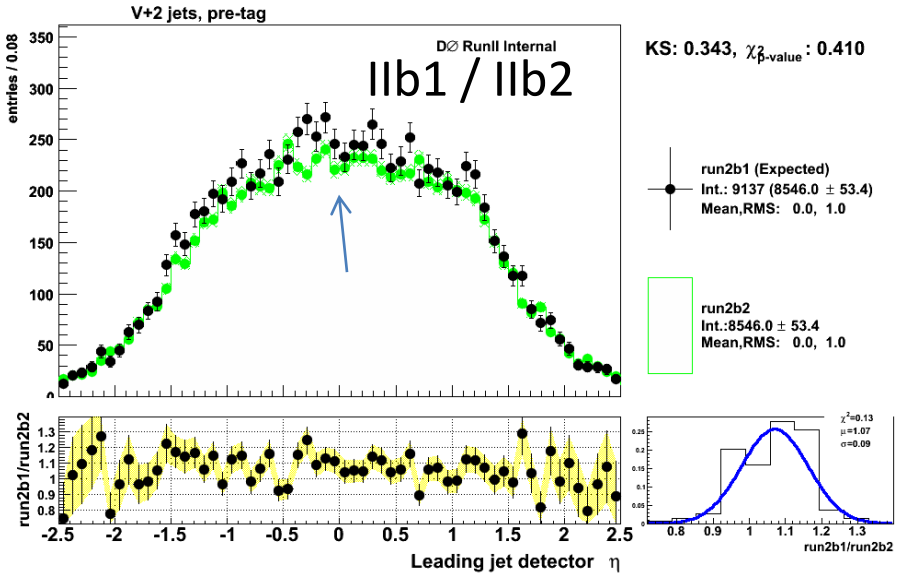


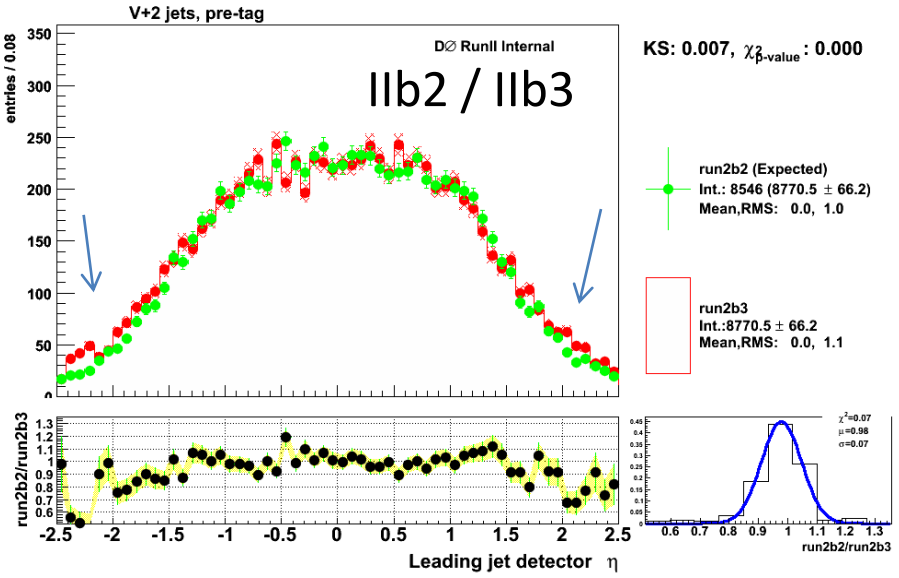


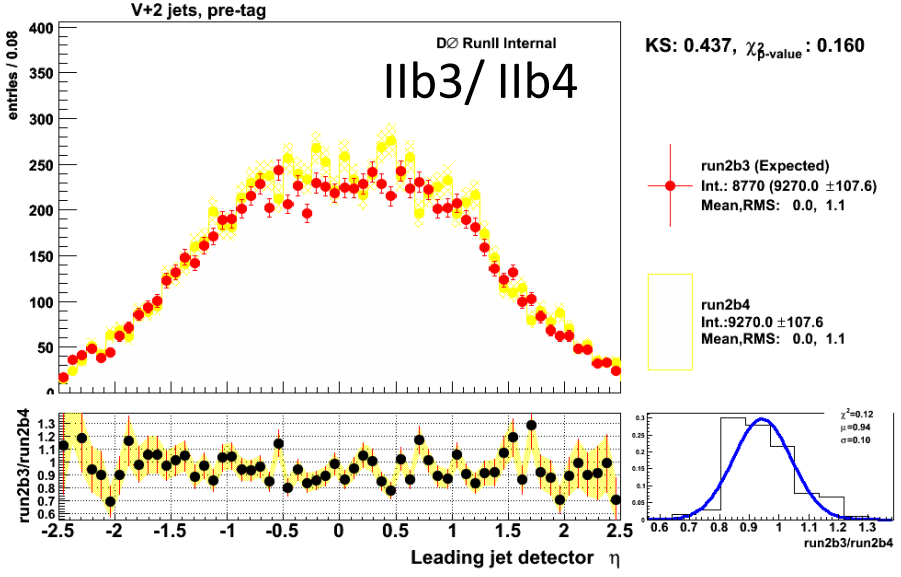


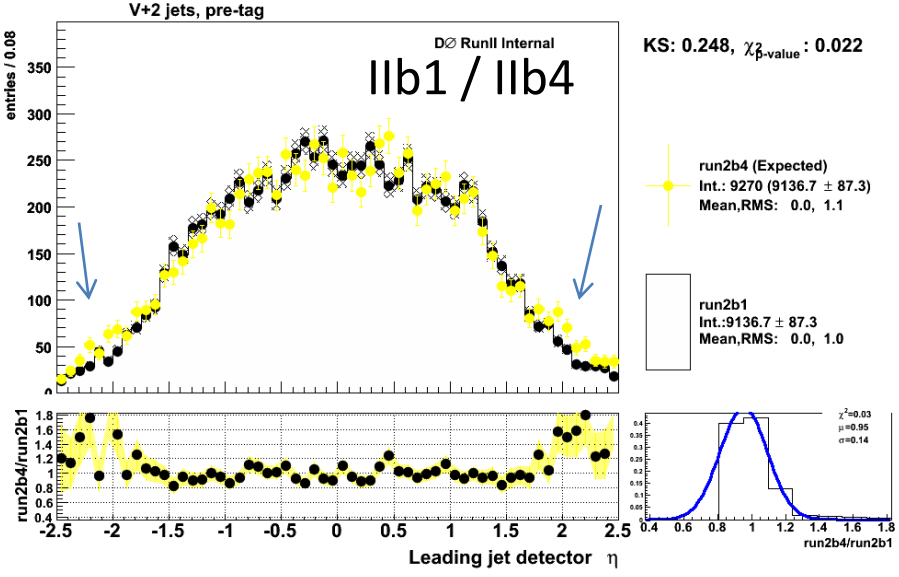
Leading jet detector η

Electron channel



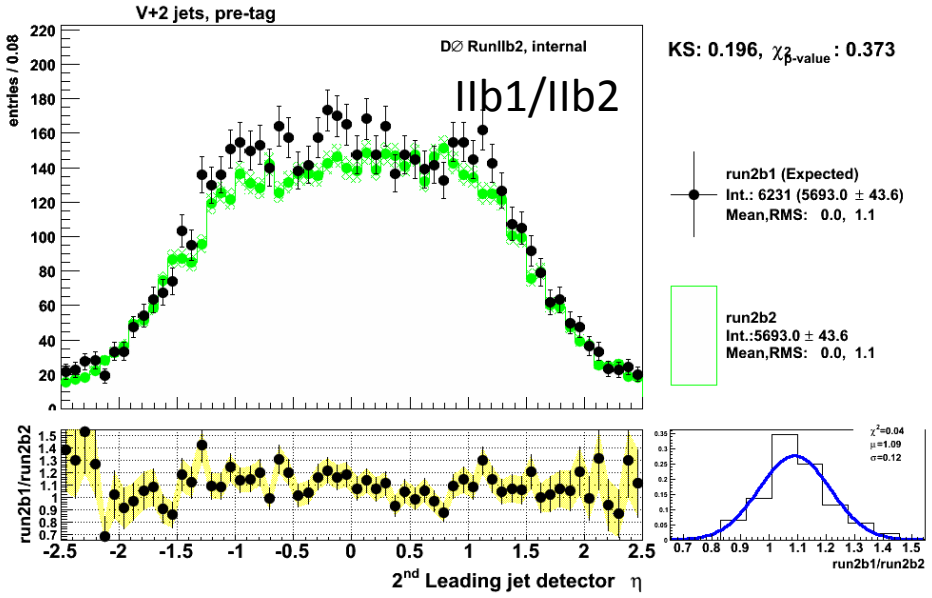


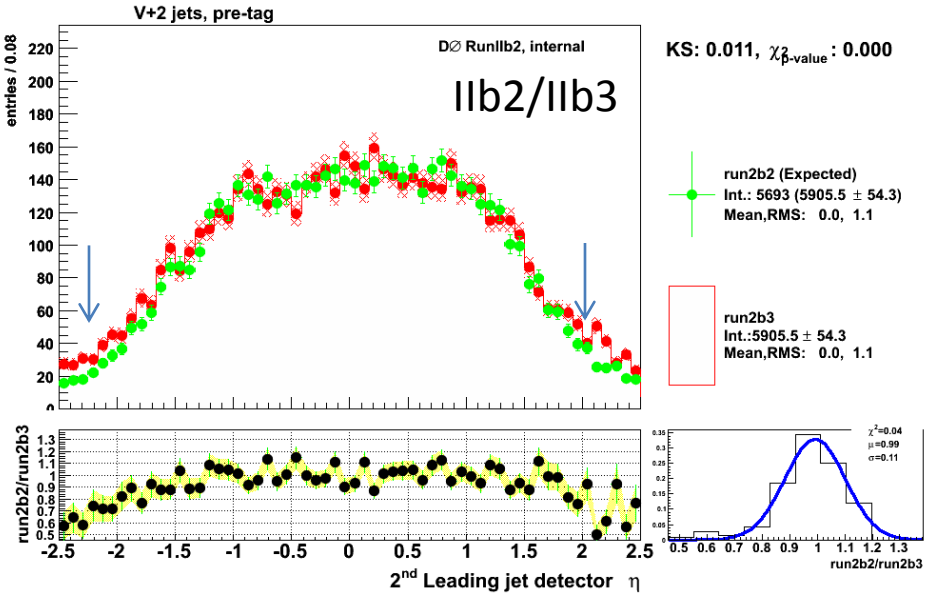


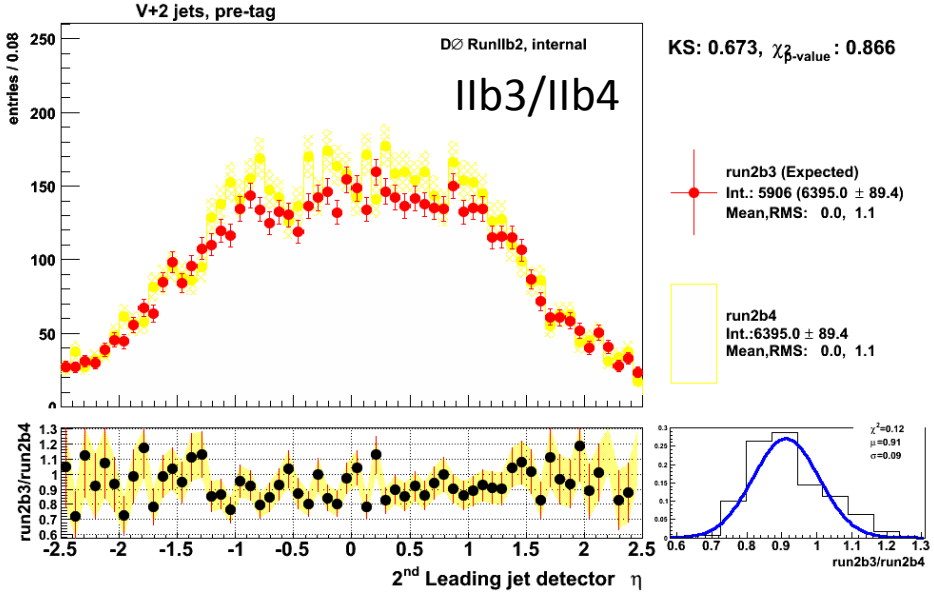


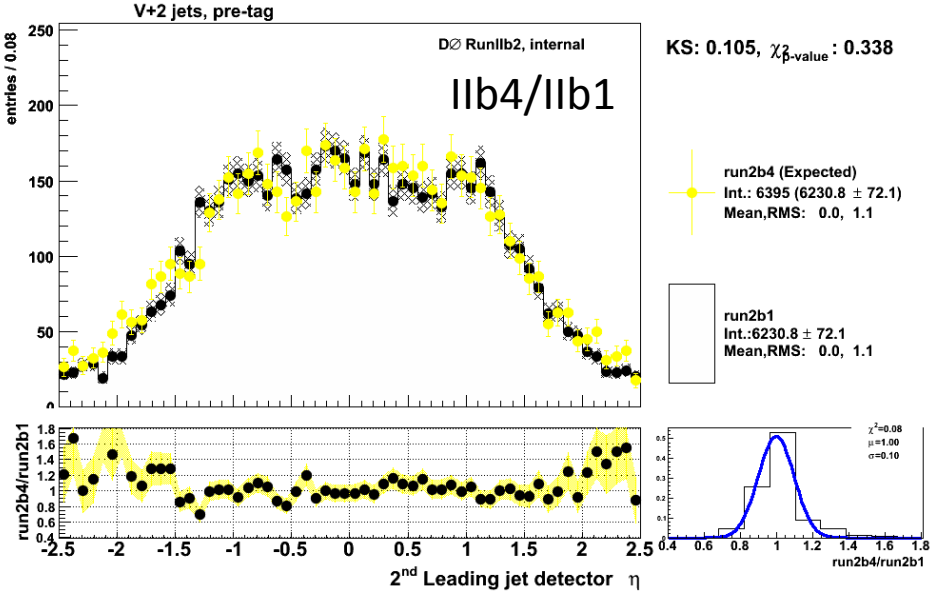
Muon channel

2nd Leading jet detector η



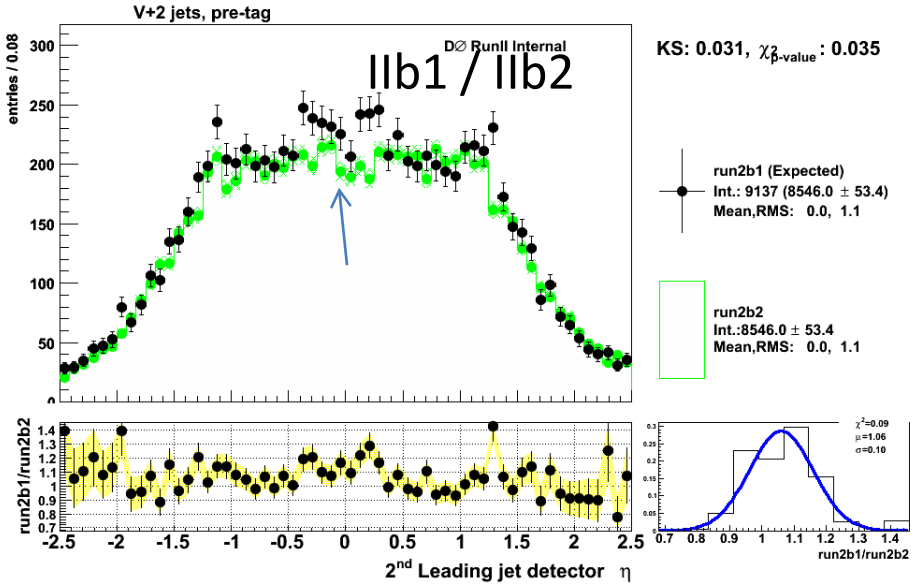


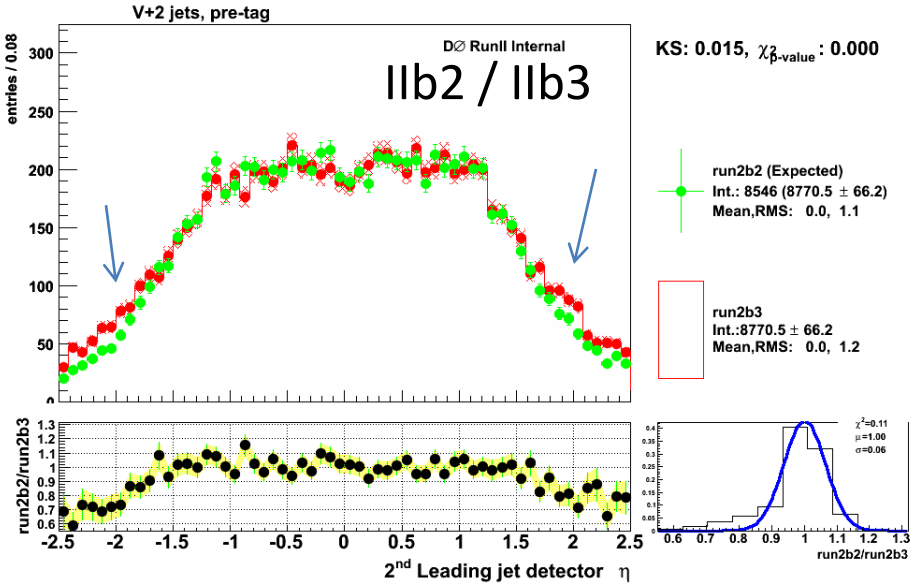


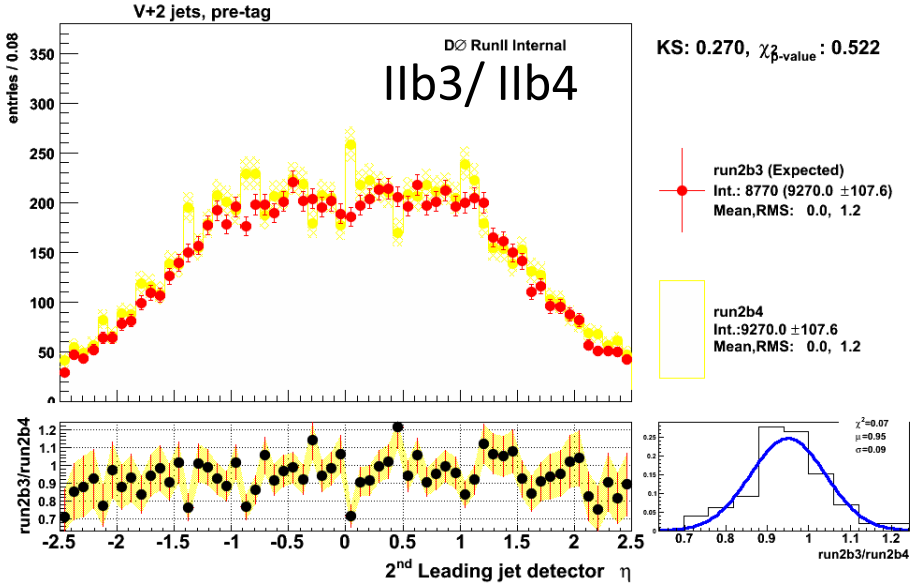


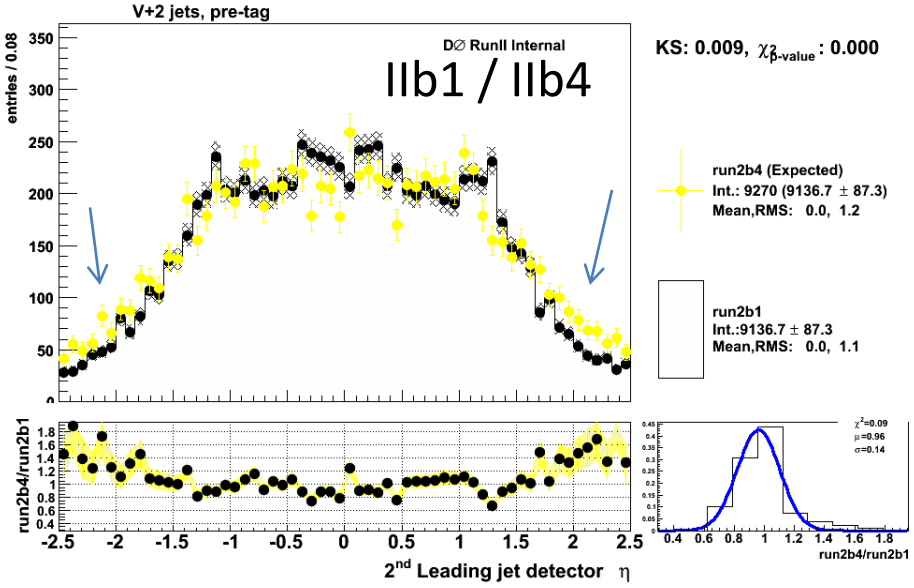
2nd Leading jet detector η

Electron channel



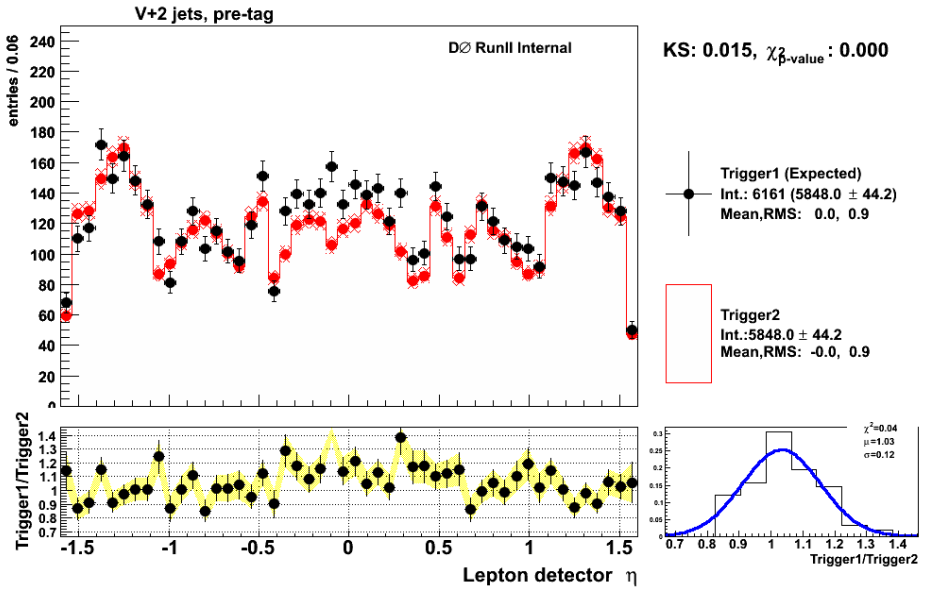


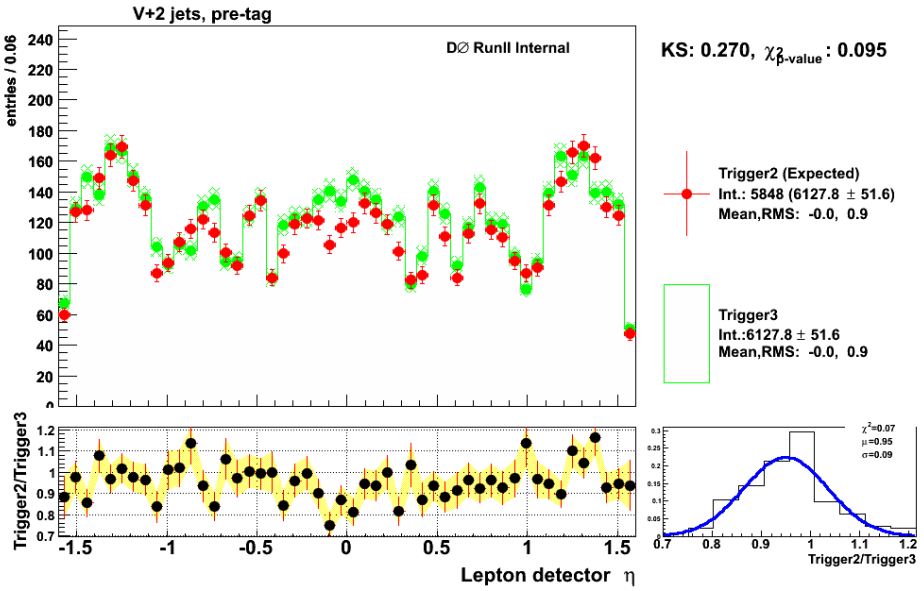


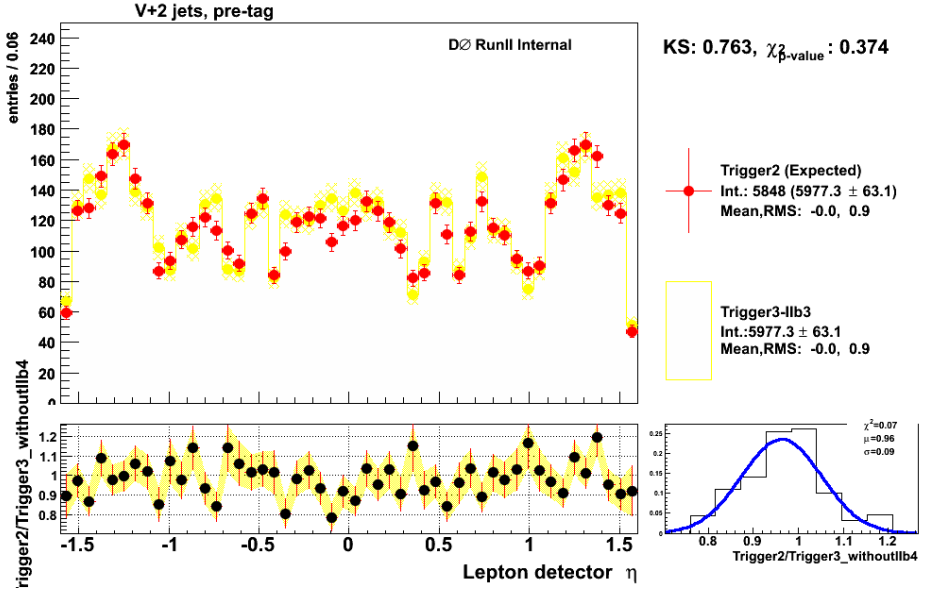


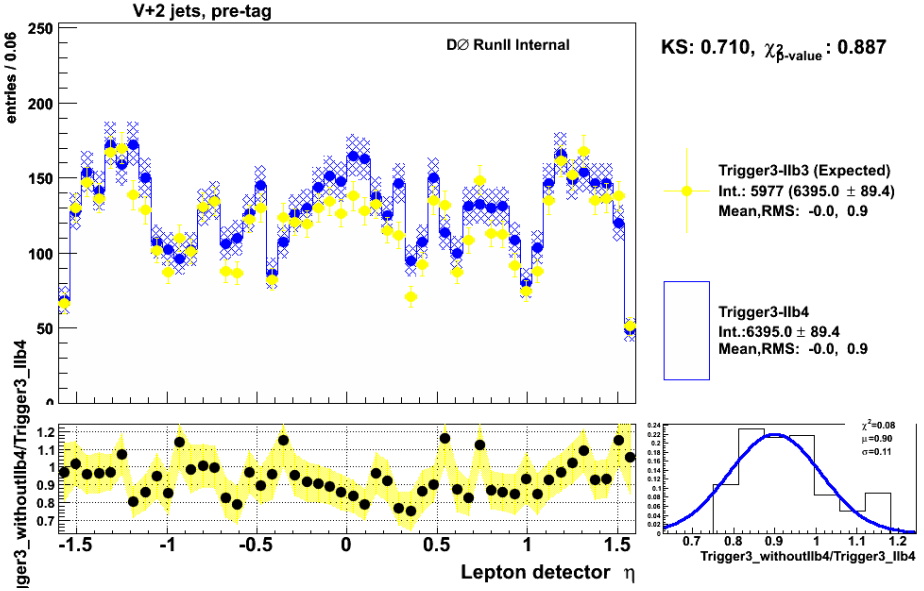
normalized by luminosity

Lepton detector η



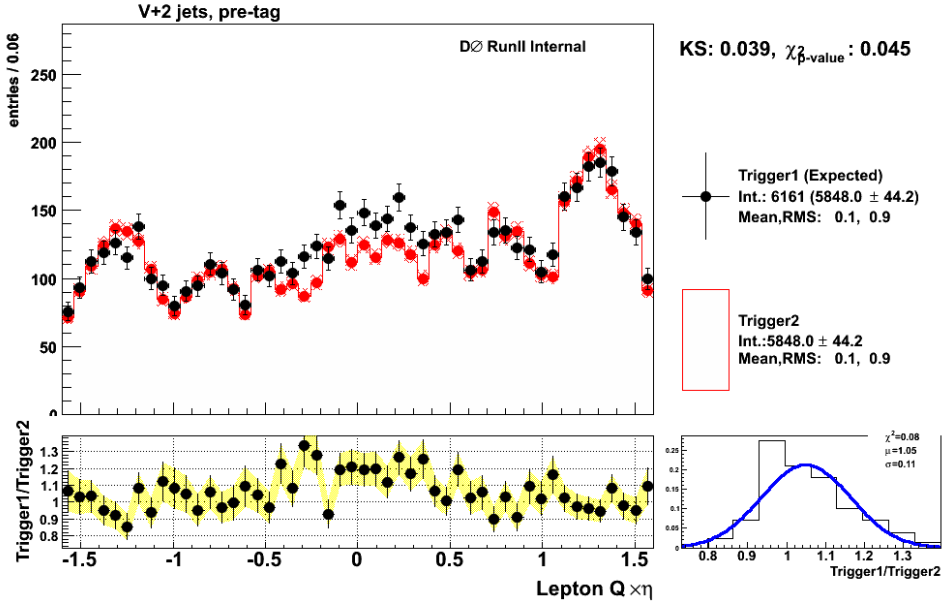


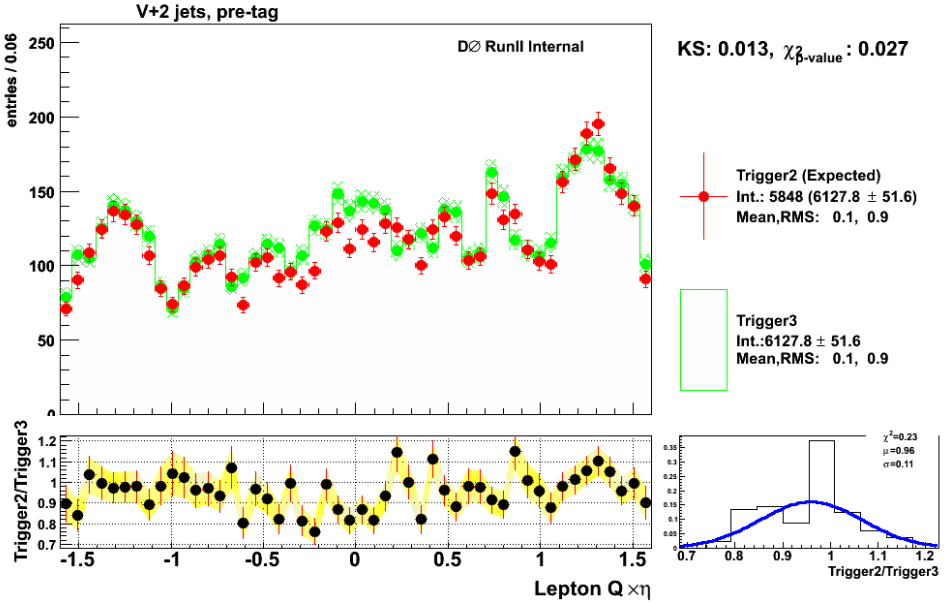


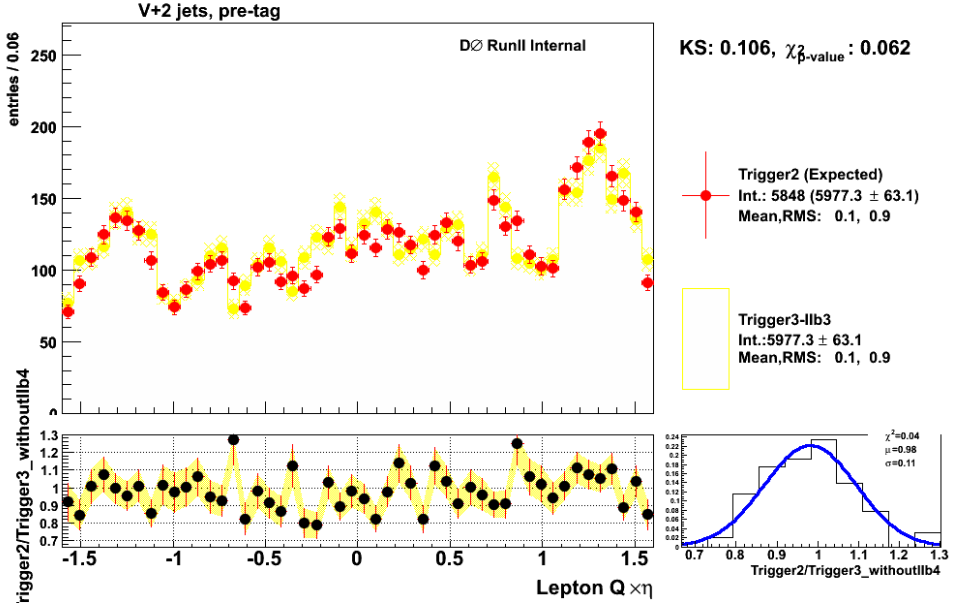


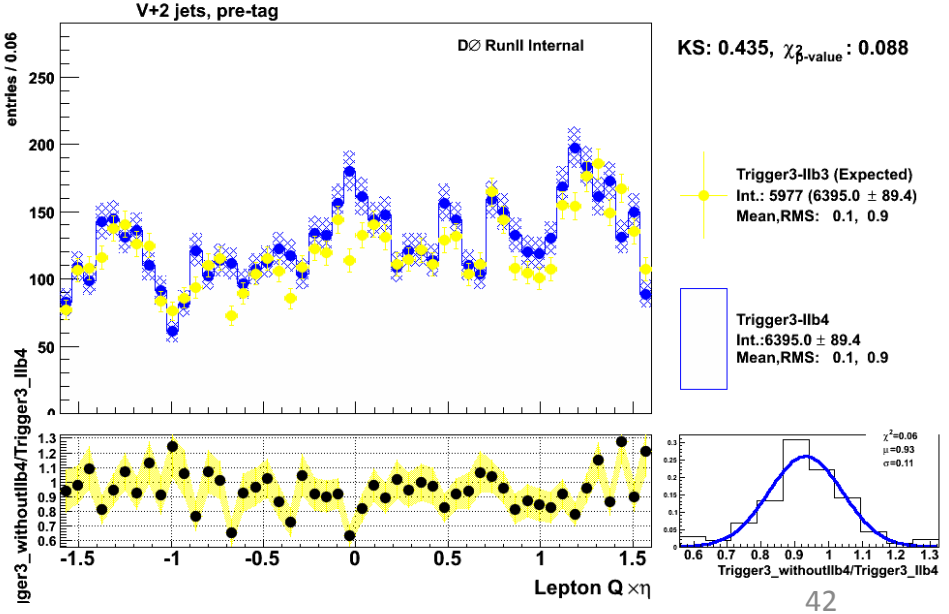
normalized by luminosity

Lepton Qxη



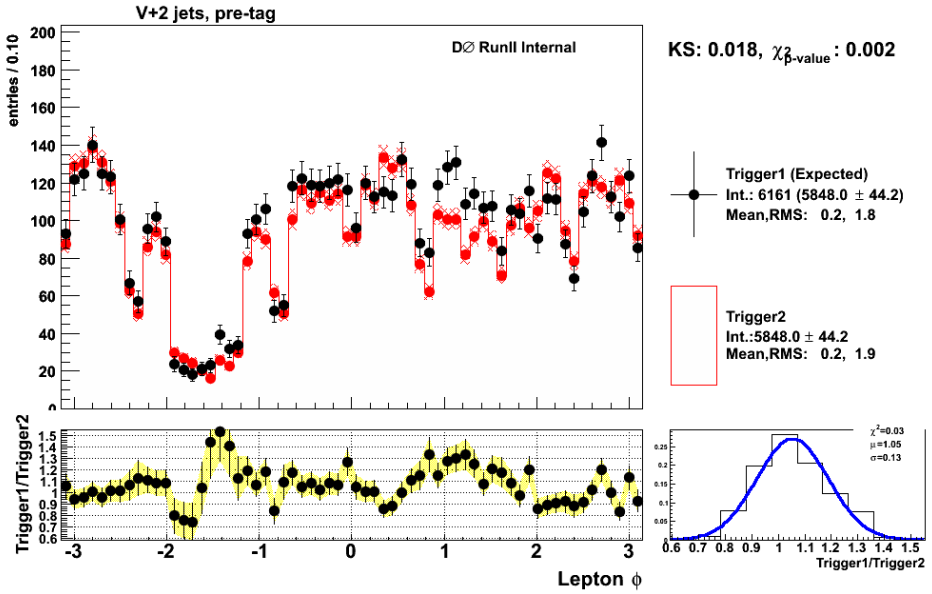


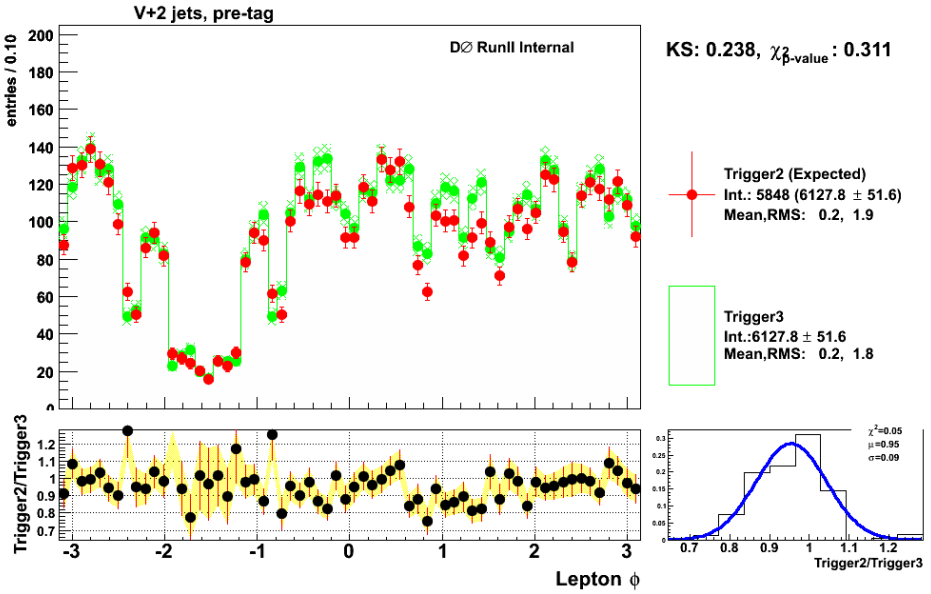


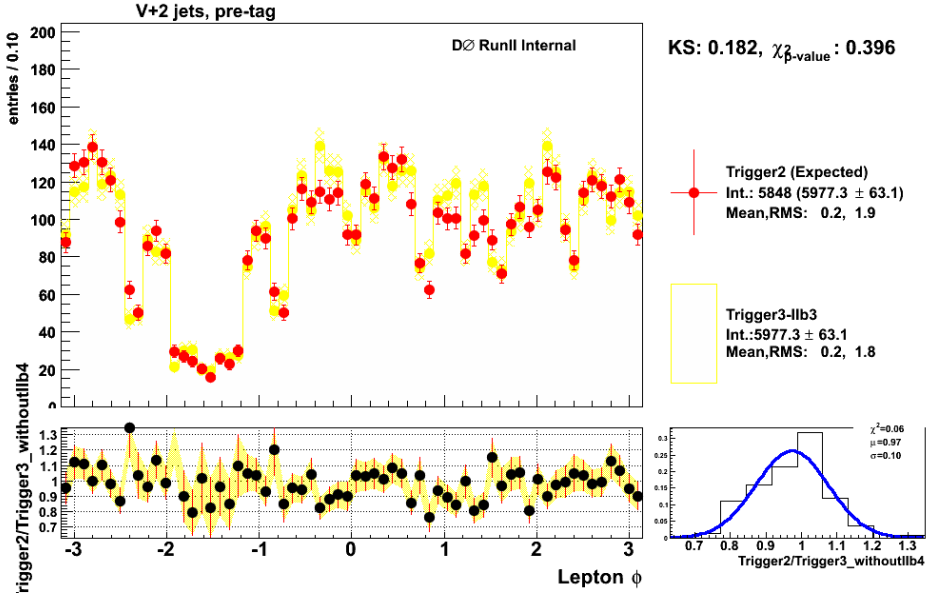


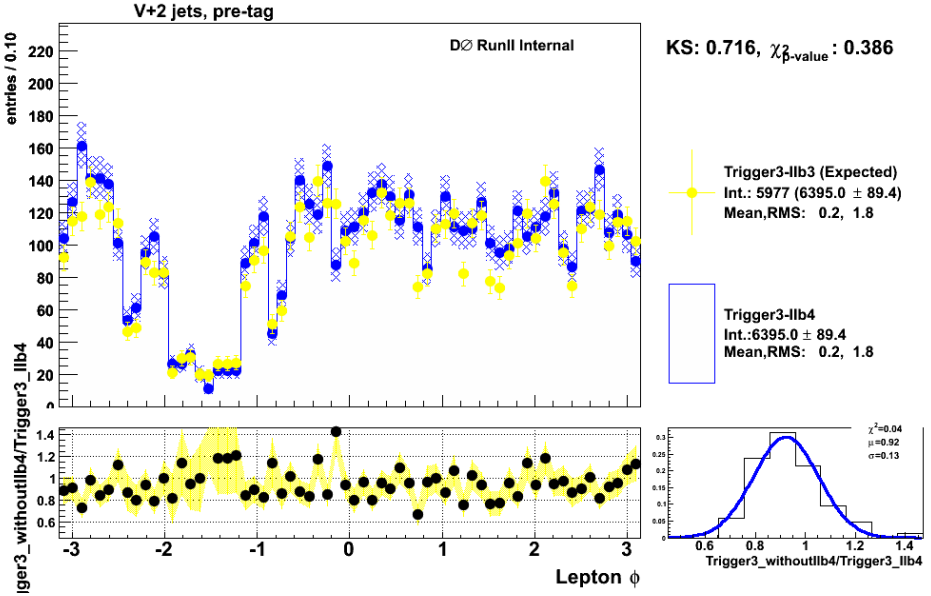
normalized by luminosity

Lepton Φ



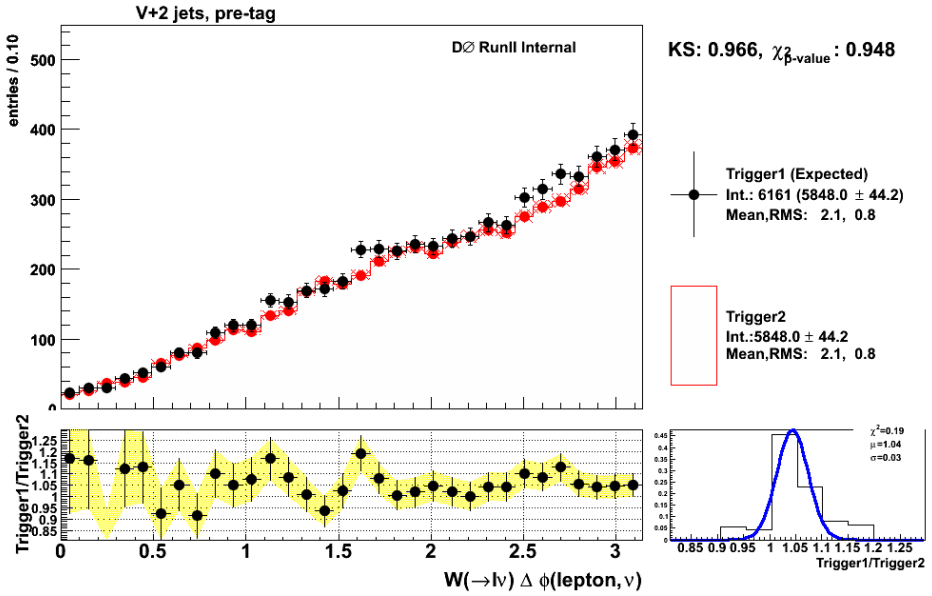


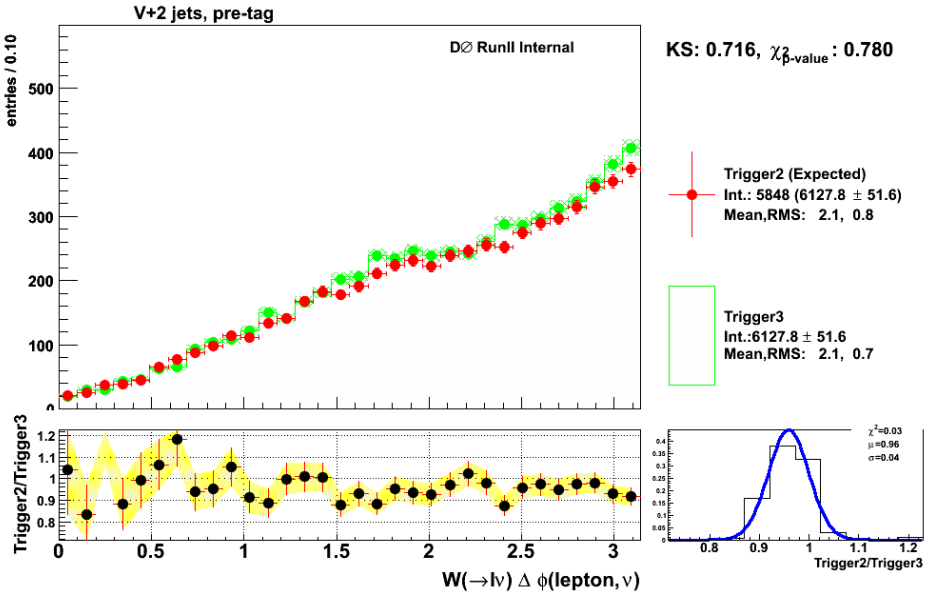


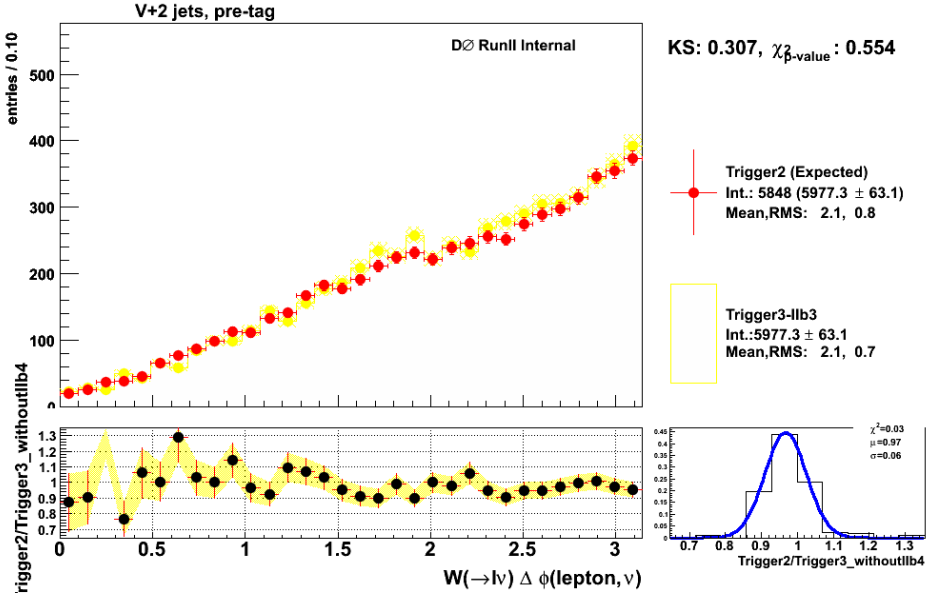


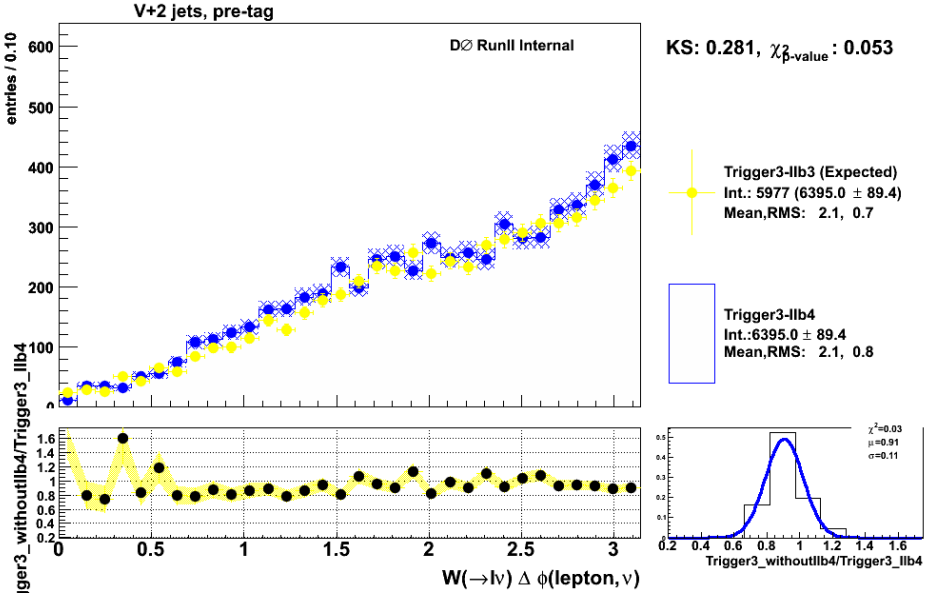
normalized by luminosity

W_ΔΦ



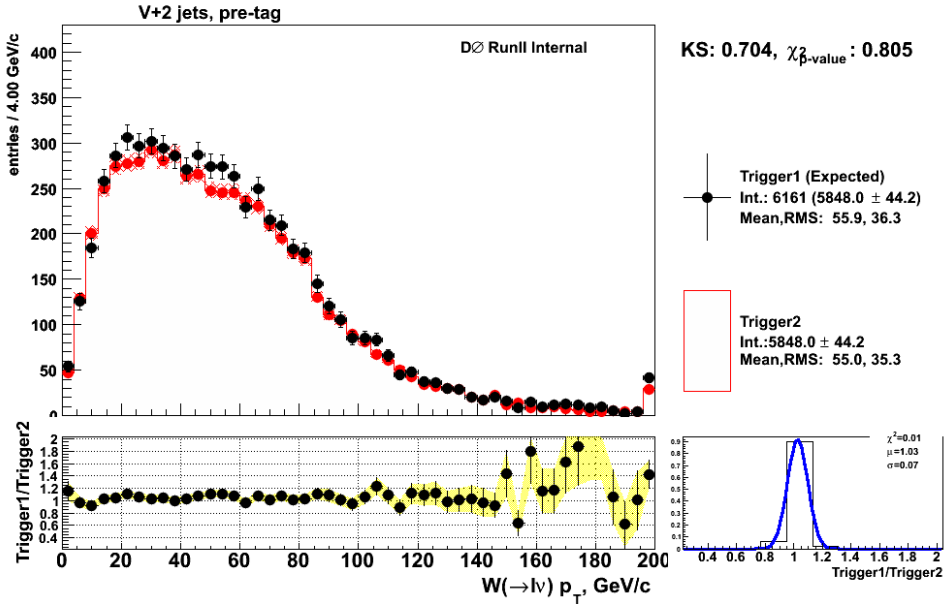


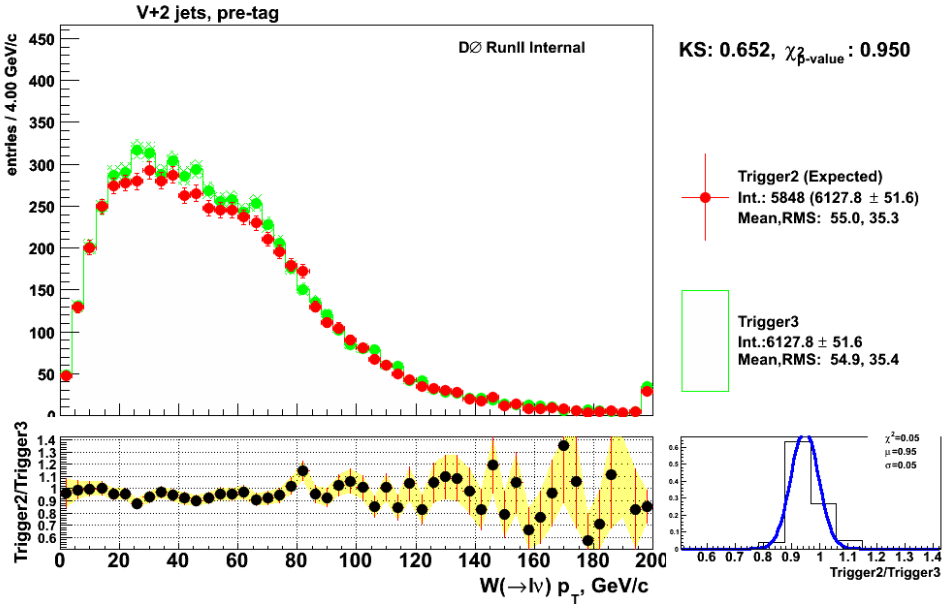


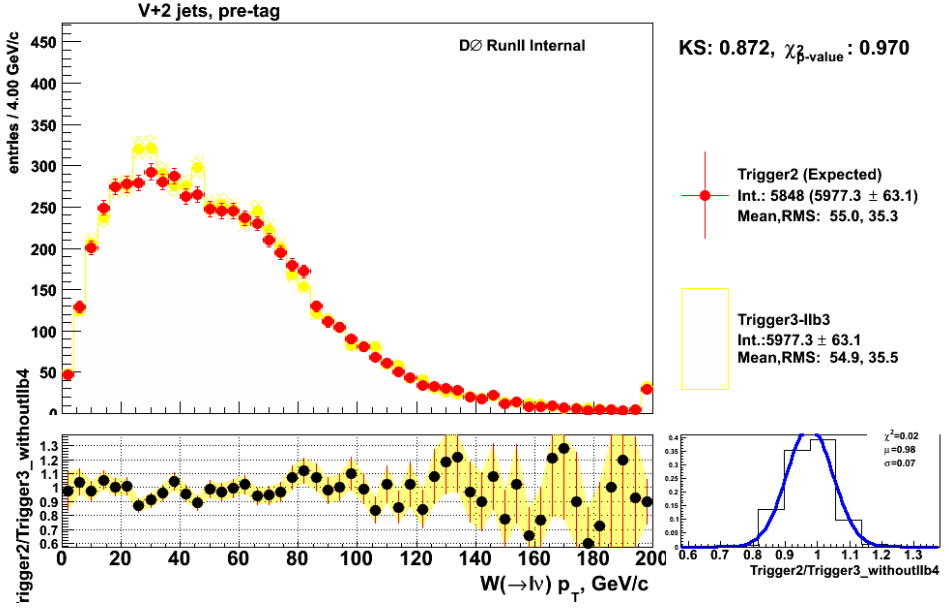


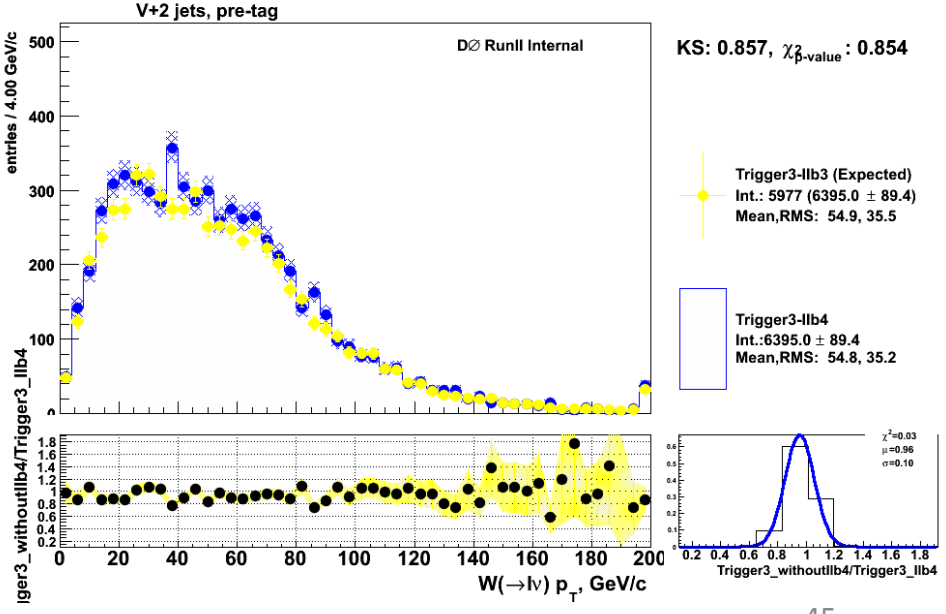
normalized by luminosity

W pT



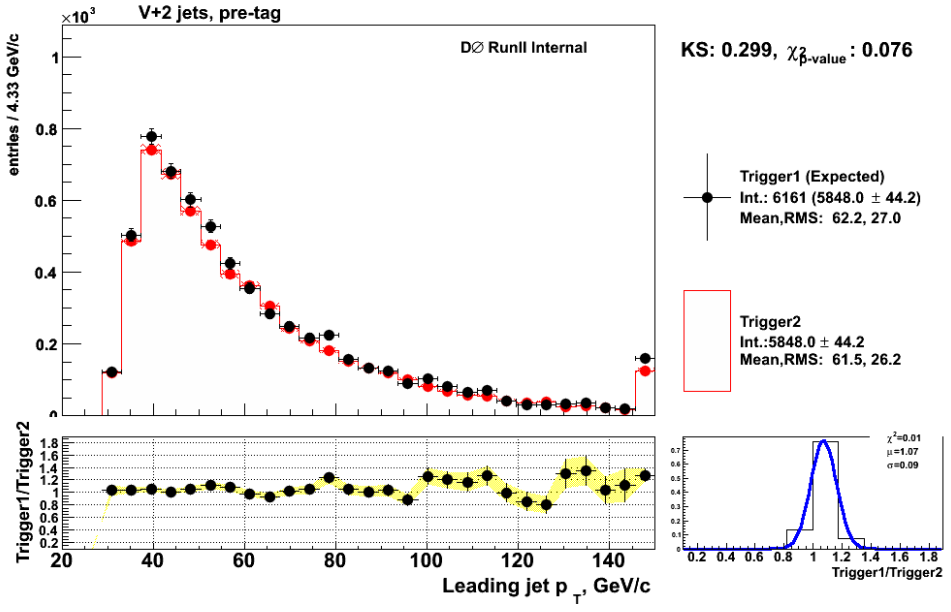


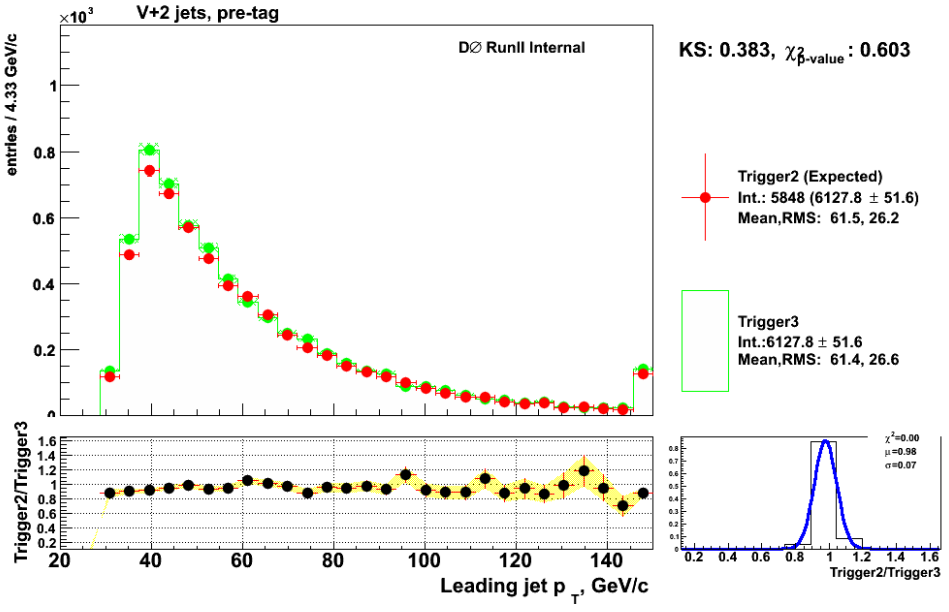


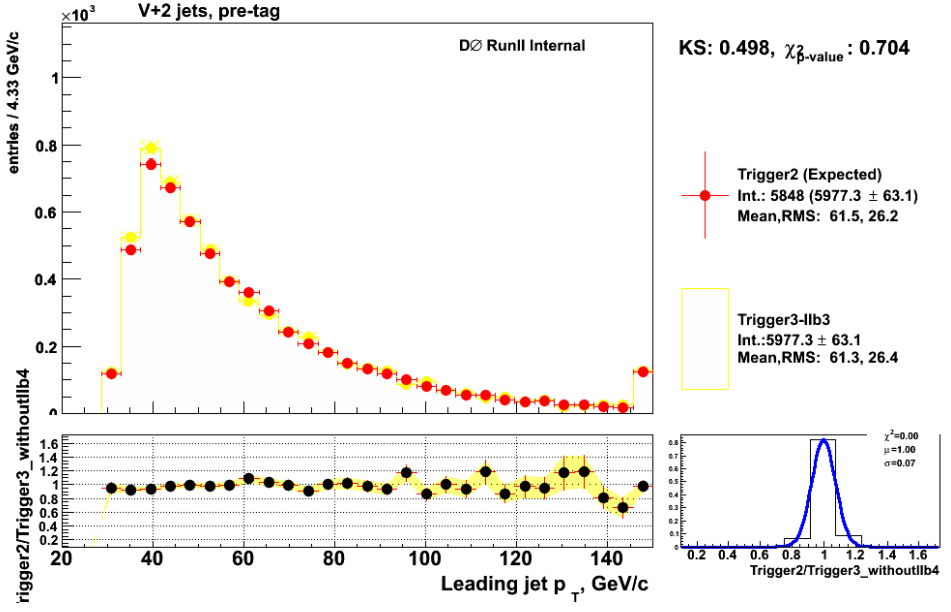


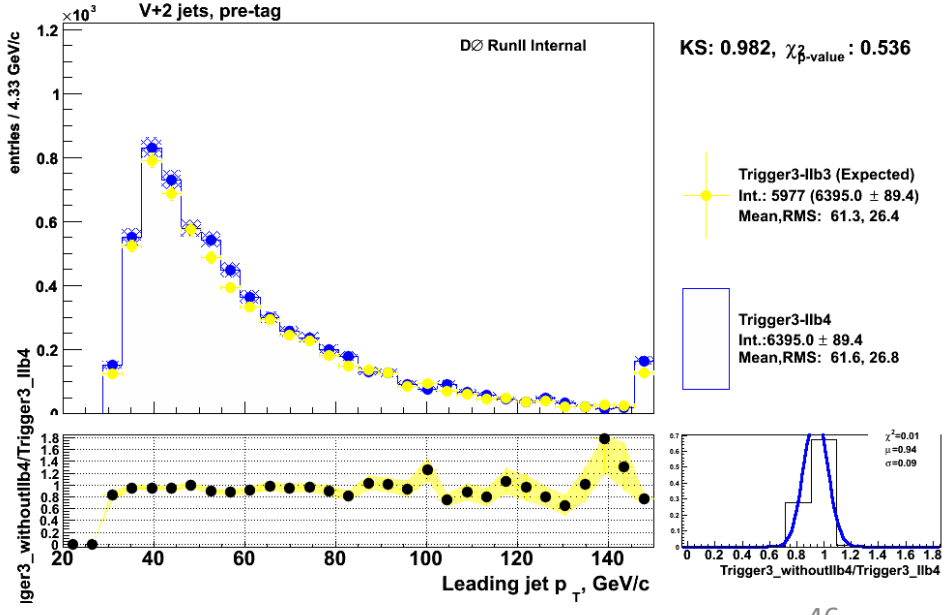
normalized by luminosity

Leading jet pT



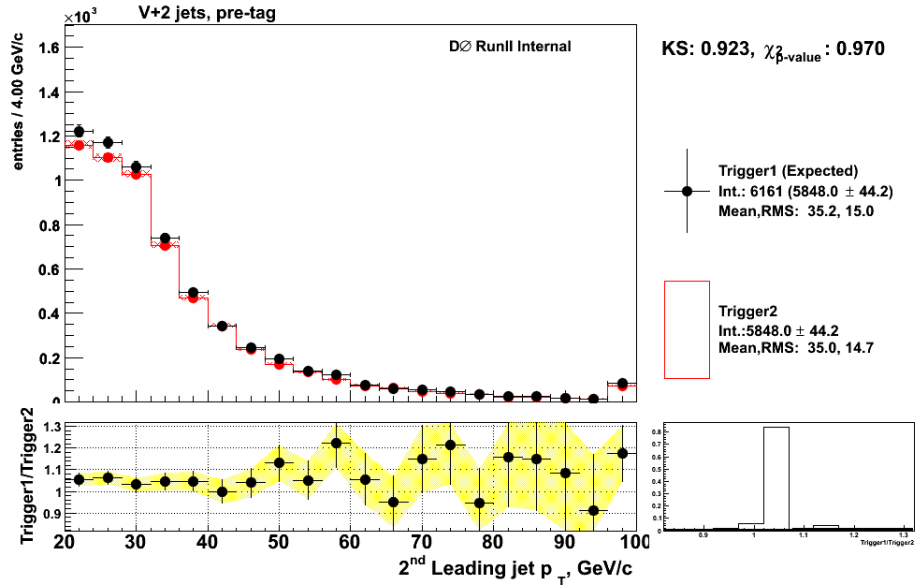


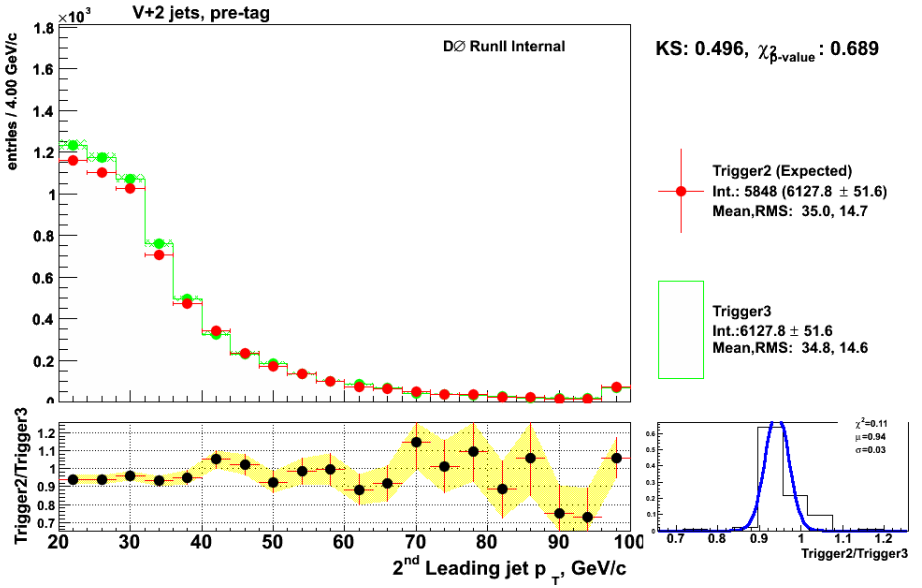


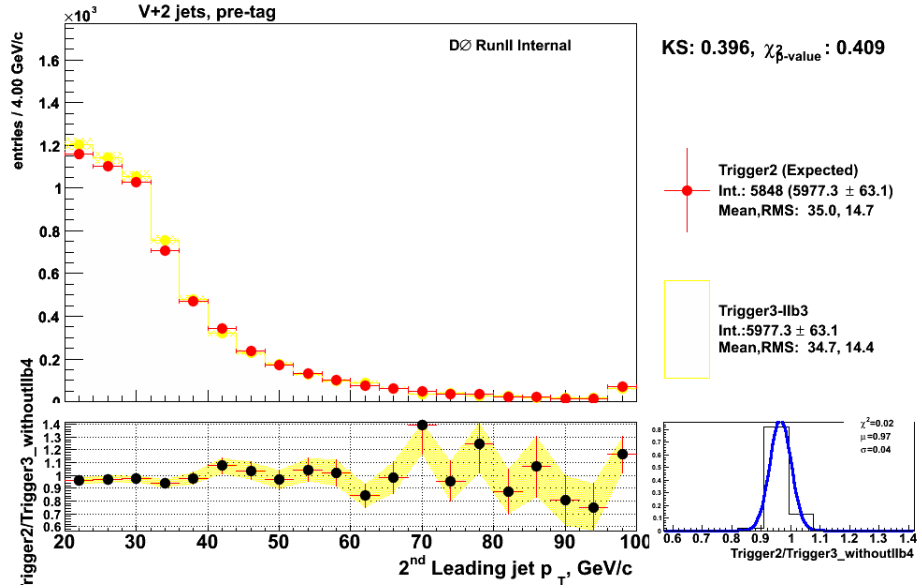


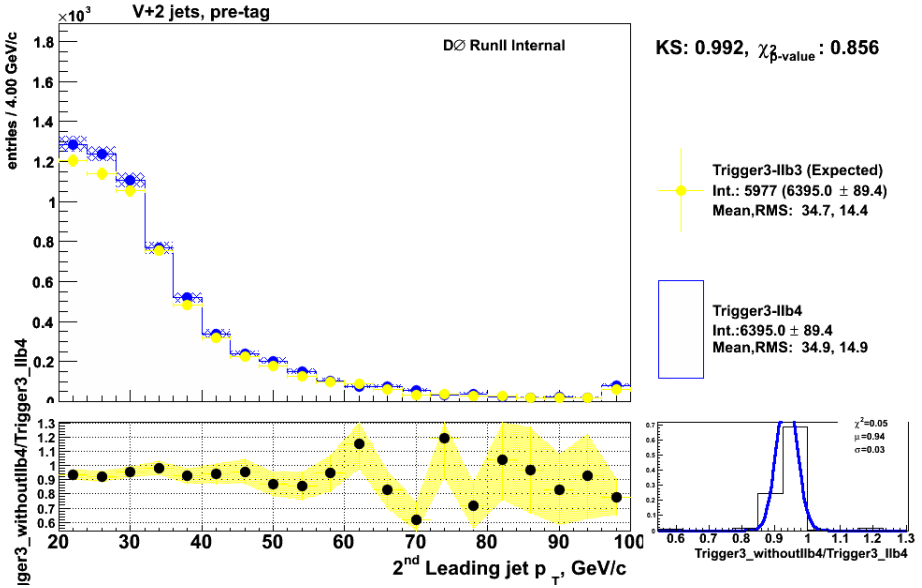
normalized by luminosity

2nd Leading jet pT



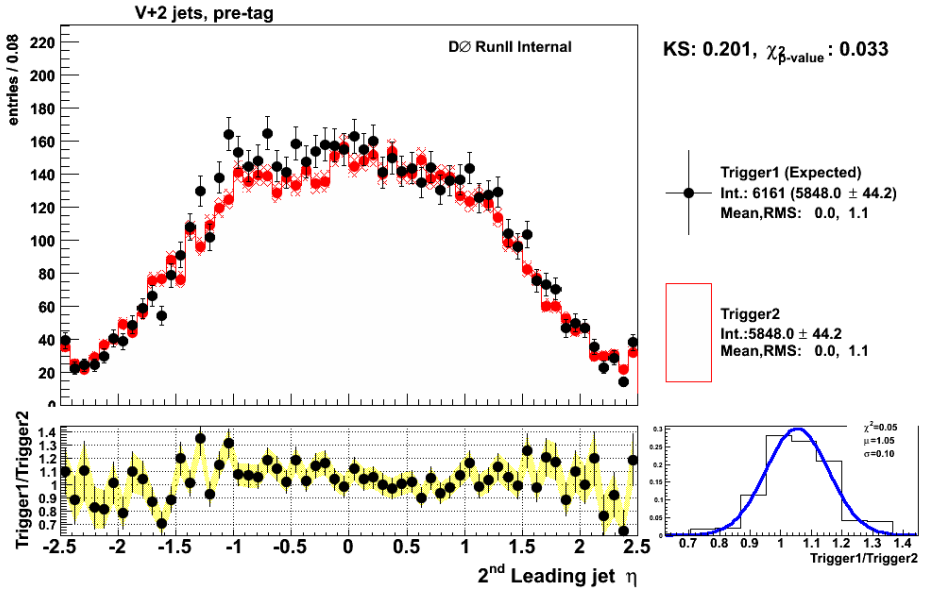


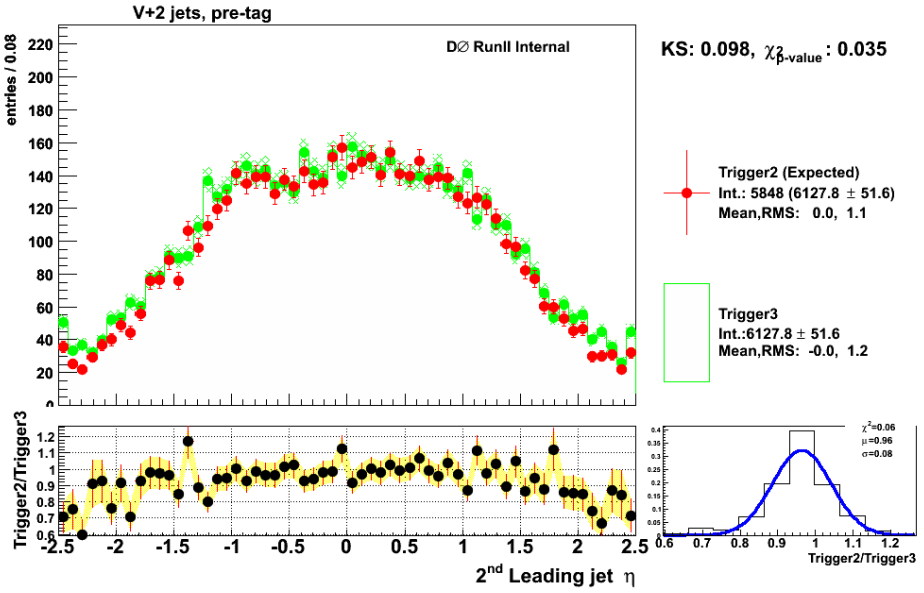


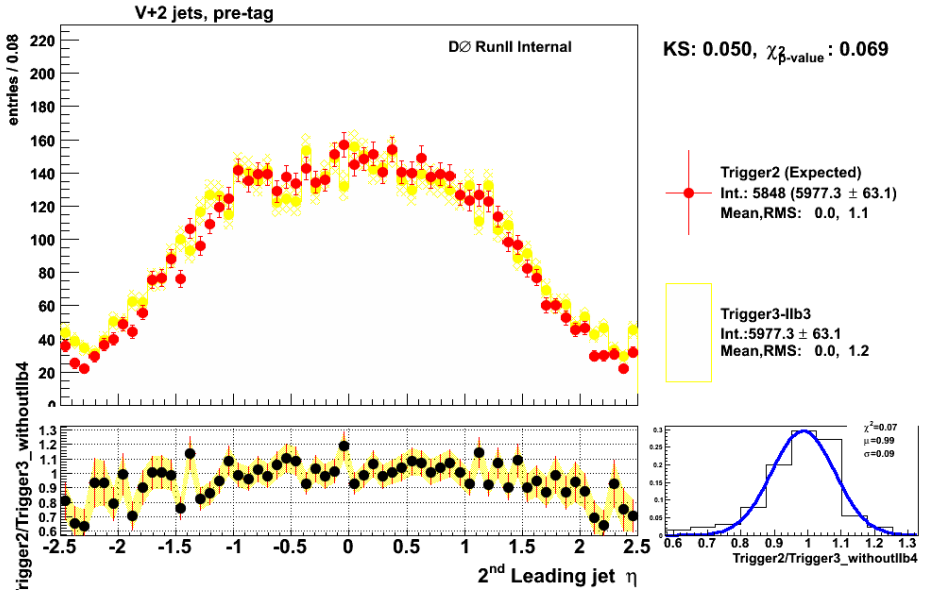


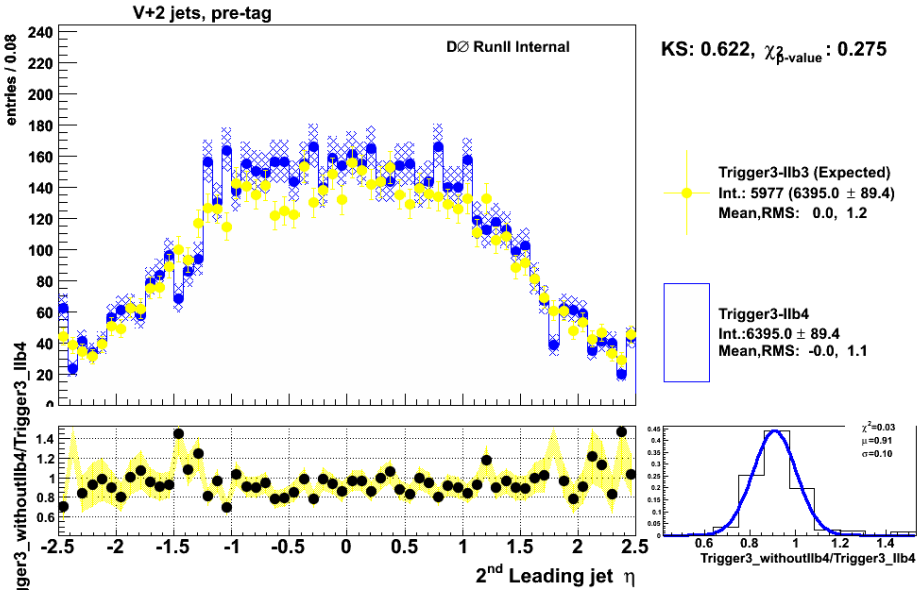
normalized by luminosity

2nd Leading jet η



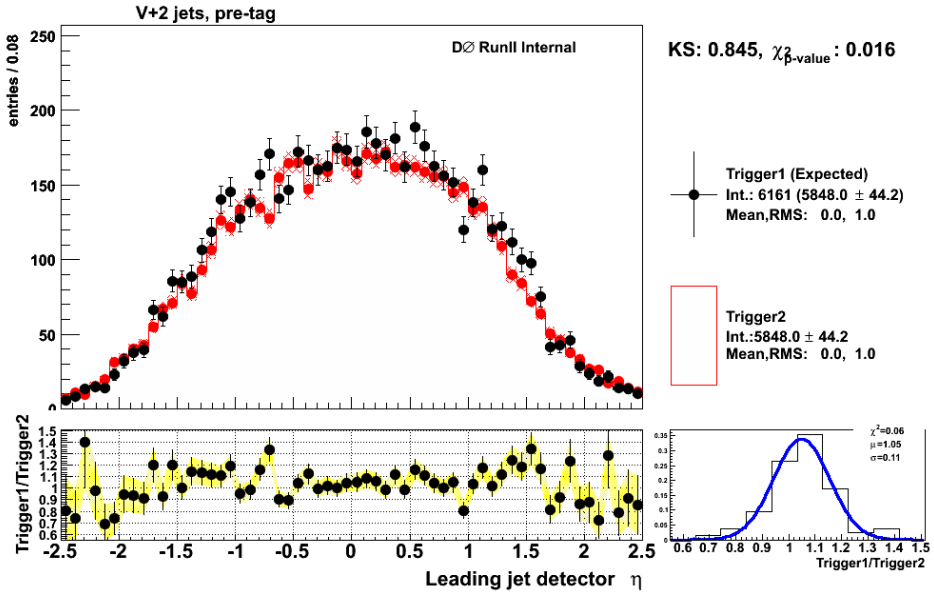


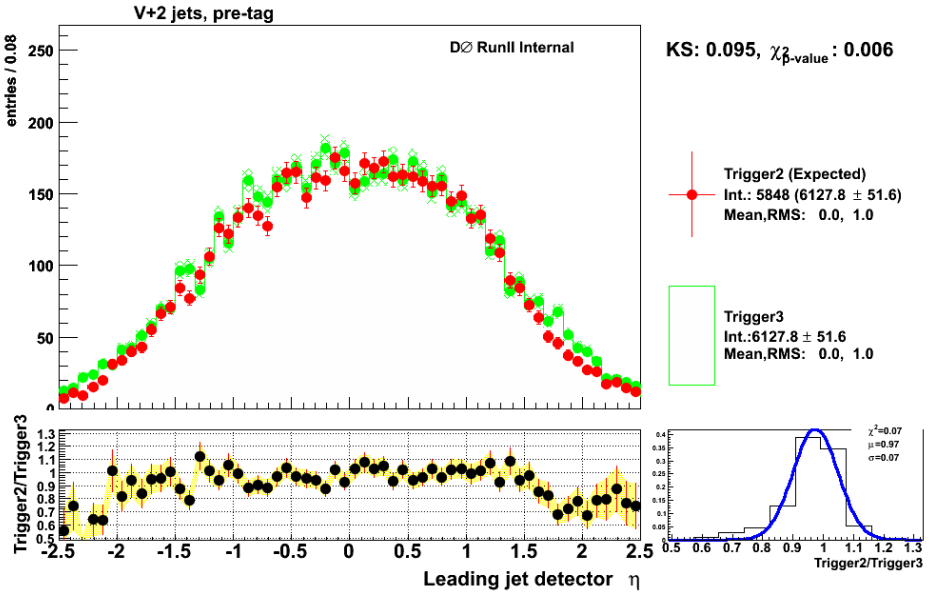


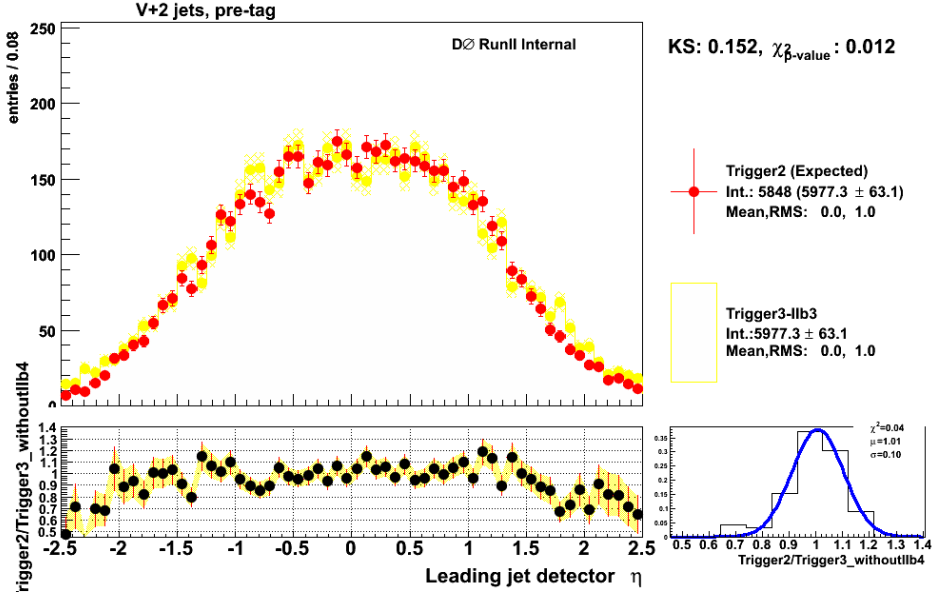


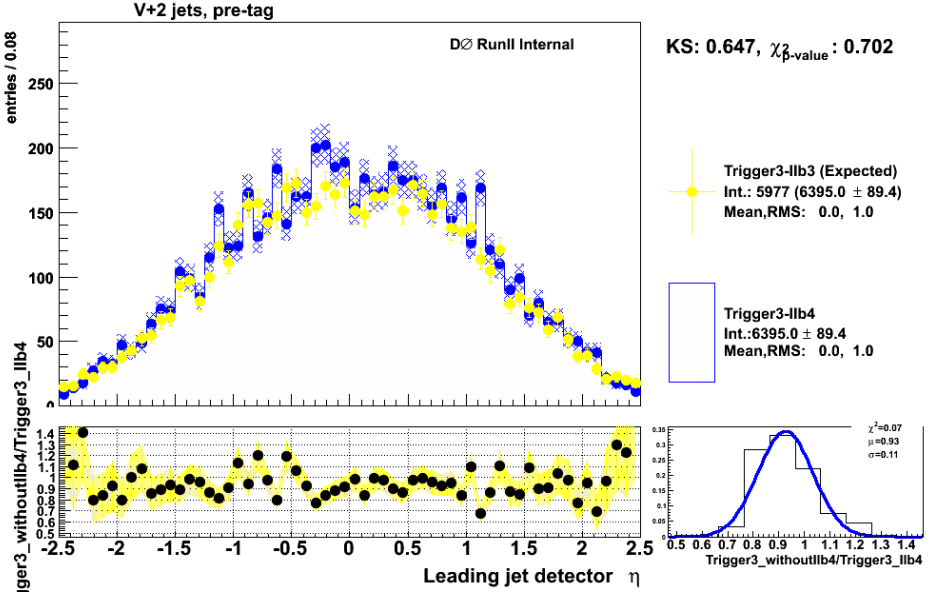
normalized by luminosity

Leading jet detector η



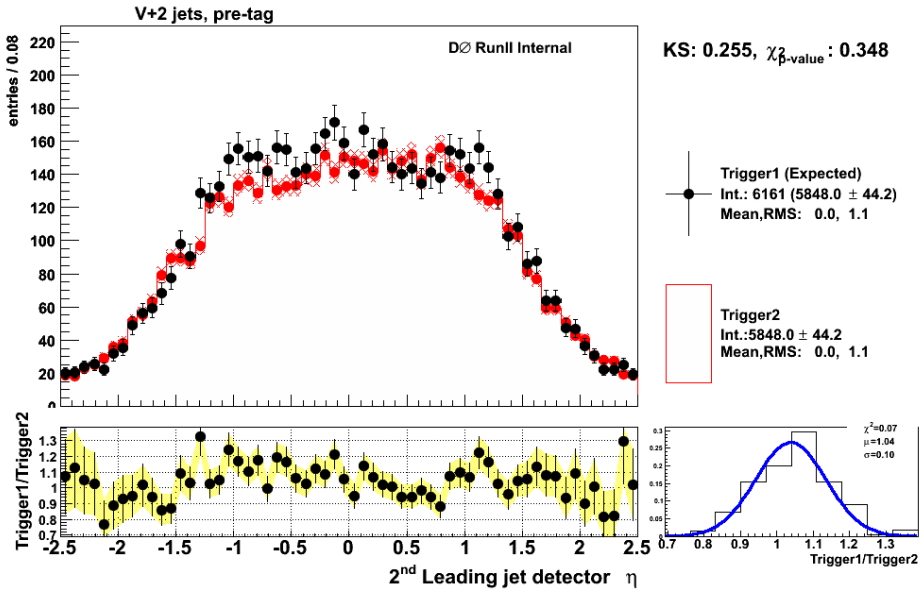


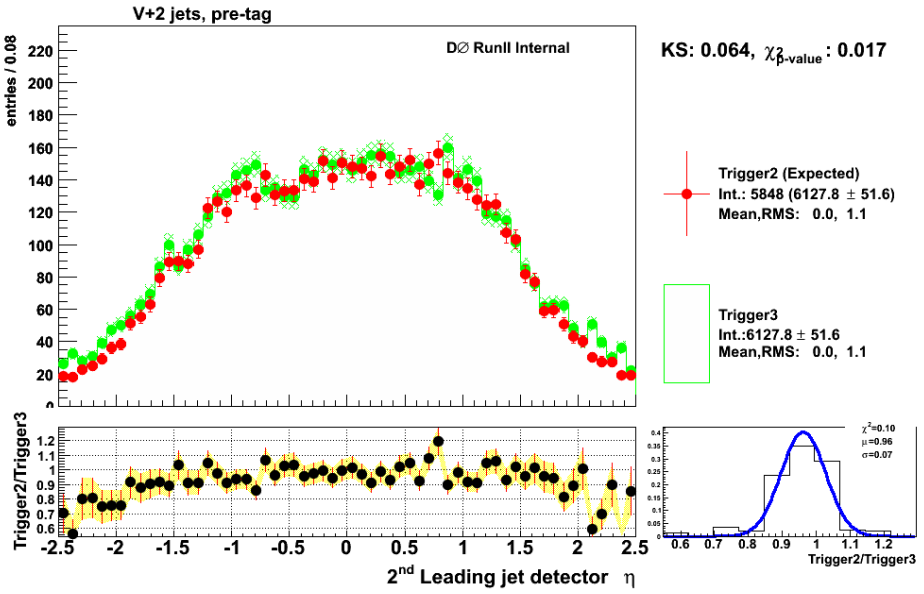


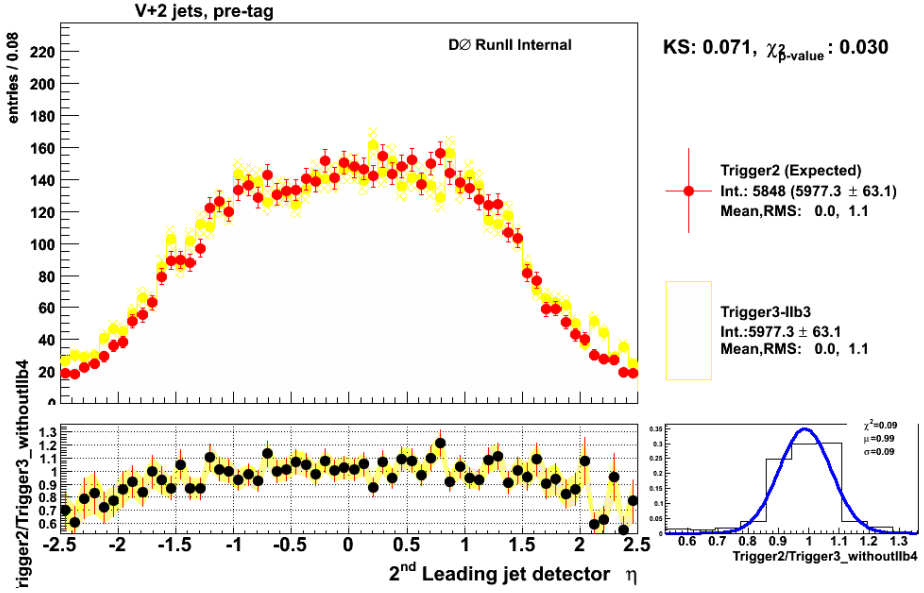


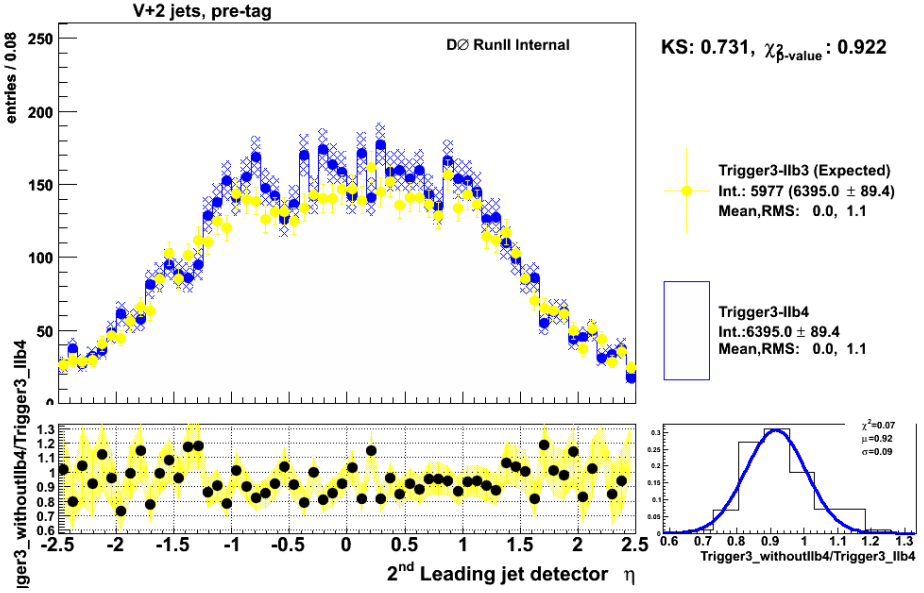
normalized by luminosity

2nd Leading jet detector η



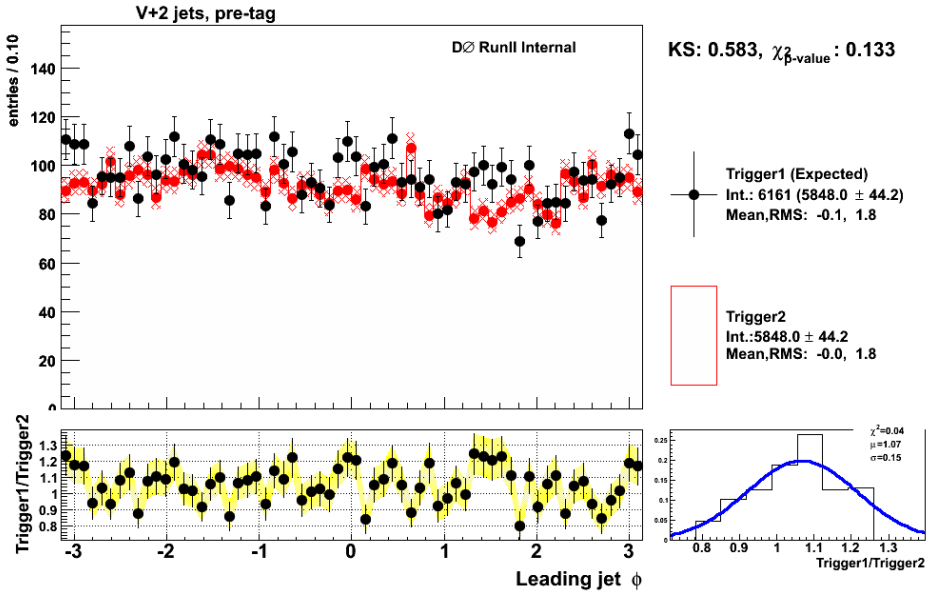


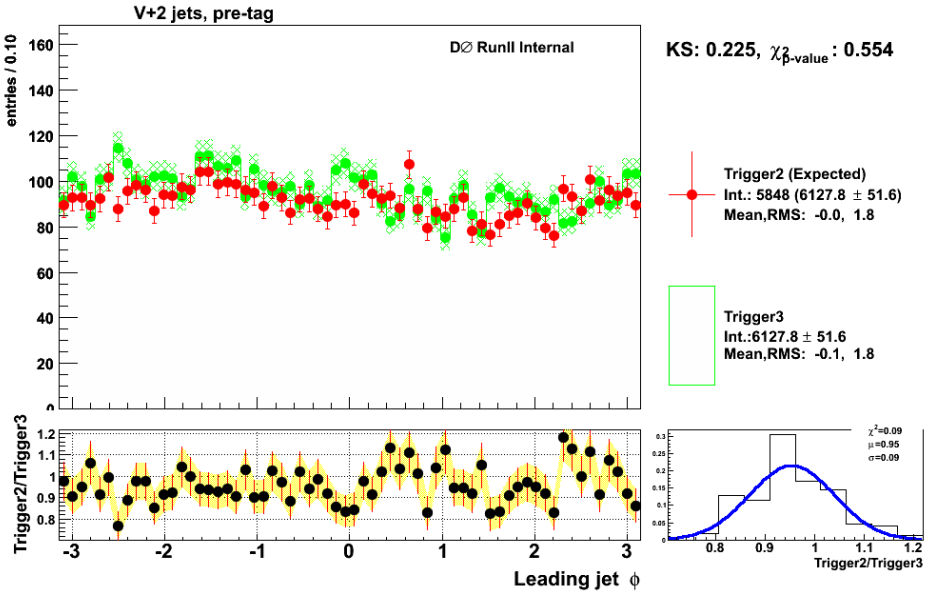


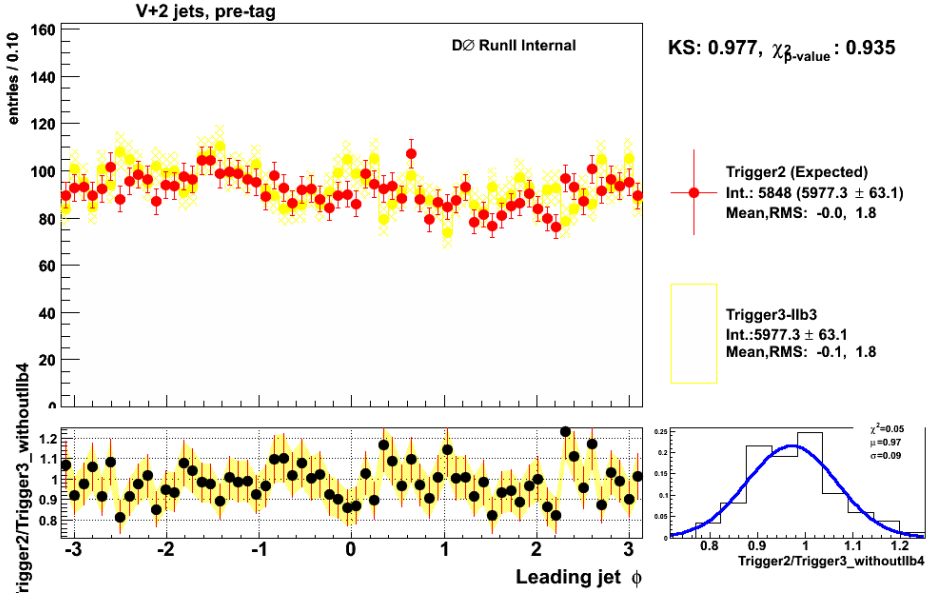


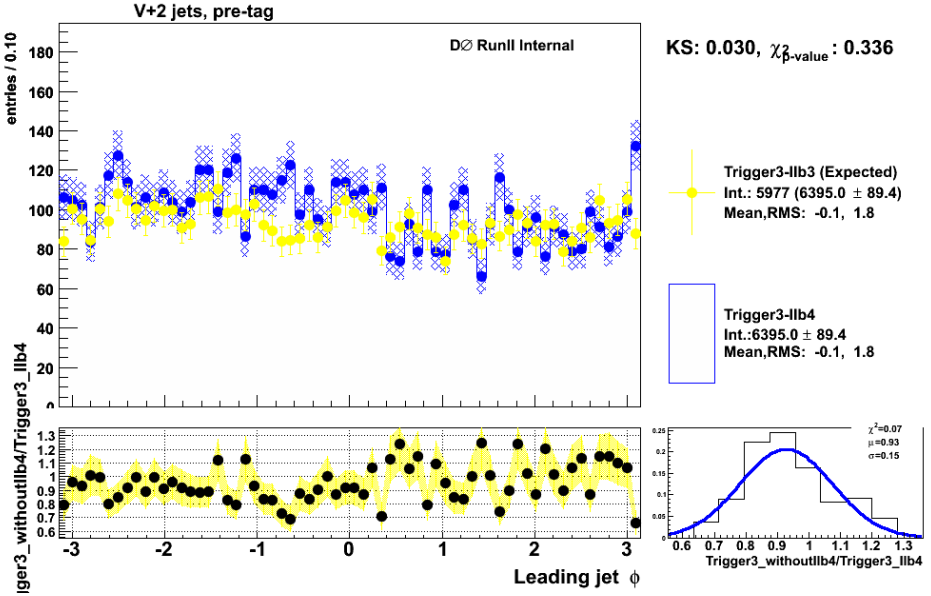
normalized by luminosity

Leading jet Φ



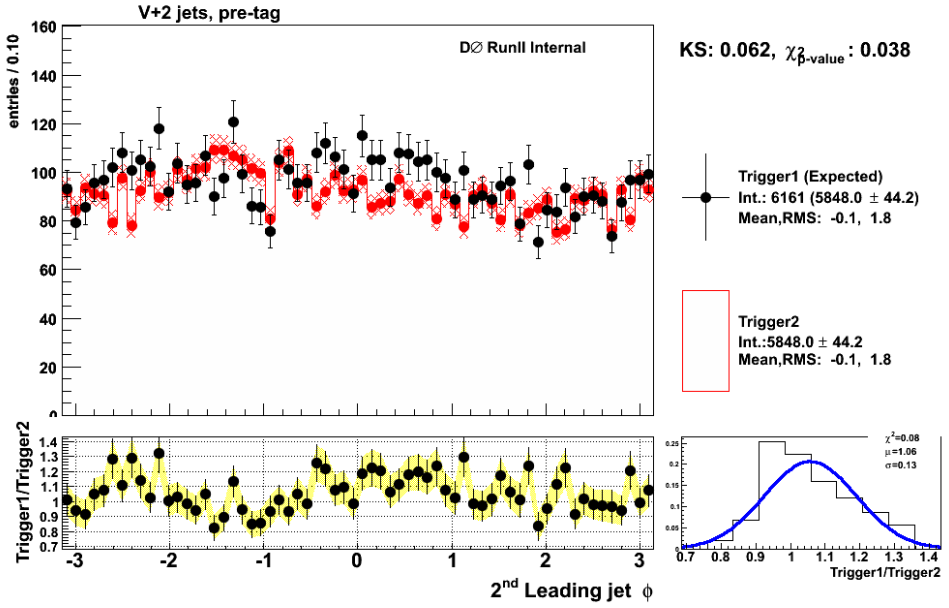


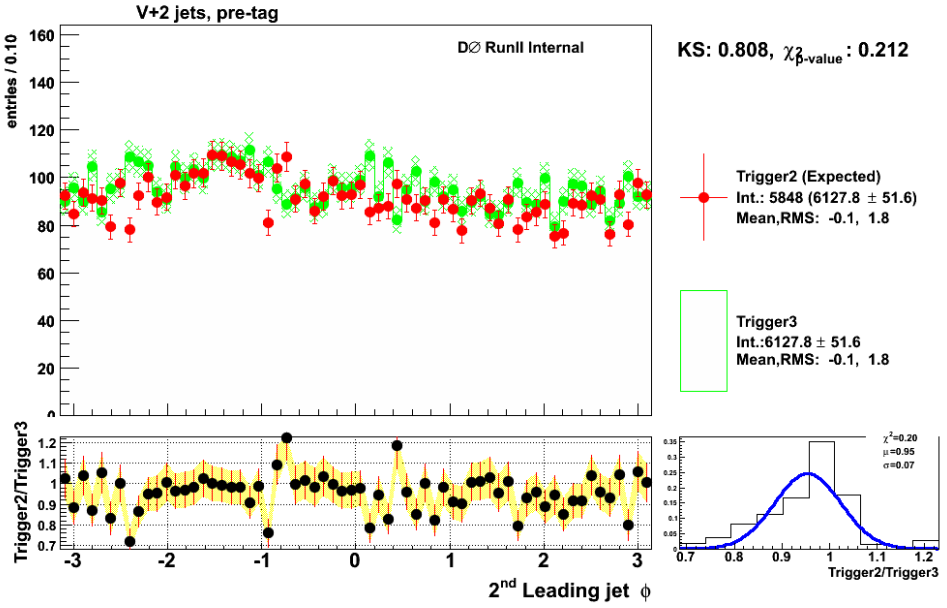


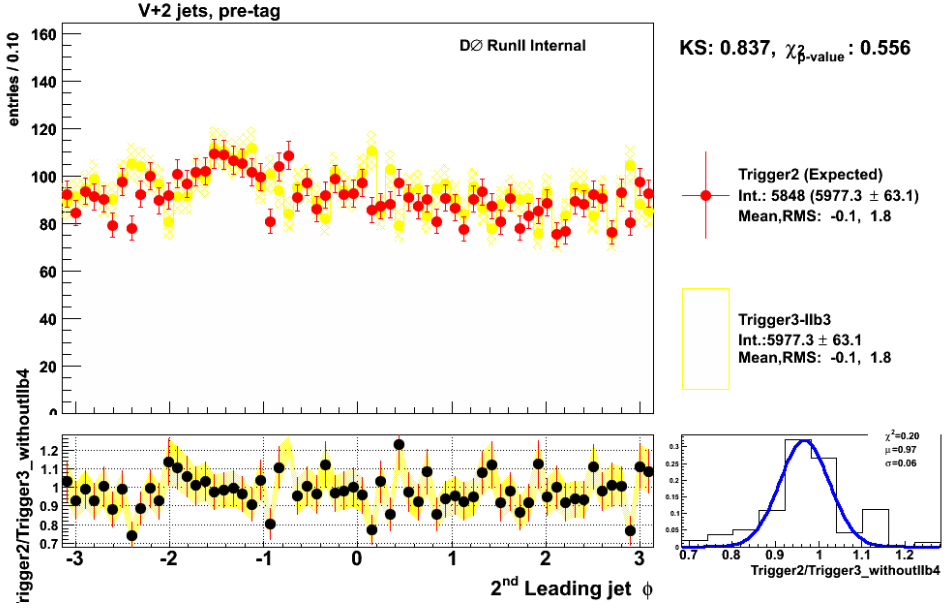


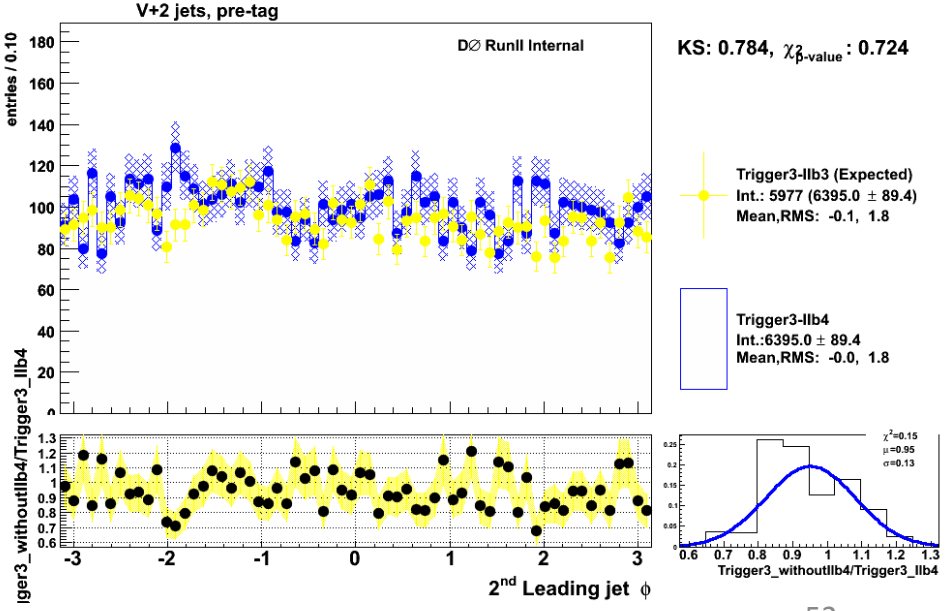
normalized by luminosity

2nd Leading jet Φ



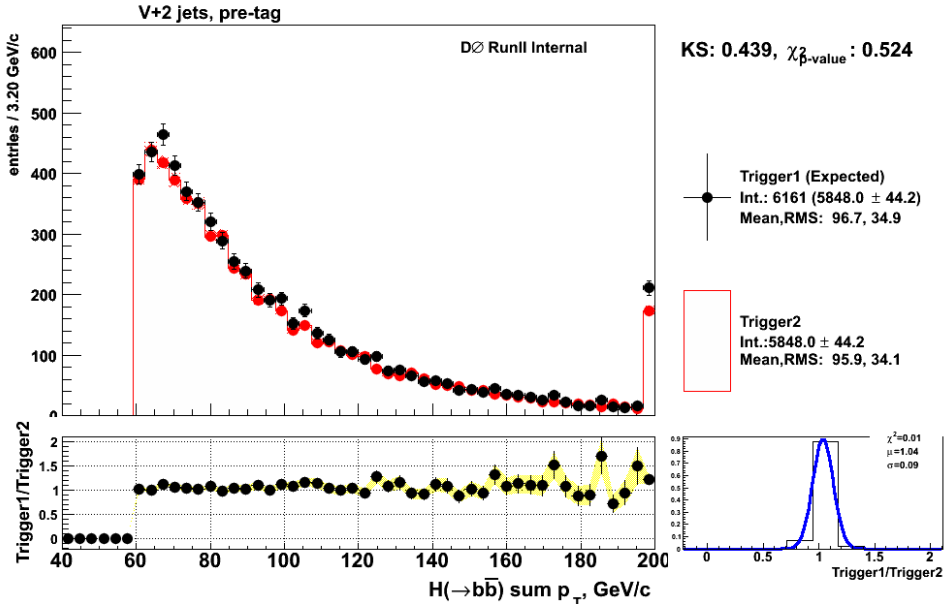


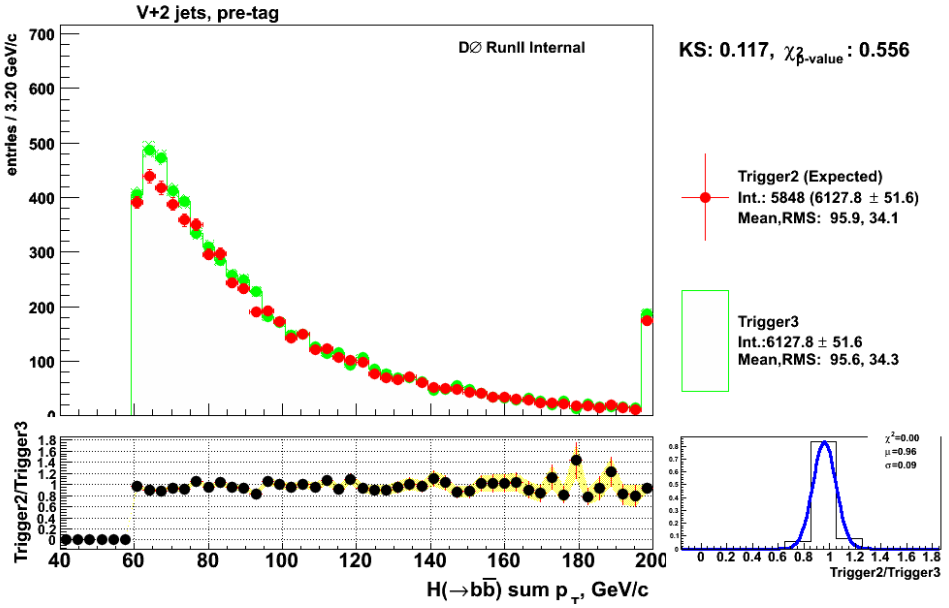


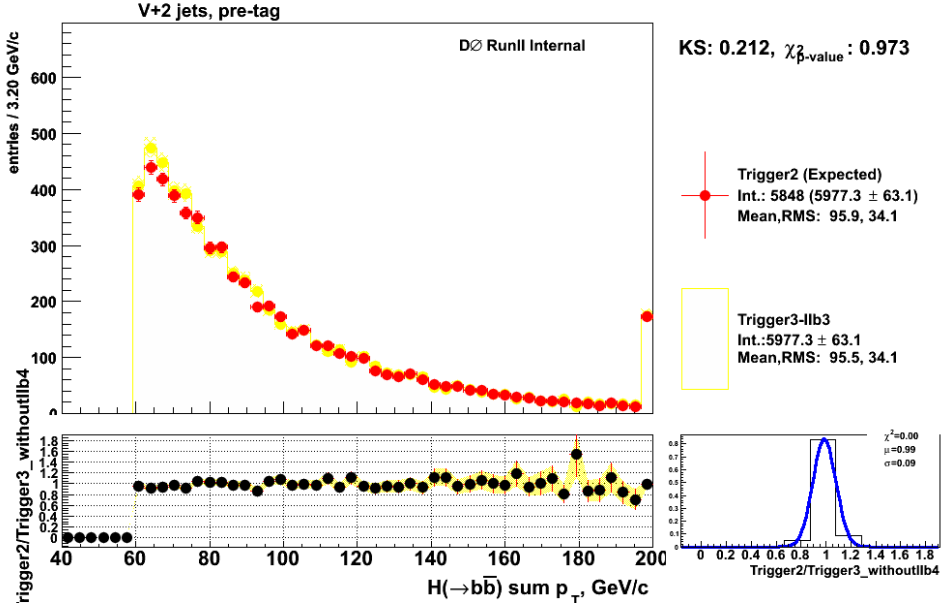


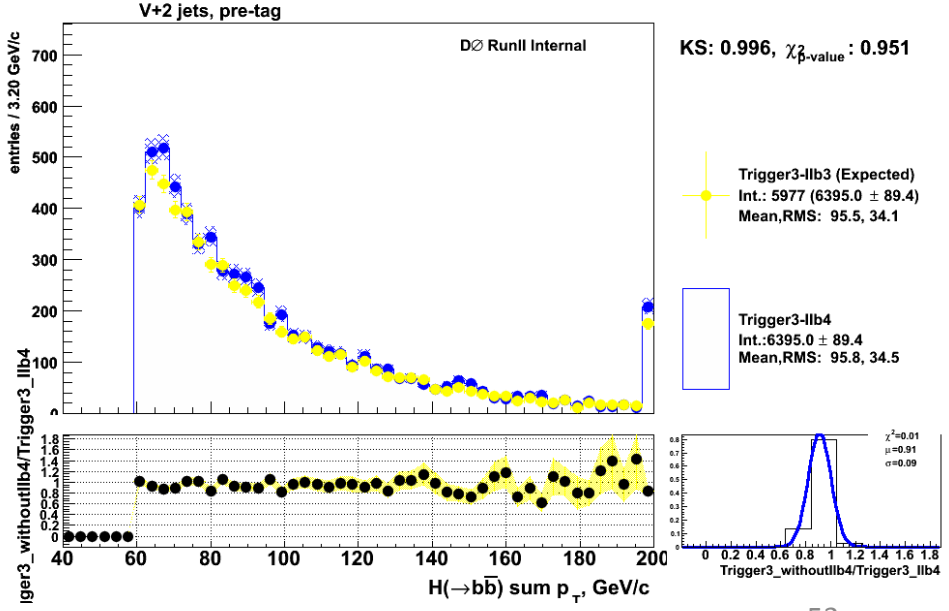
normalized by luminosity

Di-jet sum pT



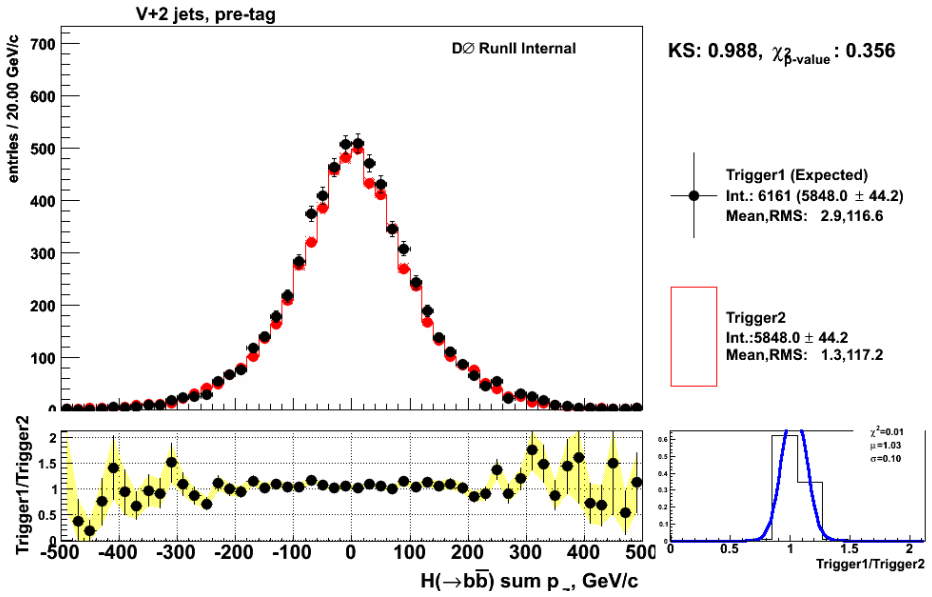


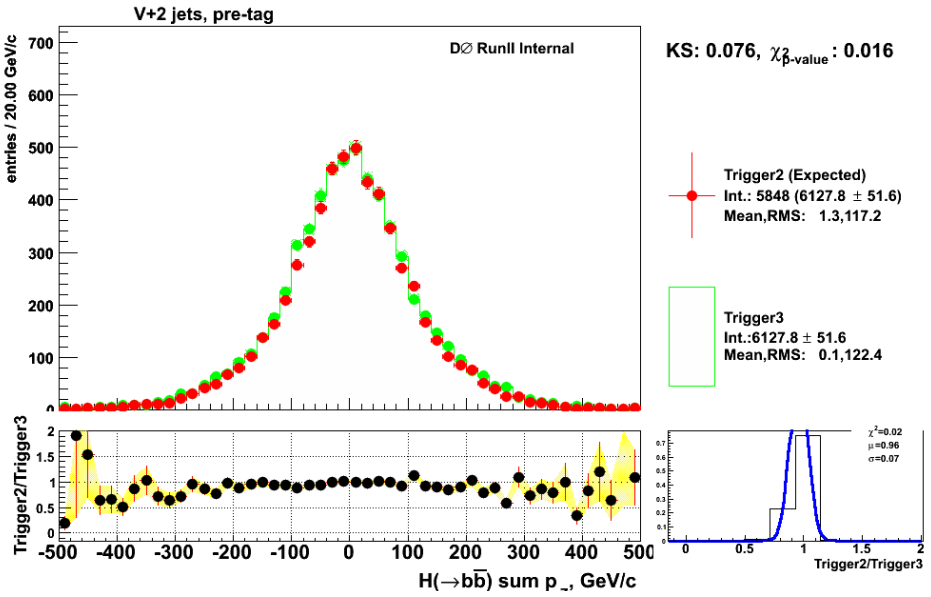


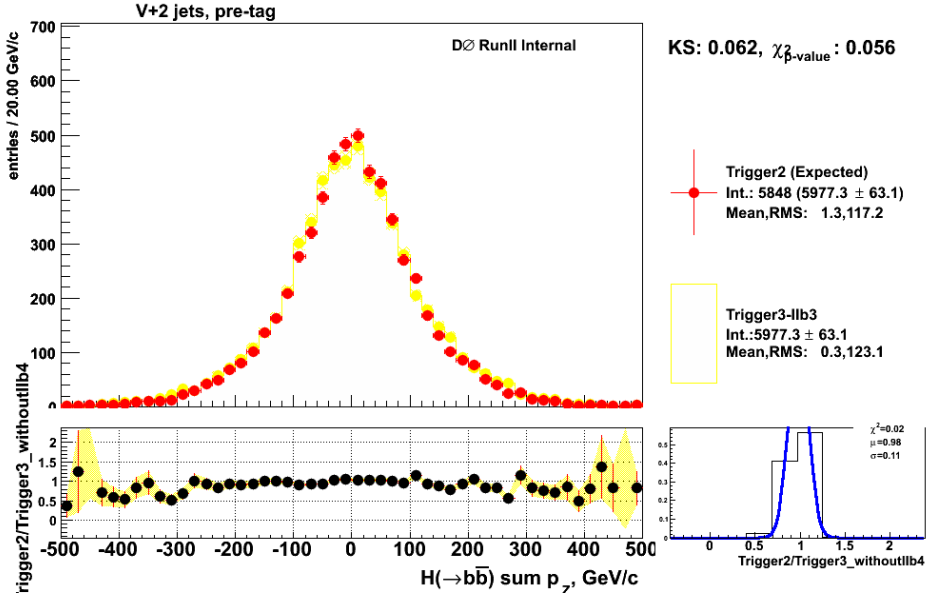


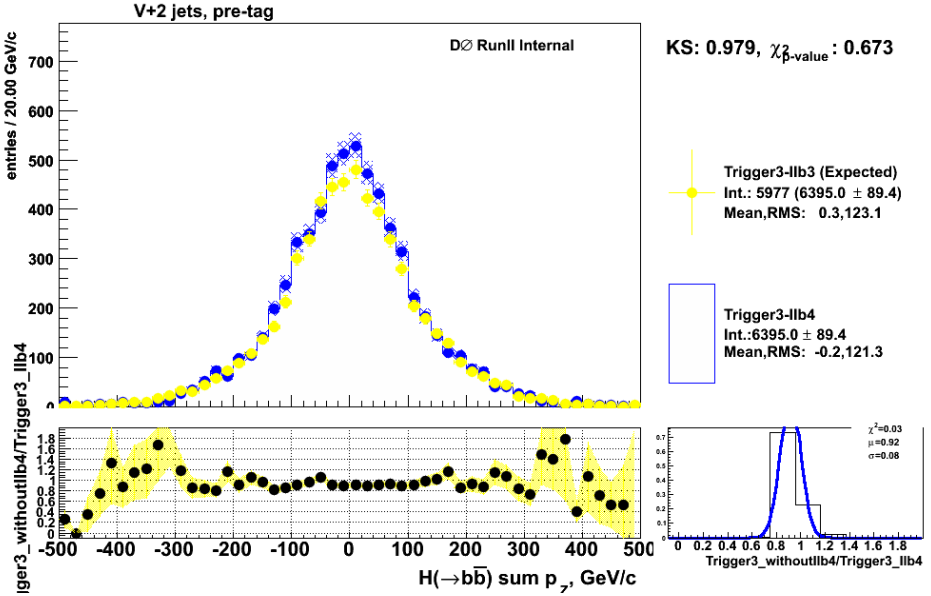
normalized by luminosity

Di-jet sum pz



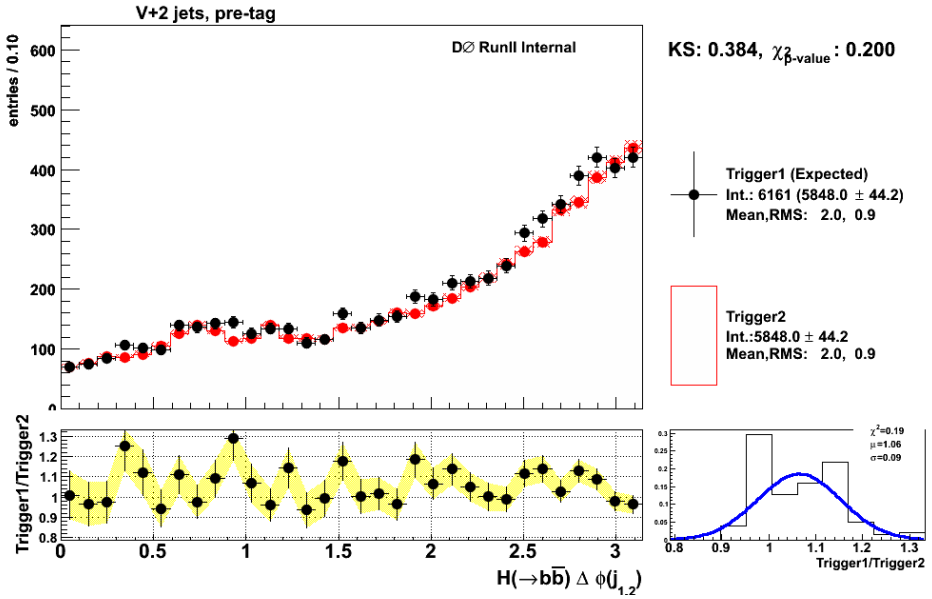


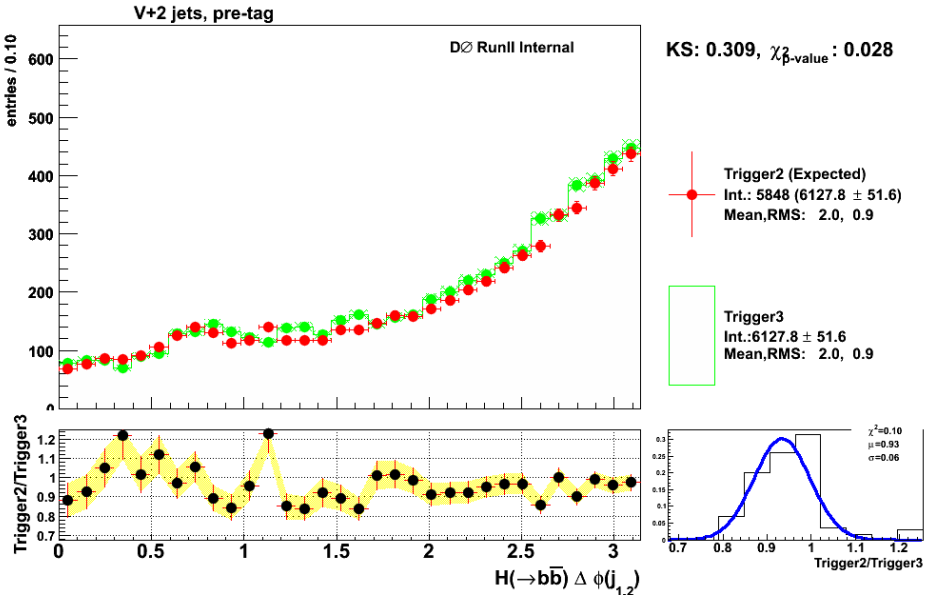


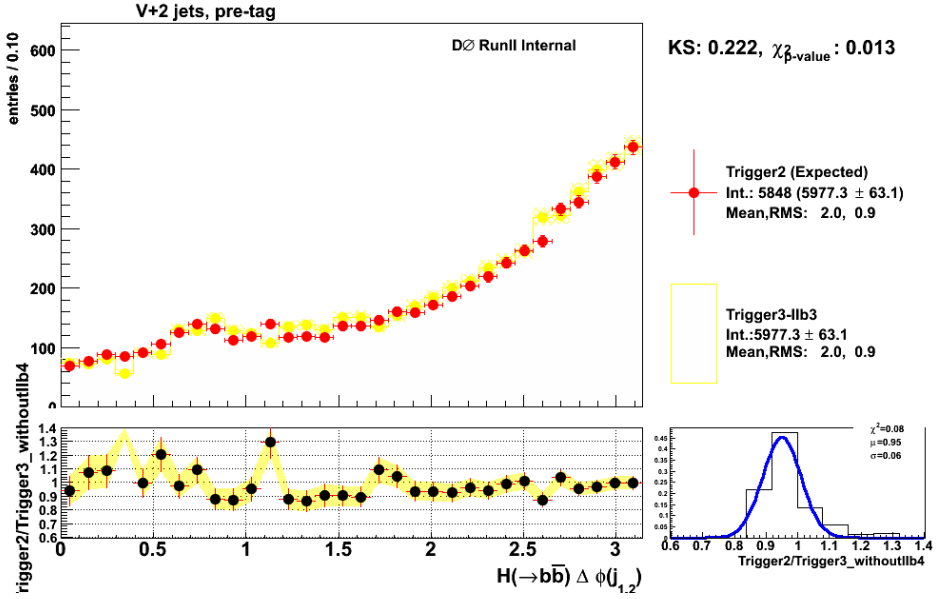


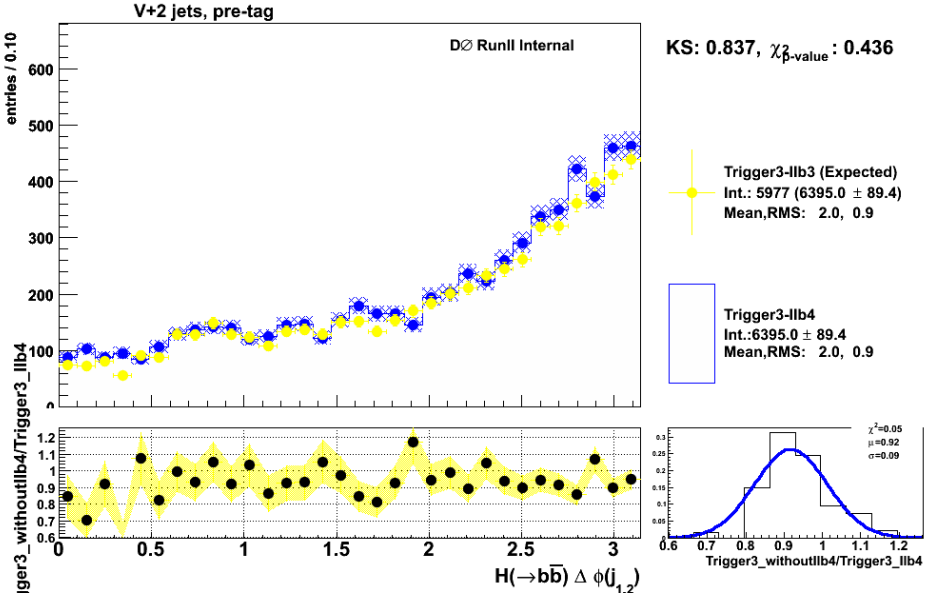
normalized by luminosity

ΔΦ between di-jet



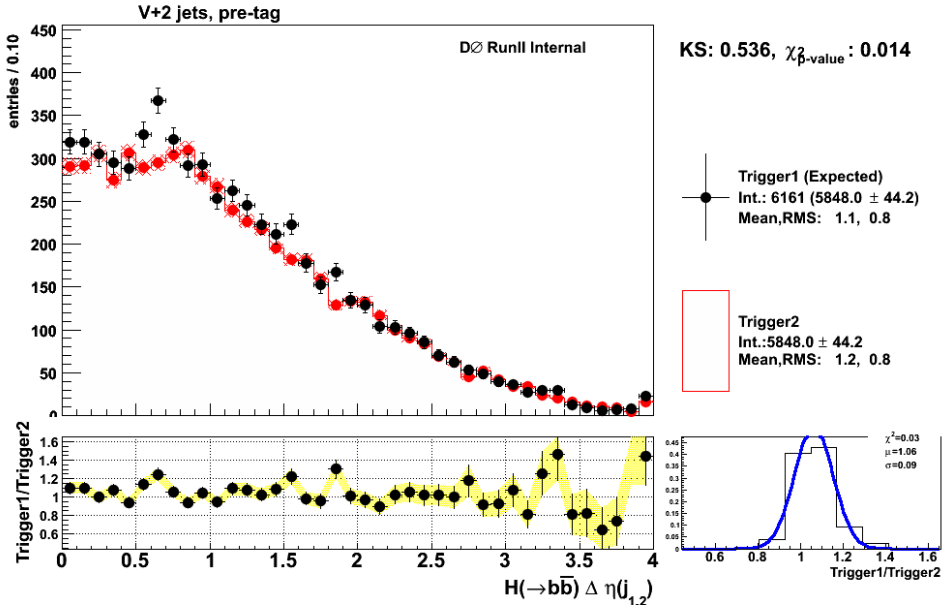


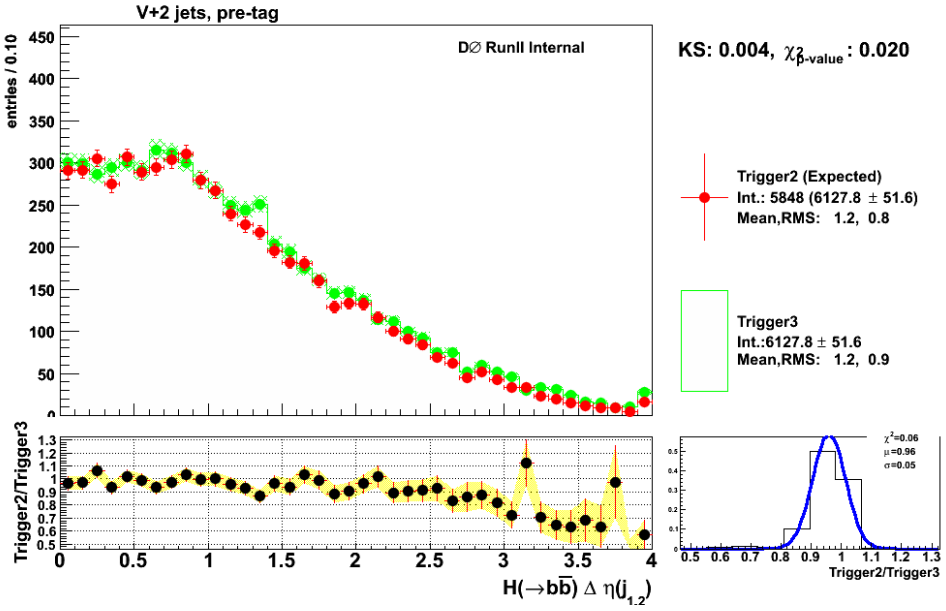


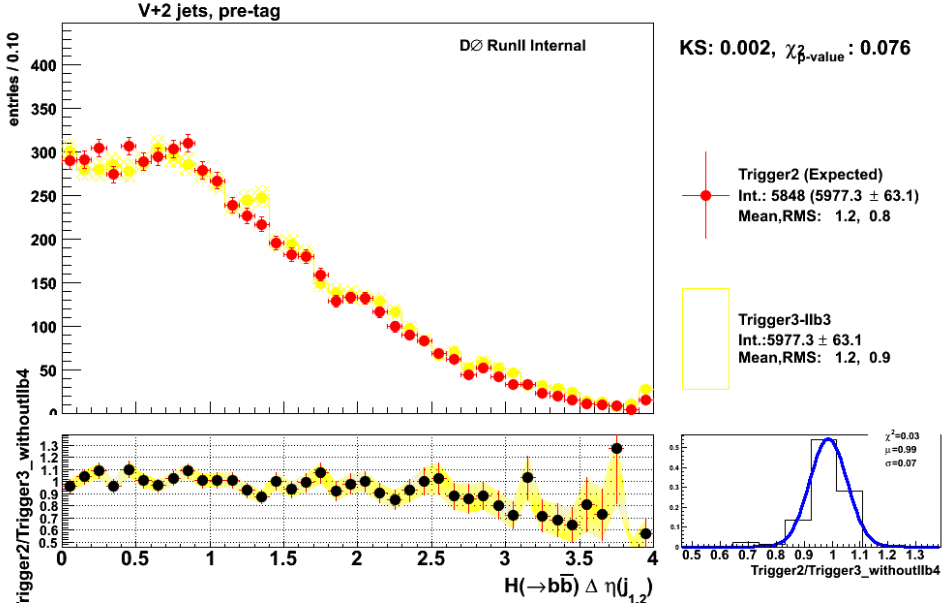


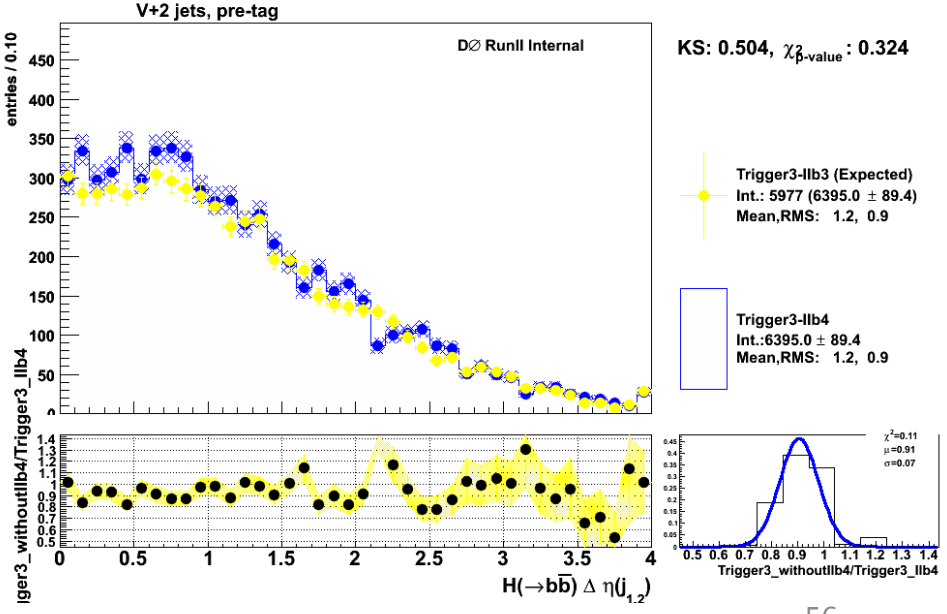
normalized by luminosity

Δη between di-jet



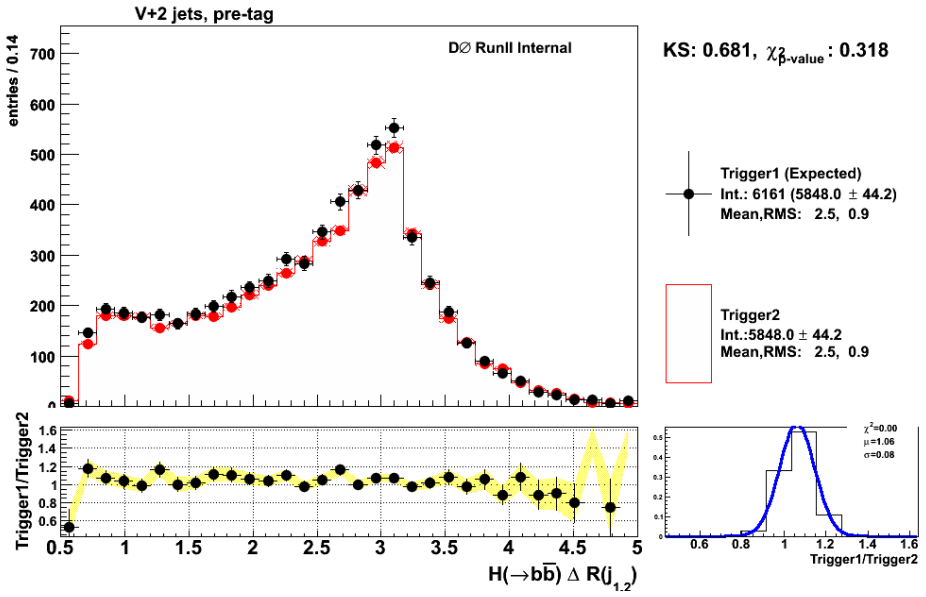


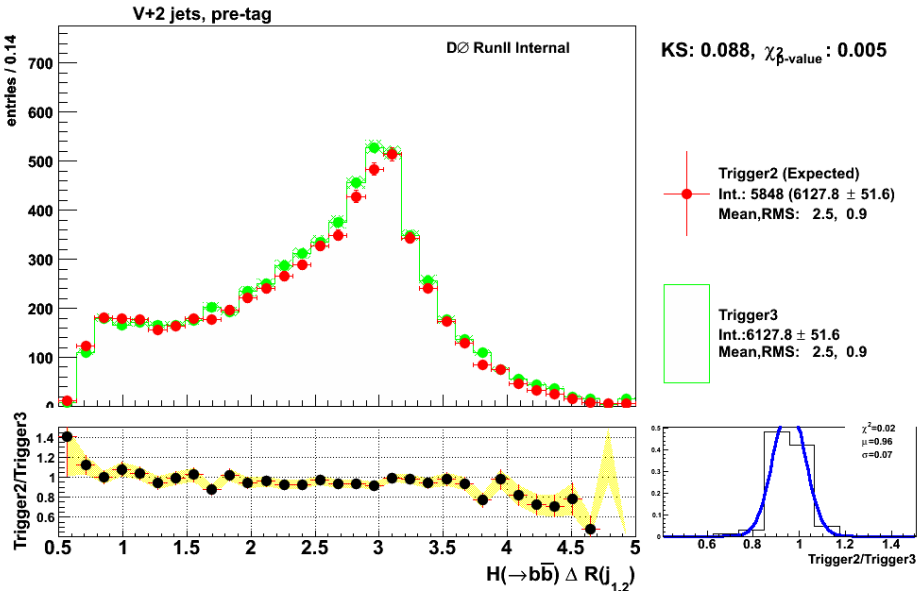


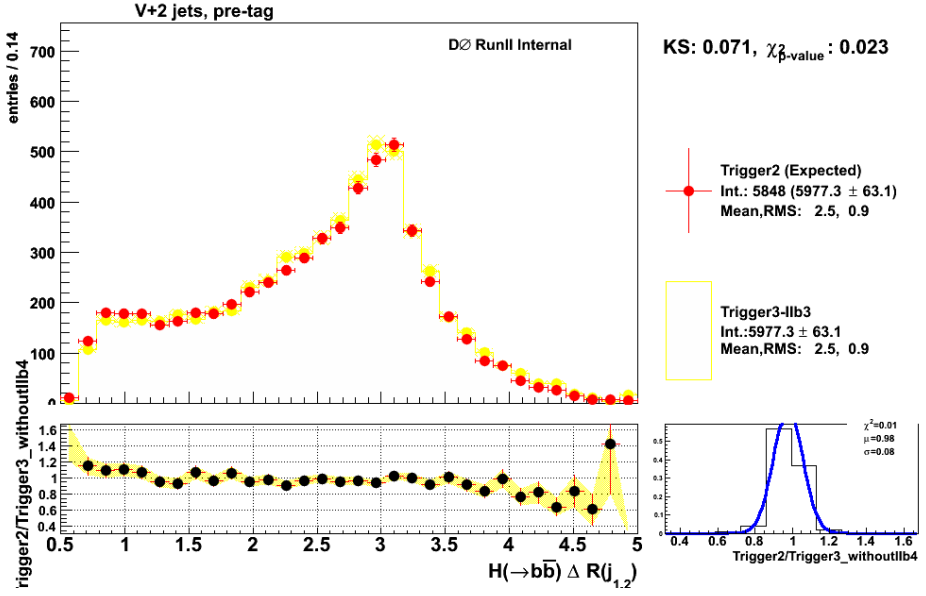


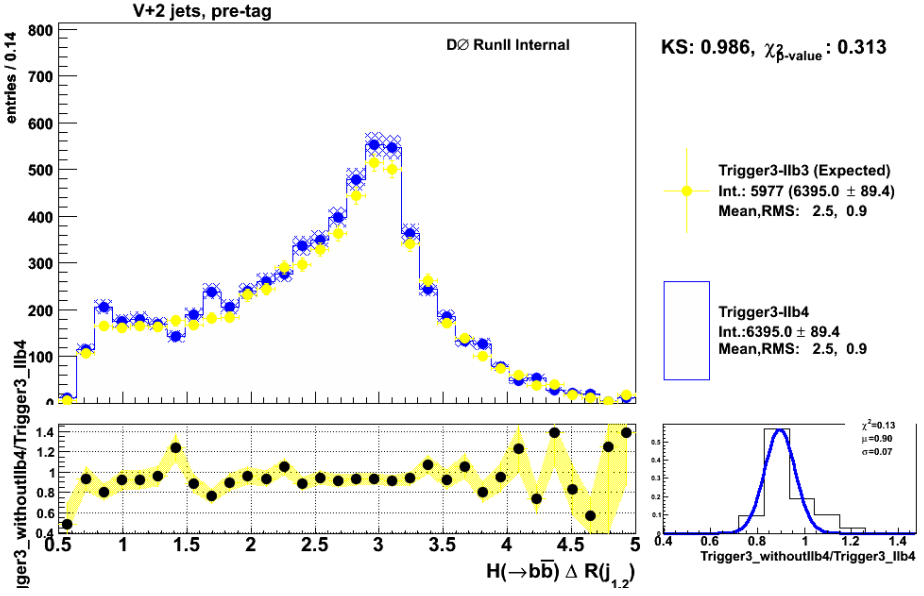
normalized by luminosity

ΔR between di-jet









normalized by luminosity

Di-jet mass