Vjets+Generator group status and plans

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Vjets+Generator conveners
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Vjets+generator group: overview

Provide (reduced) data samples for analysis

Provide V+jets common MC sample:

- Production and test

Vjets_cafe: consistent framework to analyze Data and MC

- Ensure consistency of cafe_packages to be used
- Develop and maintain some of the common tools
- Provide proper configuration to run on data and MC

V+jets common correction:

- MC driven correction
  - Cross-section, HF factors
- Detector driven correction
  - Need certified object id's, JES/JSSR, triggers
  - pT(Z), pT(W) inclusive reweighting,
  - njets dependent pT(Z), pT(W), reweighting jet angles

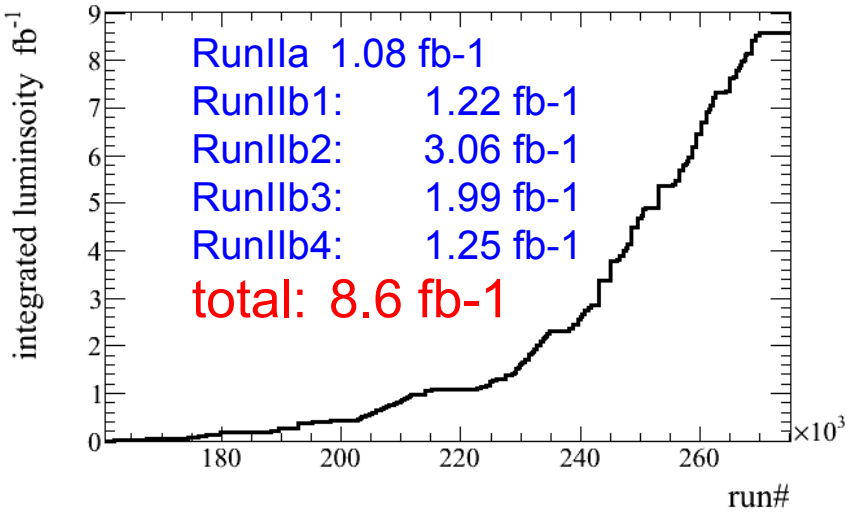
Generator group activities:

- Discuss and study new ideas
  - New generators, Pythia tune, PDFs, ..
- Implementation in D0 framework
  - full simulation chain or correction factors

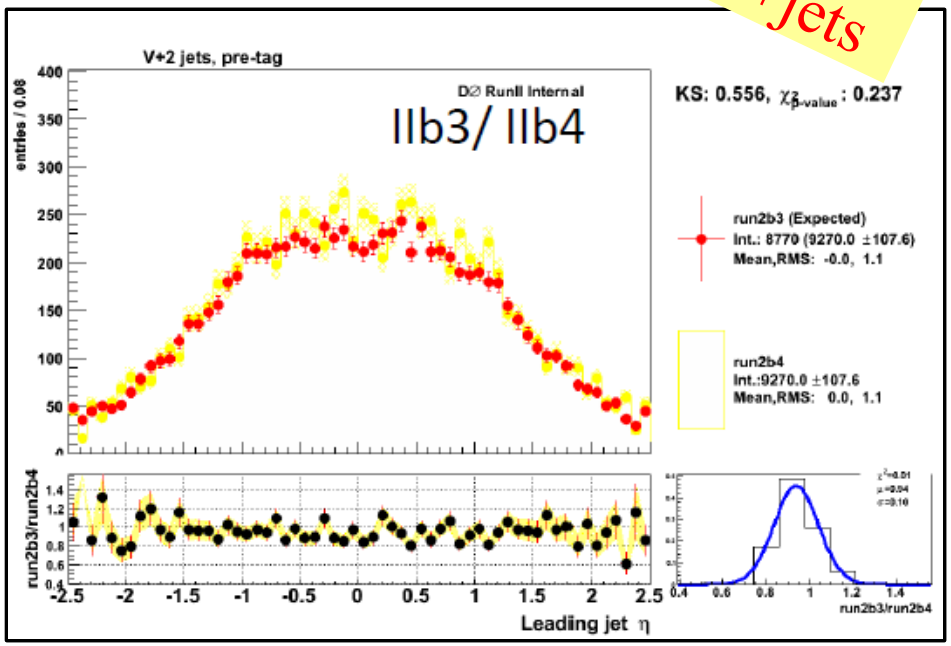
Data samples

Run 2b4 data, EPS2011 cut off available

- Integrated luminosity, luminosity profile is ready (thanks to Peter R)



Dikai Li
W+jets



- Ongoing study of RunIIb4 data
  - no major surprise from newest data

- production of usual vjets skim is ongoing, thanks to Jyoti Joshi
  - 2MU, 2EM, EMMU, EmInclusive
  - single MU skim is actually a CSG skim.

Common MC status

	Caf label	Generator	Reco	cafe	Overlay and nick name	Remark/ main feature
1)	v11	p17.09.08 p17.09.08 p17.xx	p17.09.08 p17.09.08 p17.xx	p18.14.00 p18.13.01 p18.13.01	Run2a	
2)	v11	p20.08.02 p20.09.03	p20.09.03	p21.11.00	Run2b-1	Run2b-1 vertexing
3)	v5	p20.09.03	P20.15.04	p21.18.00	Run2b-2	Run2b-2 vertexing Improved tracking simulation
4)	v1	p20.09.03	p20.17	p21.21.00	Run2b-3	Better simulation of tracking, ZB in calorimeter, ICD

Here is what most analysis should use for EPS 2011

- Run2b-1 MC 2) to simulate Run2b1 data
- Run2b-2 MC 3) to simulate Run2b2 + 2b3 +2b4 data

Production of Run2b3 MC is well advanced. Question of using it for this summer can be raised . But it is not certified on time

It would be good if people were at least starting to look at this MC

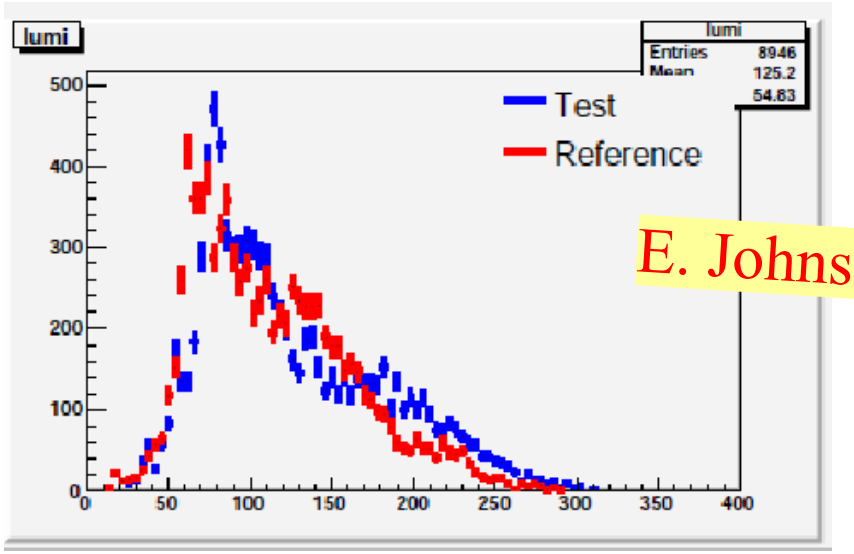
Vjets_cafe "certification"

Define automated procedure to certify our version is working.

1. Employ vjets_cafe tags (allows for history of changes) √
   - latest and greatest v05-06-05 for summer analyzes
2. check code compiles well √
   - scripts: vjets_cafe/scripts/vjets_checkout.csh
     - also check you have the right versions of packages
3. check code runs on several data/MC with no crash √
4. Test basic Data and MC outcomes √
   - number of events at end of job
5. Check basic distributions on going vjets_cert project

Goal: make step 5 be performed by physics group "certifiers"

- vjets_cert well advanced. Should be ready within a few weeks



Subjective view of past 6 months

1+2+3+4 has already allowed to reduce numbers of mistakes, confusion, unusable release....

vjets_cafe update

New version to prepare summer analysis: vjets_cafe v5.6

- to process data run2a, run2b1+2+3+4
- to process MC: run2a, run2b1, run2b2
- based on p21.21.00

new relative to v5.5.12e (Moriond 11)

Status and plan for v5.6

- almost completed

https://plone4.fnal.gov/P1/D0Wiki/physics/VplusJets/CAFtools/vjets_cafe_v5.6

vjets_cafe v05-06-05

- latest update last week with trigger efficiencies
- What is really new in the data/MC treatment wrt to v5.5 is the JSSR: "new jet treatment" (see next slides)

Vjets_cafe framework update status

Many epochs, many MCs. We cannot support any kind of data/MC correction.

1. data/MC supported for summer 2011:
   - 2a/2a + 2b1/2b1 + (2b2+2b3+2b4)/2b2
2. In addition, should be good to start supporting 2b3 MC
   - 2a/2a + 2b1/2b1 + 2b2/2b2 + (2b3+2b4)/2b3

NB: you should not/can not use only run2b1 MC

summary:

v05-06-05

	1. support 2b4 data	2. support 2b3 of MC
muonid	dedicated certification	certified READY !!!
muon smearing	same as data 2b3= should be ok	same as 2b2 MC. to update ?
em-id	dedicated certification	same as 2b2 MC. to update
em smearing	ok	same as 2b2 MC. to update ?
tau-id	same as data2b3.	same as 2b2 MC. to update ?
JSSR-combo	same as data 2b3 to update ?	same as 2b2 MC. to update
Jet-id IIa	2b4 certification	same as 2b2 MC. to update
Jet VC	2b4 certification	same as 2b2MC. to update
trigger	2b4 certification	same as 2b2MC. to update

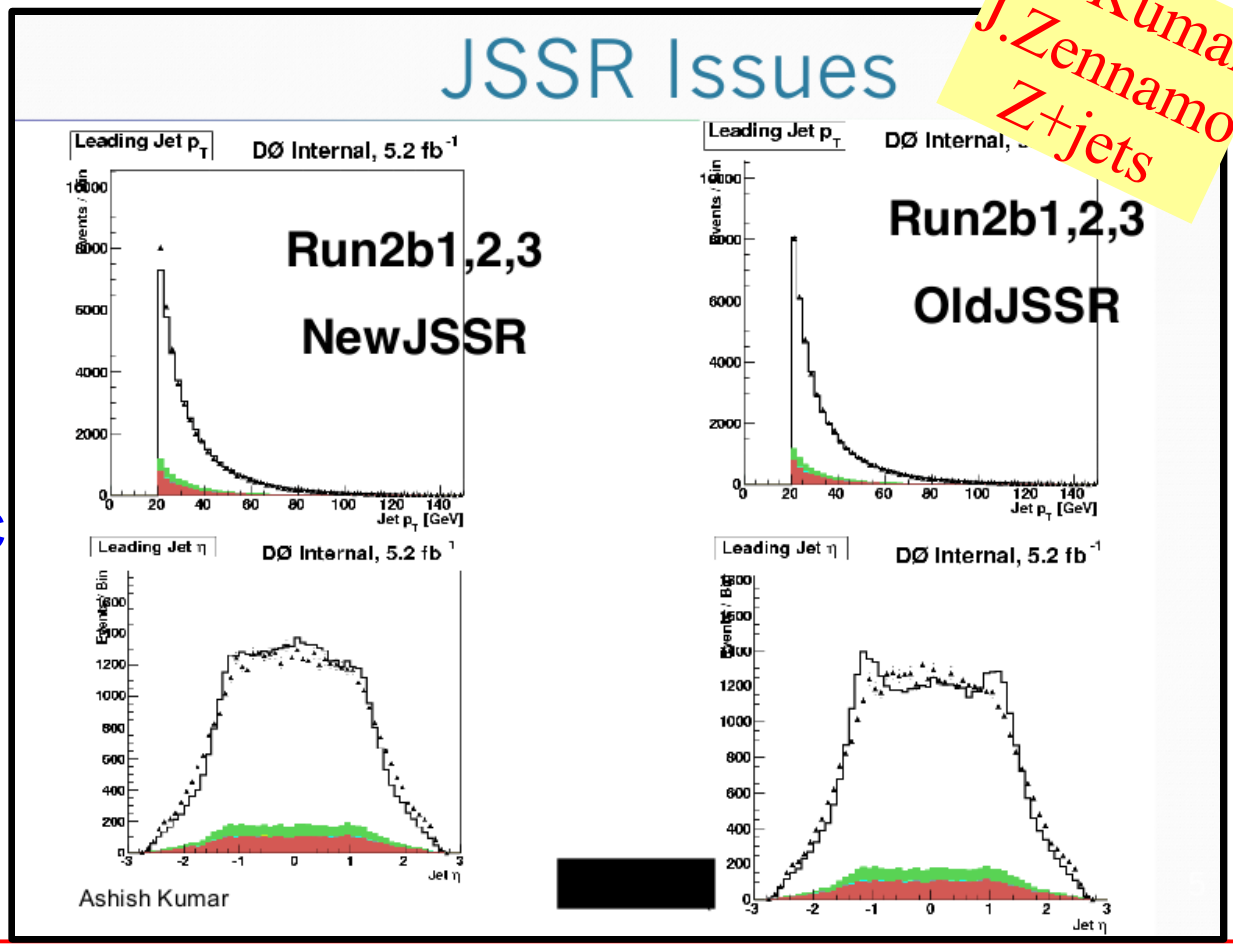
V+jets studies

- V+jets is very sensitive to jet treatments, corrections.... and they are changing a lot these times.
- Example : new vs old JSSR
  - here old = used for summer 2010
  - new=released in june 2010, but people have switch to it for Moriond 2011

At first sight

- old
  - better Pt model
  - poor agreement in EC
- new
  - better horn
  - very poor agreement in EC

A. Kumar
J.Zennamo
Z+jets



JSSR Market and default vjets_cafe

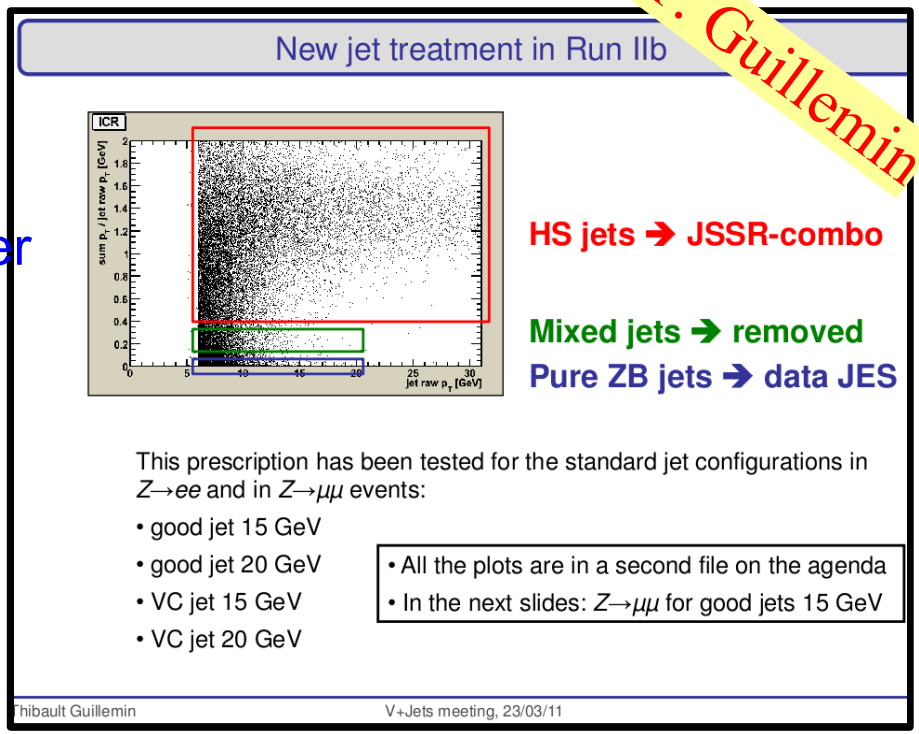
- ICHEP10 default in vjets_cafe v5.4
  - "old JSSR": derived on data 2b1/ MC 2b1 (Z+jets, γ+jets)
- Moriond 11 default in vjets_cafe v5.5
  - "new JSSR": derived on data2b1+2b2 / MC 2b1 (Z+jets)
- EPS 11 default in vjets_cafe v5.6

"New Jet treatment"

see : http://www-d0.hef.ru.nl//askArchive.php?base=agenda&categ=a11271&id=a11271s1t23/transparencies

- "JSSR combo" : data 2b1/ MC2b1 +(data2b2+2b3)/MC2b2+ ICD correction for data
  - ICD correction from Horn Task Force
  - New method to derive Shifting parameters (see next slides)
- JSSR combo for jets from hard scatter
- Pure ZB jets → data treatment
- Mixed jets are removed !!

T. Guillemin

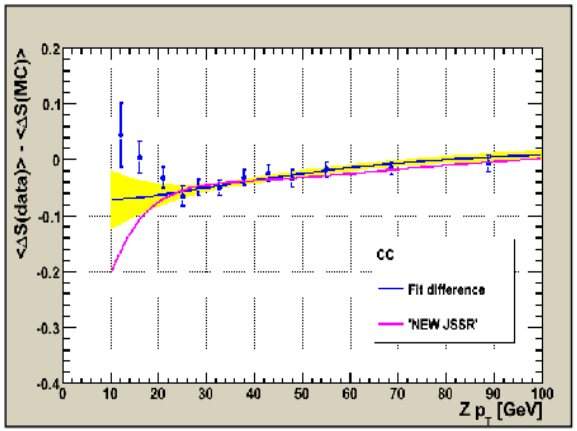


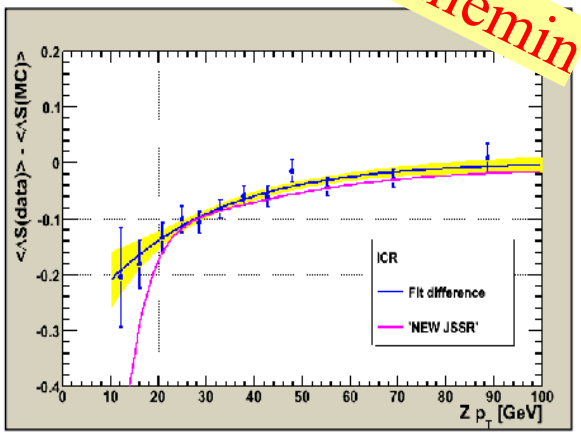
Some details on the newest Jet shifting

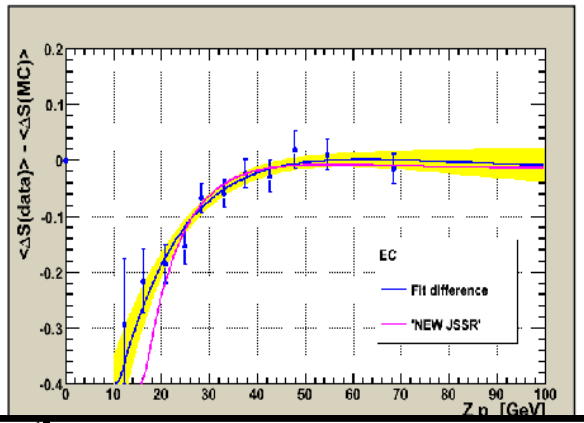
Irfu cea saclay

Shifting results

T. Guillemin

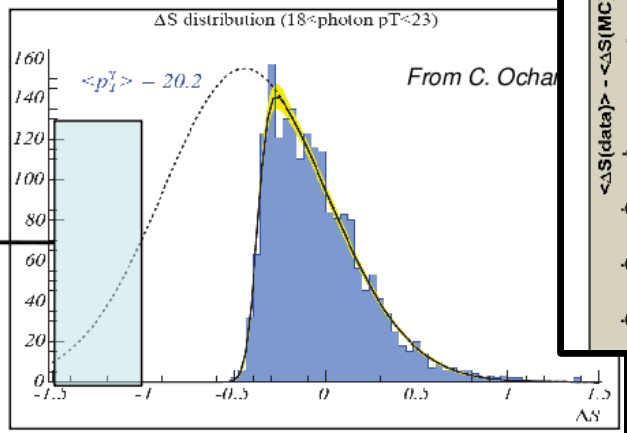






- CC: extrapolation below 23 GeV to not include the "hill" at low $Z\ p_T$ (ICR and EC: below 13 GeV) See backup slides
- Significant difference w.r.t NEW JSSR in the ICR and the EC

➔ much smaller shifting below 20 GeV



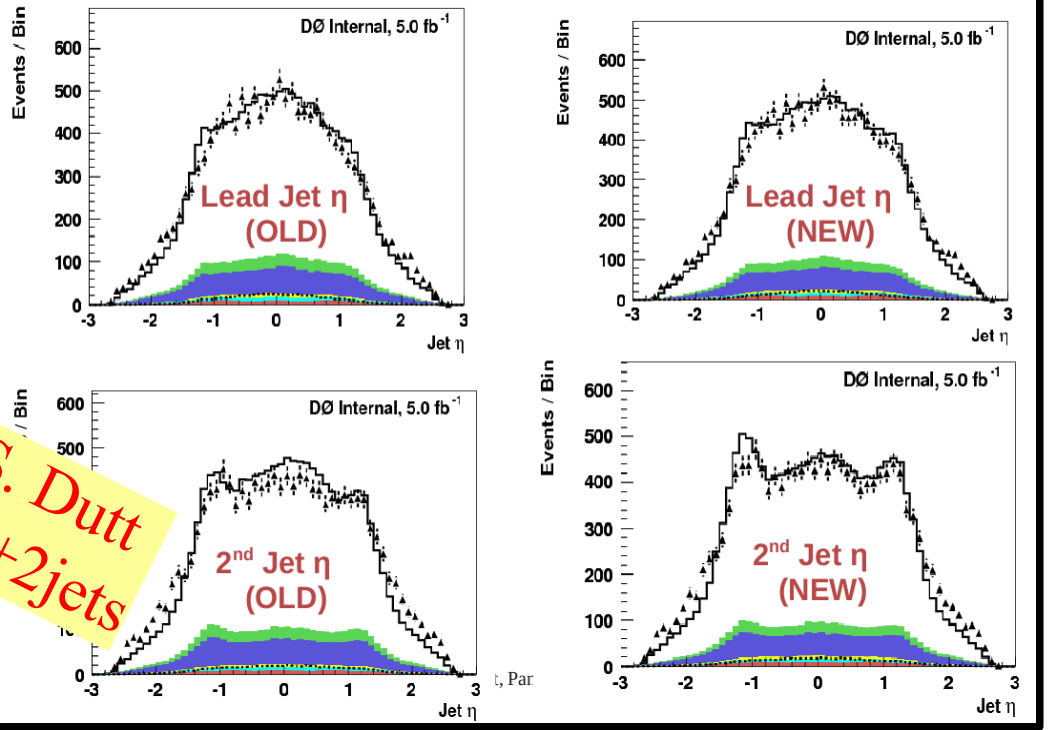
Instead of the gaussian mean, we use the estimator E:

$$E = \frac{\int_{-1}^{+\infty} x f(x)\,dx}{\int_{-1}^{+\infty} f(x)\,dx}$$

"New jet treatment" is the vjets_cafe 5.6 default

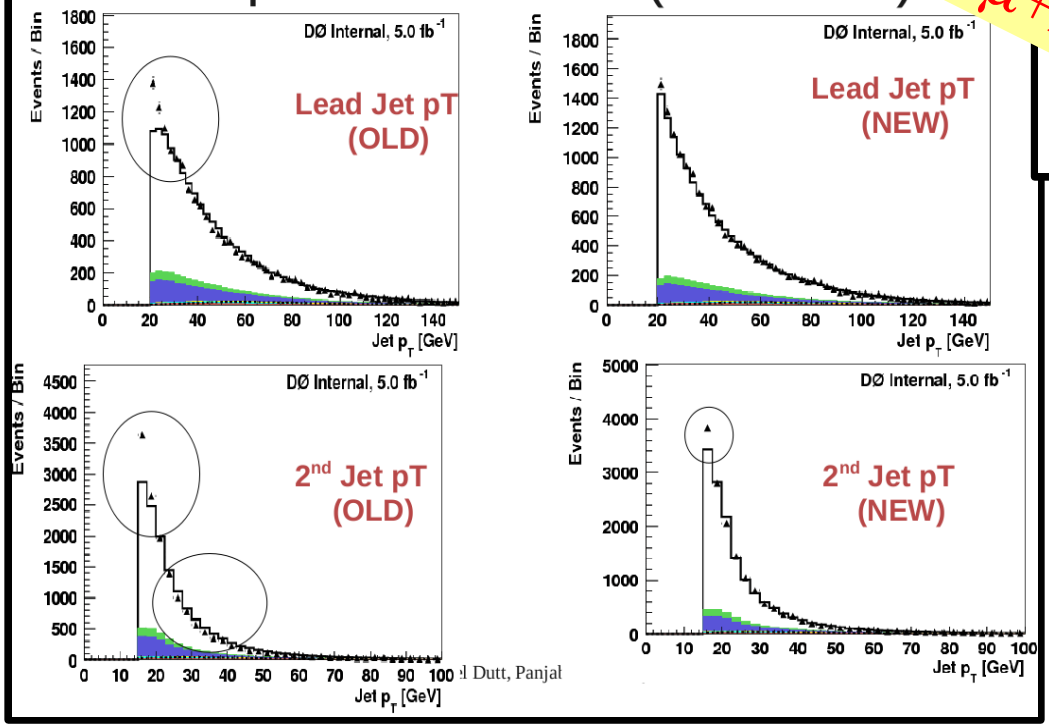
- Better agreement with "new jet treatment"
- No real improvement in EC with jets Pt>20 GeV

Jet Eta Distributions



S. Dutt
μμ+2jets

Jet pT distributions(2 Jet Bin)



l Dutt, Panjal

NB: in these plots

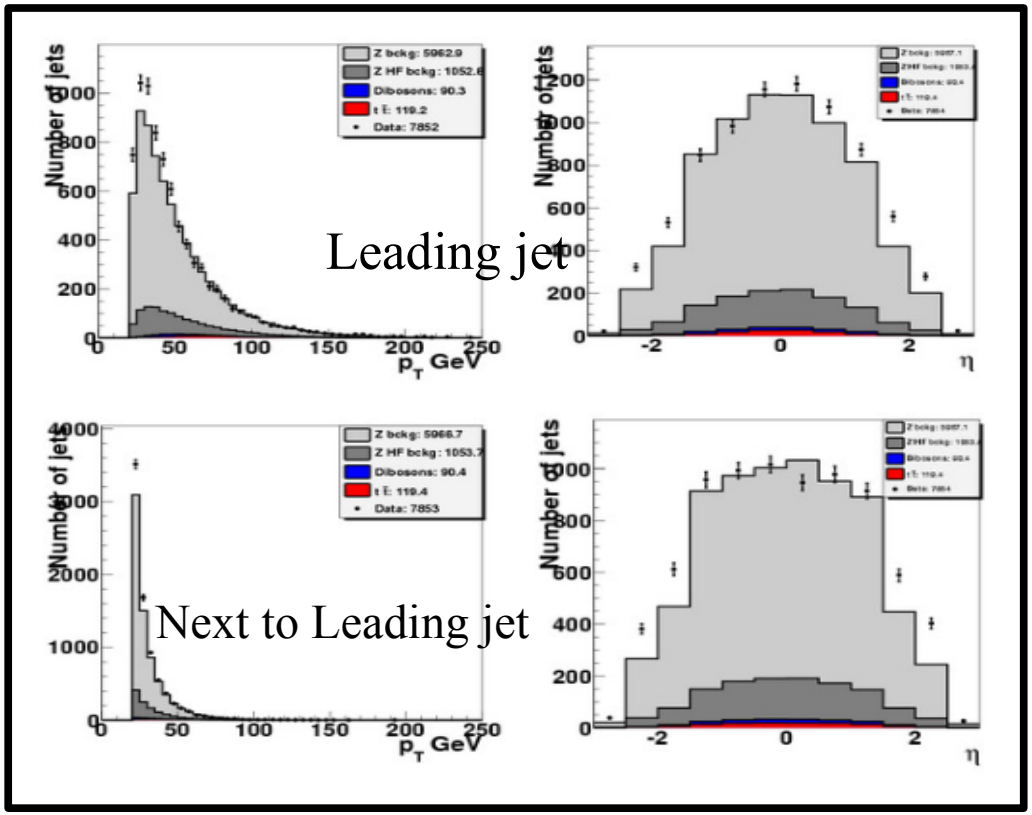
- "old" refers to the so called "new" JSSR
- "new" is the new jet treatment with JSSR combo

NB2: selection:

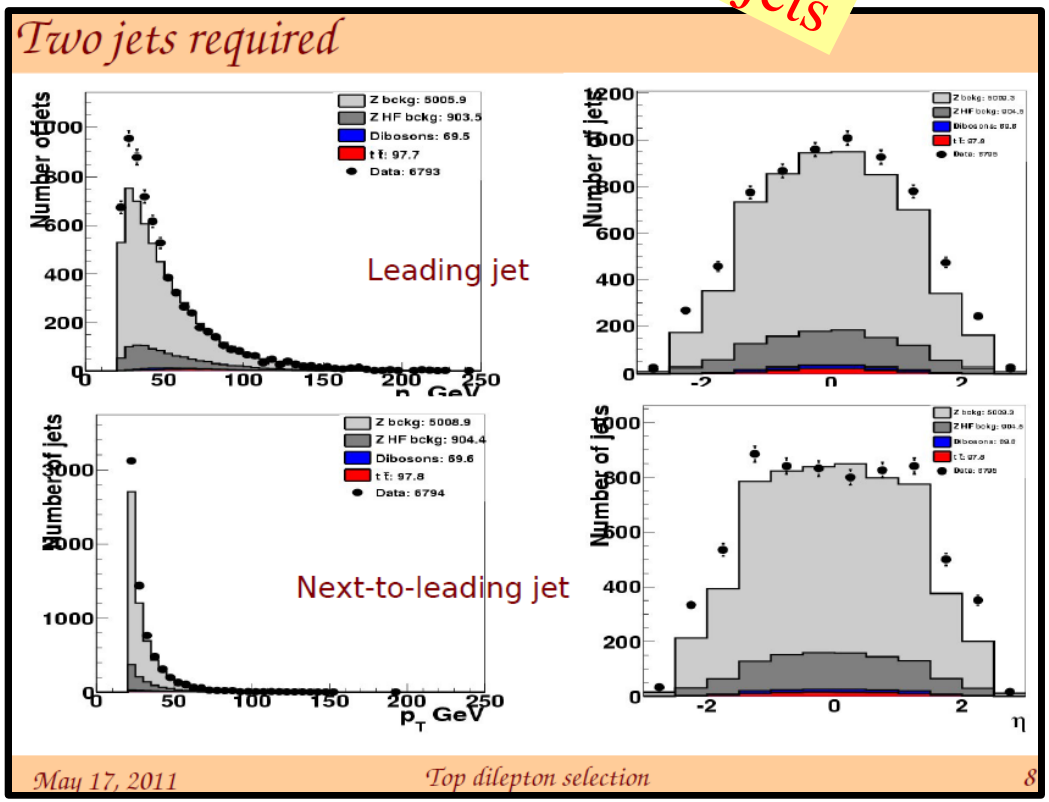
- 2muons + 2 jets Vertx confirmd pt>15,20 GeV

new jet treatment (contd)

- Slava does not see improvements
  NB2: selection:
  - 2 electrons + 2 jets pt>20 GeV



S. Sharyy ee+2jets



new jet treatment may,17

Slava's working plots from winter vjets 5.5 from web page:

http://www-clued0.fnal.gov/~shary/d0_private/fumoir/keep/2011.02.01/DIEM_2jet/plots_njet2.html

Pt(Z) reweighting

- Z Pt inclusive reweighting determined in RunIIa di-em data.
- Z Pt "exclusive" reweighting
  - depends on the number of reconstructed jets
  - sensitive to jet definitions:
    - Pt>20 or Pt>15, Vertex Confirmed or not, JSSR old vs new....
- Project to re-derive Zpt reweighting started in december
  - because of new JSSR, new MC 2b2.

C. Deterre

> • Tried to derive a MC-based reweighting, using NNLO generators, but didn't help to improve the data/MC agreement.

this was presented by Joe at last report at Conveners' meeting

> • New strategy: come back to the method used previously and derive a data-based reweighting.

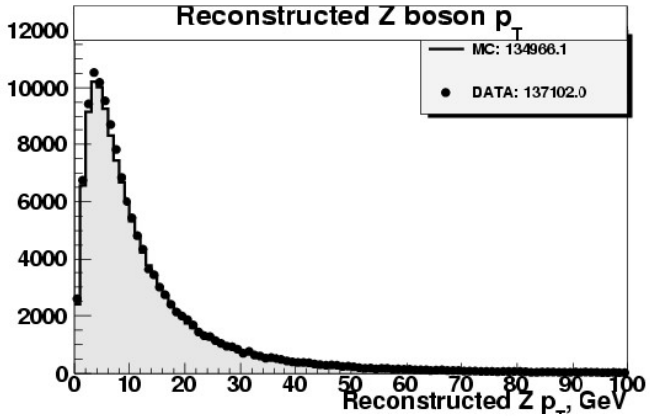
  - Work went on in the last couple of weeks
    - see:

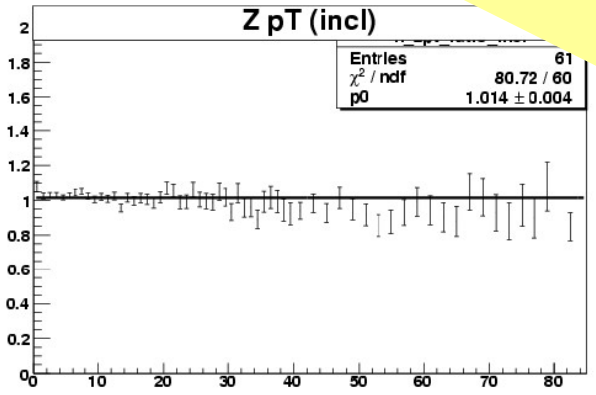
http://www-d0.hef.ru.nl//askArchive.php?base=agenda&categ=a11274&id=a11274s1t25/transparencies
http://www-d0.hef.ru.nl//askArchive.php?base=agenda&categ=a11276&id=a11276s1t23/transparencies

Pt(Z) study

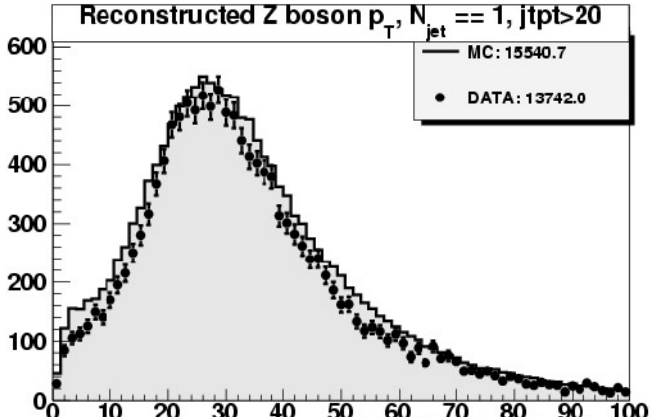
C. Deterre

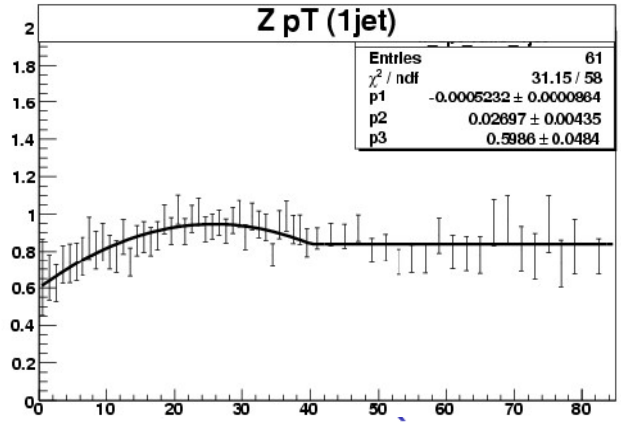
Inclusive level



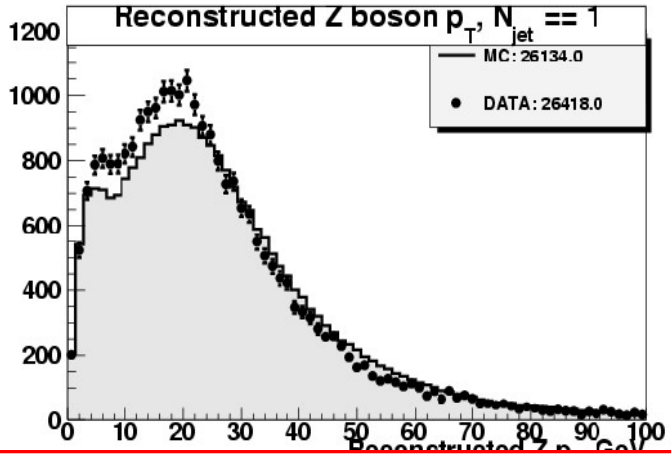


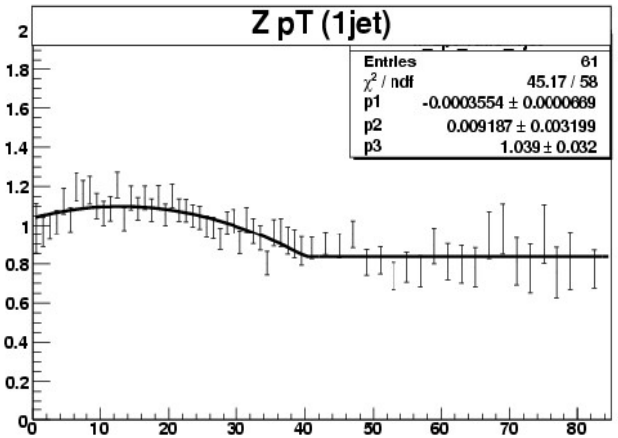
1 jet Pt>20



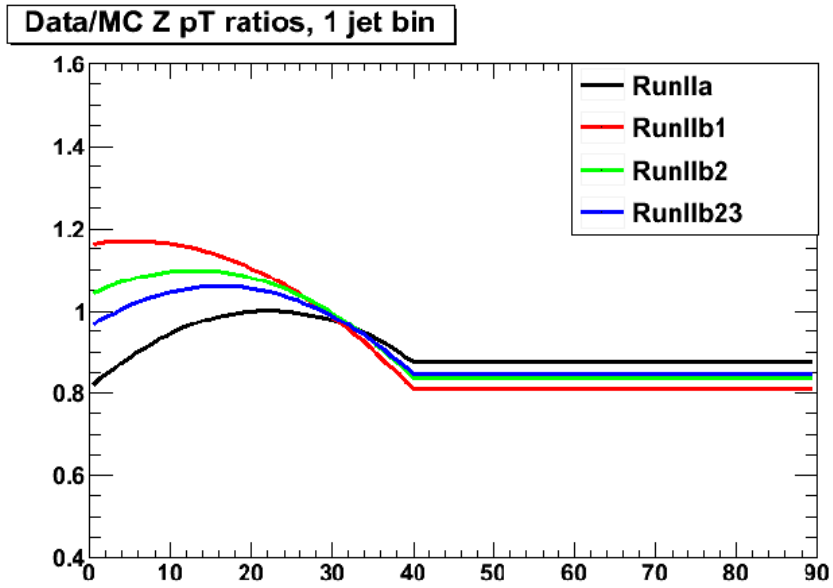


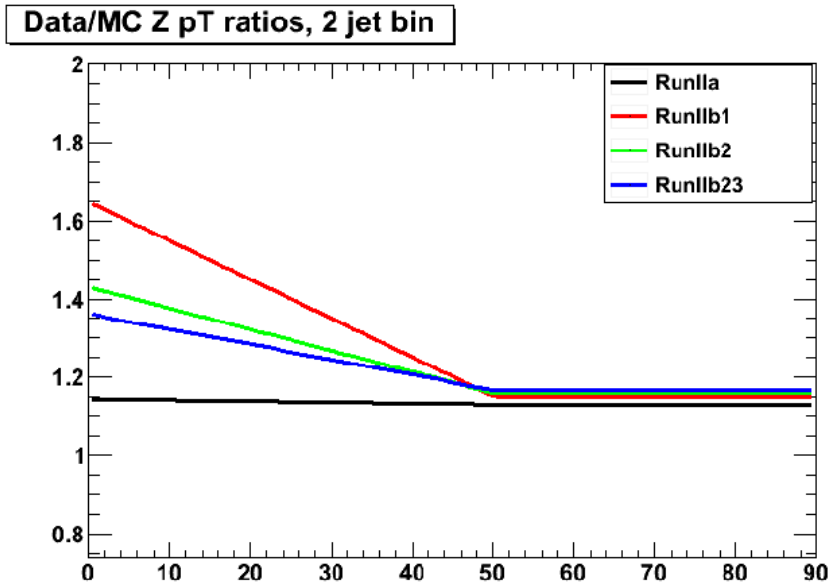
1 jet Pt>15





Study of Pt(Z) reweighting





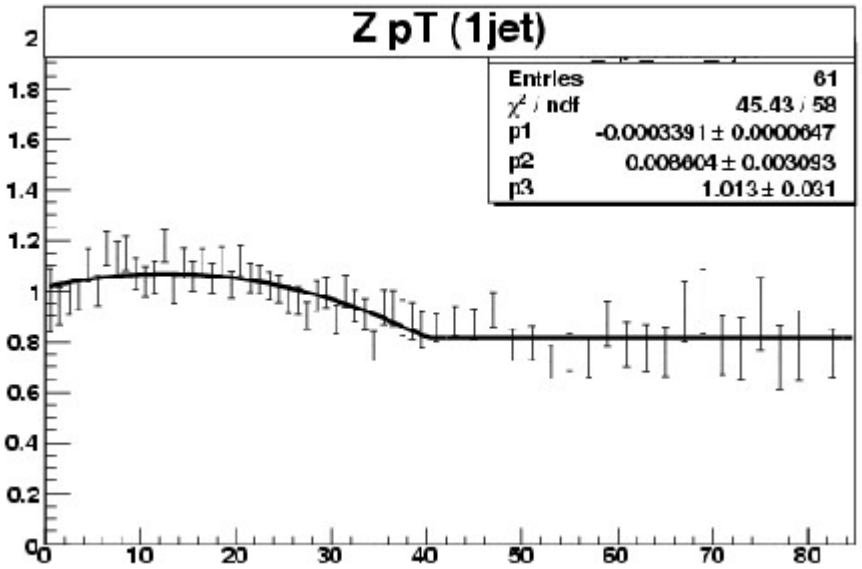
- Large time dependence of the correction.
  - tend to demonstrate that we are facing not understood detector/reconstruction effects.

Pt(Z) with "new jet treatment"

In the meantime : the "new jet treatment" showed up

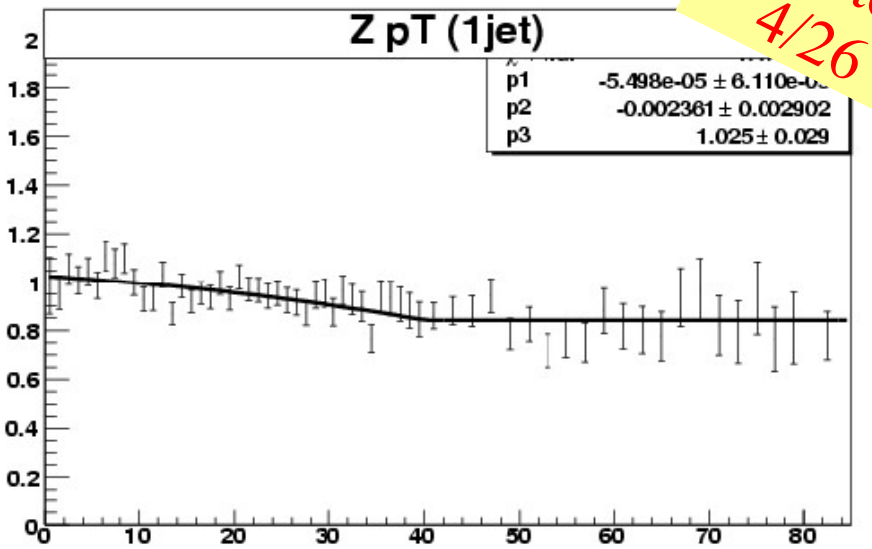
- As it becomes default, then corrections have to be provided also for this case.
- Started to look at new jet treatment.
  - Corrections seems to be slightly different

new JSSR



JSSR combo
"new Jet treatment"

C. Deterre 4/26



Systematic studies for Pt(Z) reweighting

DATA/MC differences covered by Jet energy resolution uncertainty.

Dielectron channel (RunIIb2): jet resolution

C. Deterre

Shift the jet resolution, using the standard JSSR error estimation.

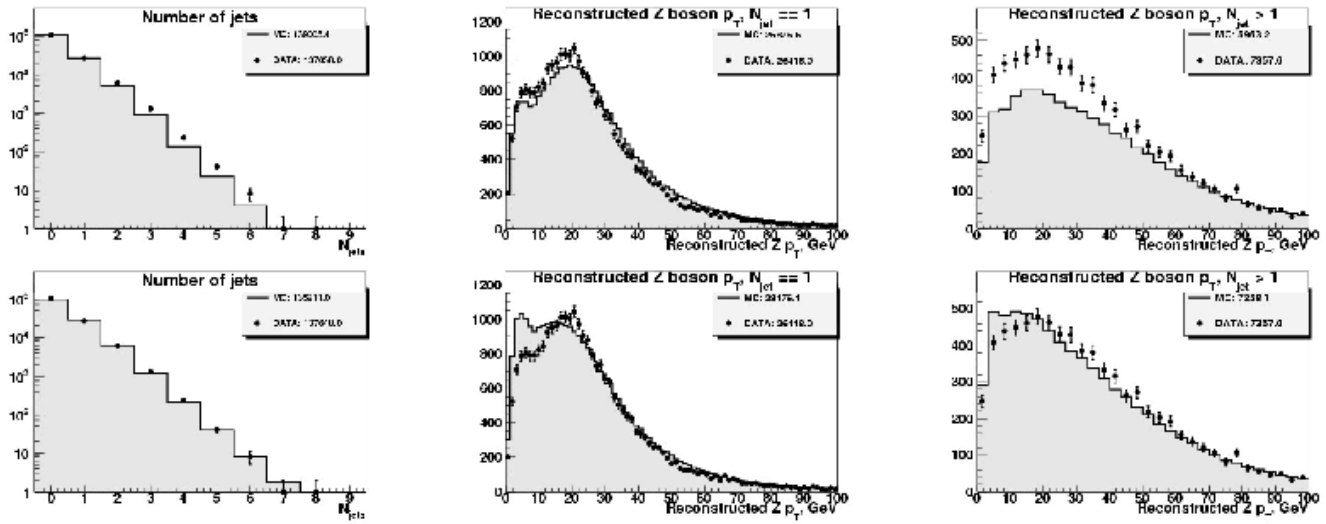


Figure 7: Data/MC Z p_T comparisons with inclusive reweighting only for the default (top) and shifted jet resolution parameters (*resup*, bottom).

→ data/MC discrepancy covered by the jet resolution uncertainty

Partial conclusion: our limited knowledge of low Pt jets prevents deriving "exclusive Pt(Z) correction"

Cecile will give a try to the "new jet treatment" to see if this is the same

V+jets: constraints from data

- Measurements performed within QCD group could be propagated to our MC.
- Need results to be finalized/finished, then backported to our MC

Published
- σ(Z+b)/σ(Z+j): A.Kumar, K. smith, A Kharchilava
  - Phys.Rev.D 83 031105 (2011)

On going
- σ(Wbb): S. Greder, B. Penning
  - expect result for summer 11
- W+jets: D. Price, S. Lammers, G. Hesketh
  - under review for publication
- σ(Z+b) : J. Zennamo, A. Kumar

- Too late to be implemented for summer 2011 analysis
- However this is still a goal to have in mind.

Summary

Run2b 1+2+3+4 dataset for summer 11 is ready to be analyzed

- Run2b4 data set shows no big surprise

Vjet_cafe underwent some changes after Moriond

- vjets 5.6 support run2b4 data, for summer 11 analysis
- new jet treatment may have some impact on your analysis

Vector boson Pt vs jet multiplicity

- Data/MC disagreement : seems to be covered by our (large) uncertainty on Jet resolution.
- To be confirmed with the latest and greatest “new jet treatment”