JET-ID SCALE FACTORS FOR SUMMER

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OUTLINE:

- **Introduction**
- **Results**
- **Summary**

INTRODUCTION

For a jet to be considered, it needs to pass identification requirements (Jet-ID).

With the increase in luminosity, a vertex confirmation (Jet-VC) became necessary.

The standard cut is: number of tracks coming from the PV (ntrkM0) > 1, which is required for b-ID, so all analysis which applies b-tagging, must use it.

Other analysis (e.g. single top) find this cut too inefficient, so they prefer to use a charge particle fraction coming from the PV (cpf0).

Both Jet-ID and Jet-VC have different efficiencies in data and MC.

We measure data and MC efficiencies and then scale factors to correct the MC.

The tag and probe method is used in di-jet events.

DIJET SELECTION

TAG:

- tag jet:
  - the highest jet pT
  - pT > 15 GeV
  - if data, matched with trigger requirements;
  - good quality, cpf0 > 0.5 and ntrkM0 > 1;
- probe jet is the 2nd highest jet in the event
- probe pT and tag pT must be balanced
- DeltaPhi(tag,probe) > 3
- Primary vertex with at least 3 tracks and |PVZ| < 60 cm

- For Jet-ID, no condition on the back-to-back reconstructed jet.
- For Jet-VC, the probe jet is required to be good.

PROBE:

- Jet-ID: good jet flag.
- Jet-VC: cut on track requirements.

DIJET SAMPLE

SAMPLES:

DATA: RunIIb1+2+3 (summer)

1: CSG_CAF_QCD_PASS2_p21.10.00
2: CSG_CAF_QCD_PASS4_p21.12.00_p20.12.05_allfix
3: CSG_CAF_QCD_PASS5_p21.18.00_p20.16.07_summer2010

MC:

For RunIIb1 only: Req ID from 101892-101899 -> p20.09.03
zerob_p20_09_03_RunIIbMC_online_0sup_only_sample_sept06_shutdown2007_warmcellfix

For RunIIb2+RunIIb3: Req ID from 114213-114221 -> p20.15.04
zerob_p20_15_00_RunIIbMC_0sup_sample_postshutdown07_to_juneshutdown09

For all summer data set: Req ID from 101912-101919 -> p20.09.03
zerob_p20_15_00_RunIIbMC_0sup_sample_postshutdown07_octshutdown08

FINAL SCALE FACTORS

Since there may be analysis using p20.09 for full data set,
we decided to have 3 set of SFs:

1. RunIIb1: using p20.09 MC with RunIIb1 overlay and RunIIb1 data;
2. RunIIb2-3: using p20.15 MC with RunIIb2 overlay and RunIIb2+RunIIb3 data;
3. RunIIb1-3: using p20.09 MC with RunIIb1-2 overlay and RunIIb1+RunIIb2+RunIIb3 data.

The SF can be found in the package jetid_eff v04-01-00

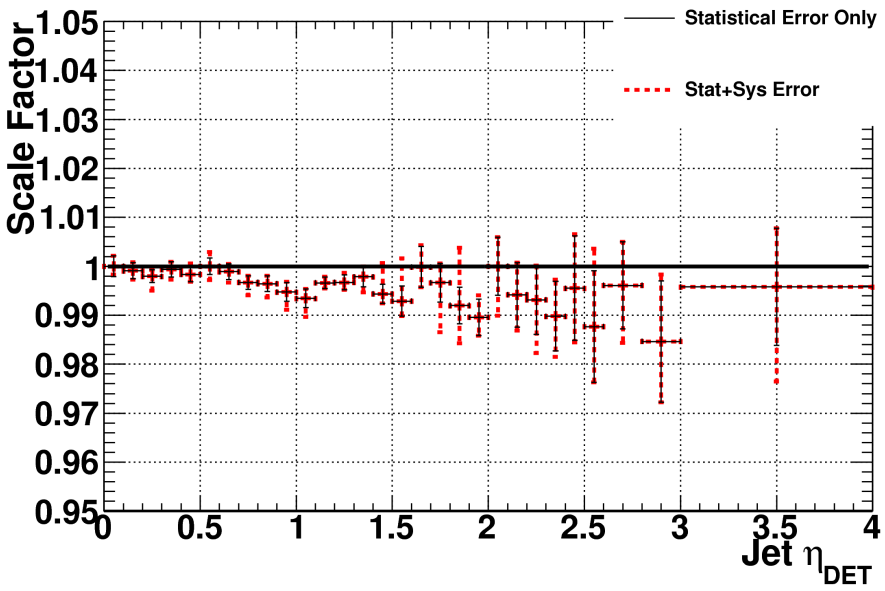
Instructions are posted in the Jet-ID web site.
http://www-d0.fnal.gov/phys_id/jets/jetid.html

More details on the SF, see D0Note 6058.

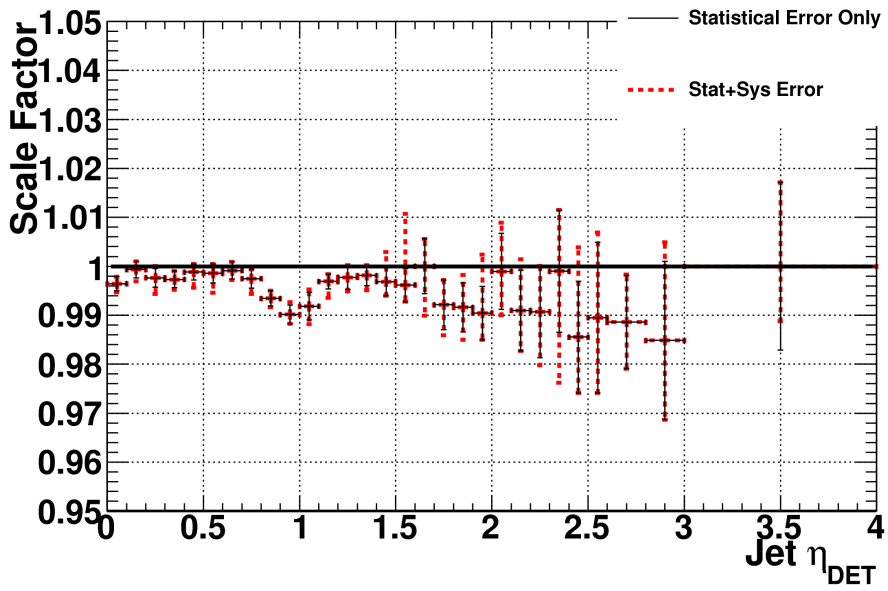
JET-ID SF

We perform a constant fit with respect to jet pT, InstLumi and Pvz*sign(detEta).
The central value is from the jet pT fit.
Differences between the other 2 fits are taken as systematic uncertainties.

RunIIb1



RunIIb2-3



JET-VC SF

The **same** data and MC is used as for Jet-ID.

The tag selection requires the probe jet to be good.

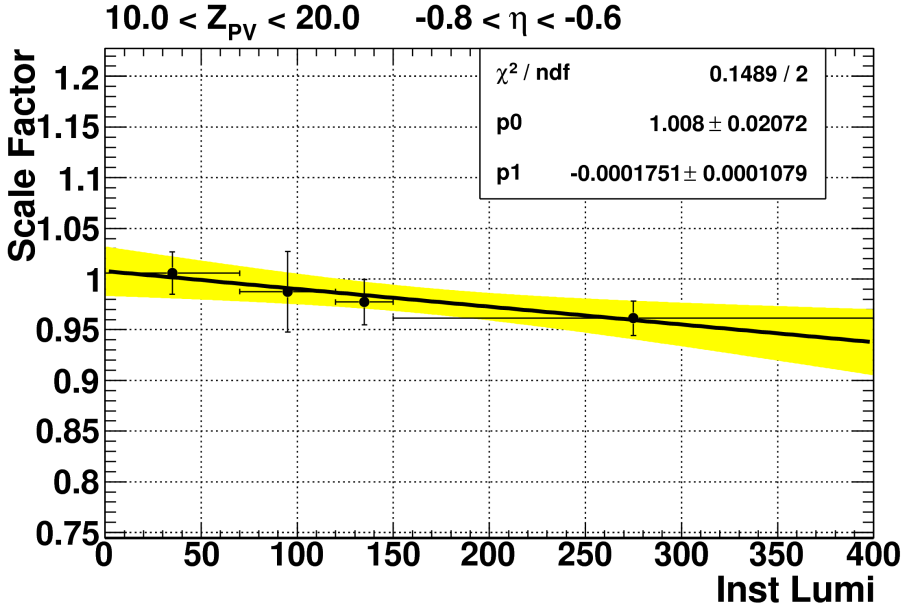
Deriving SF for 5 requirements of Jet-VC (on the top of good jets):

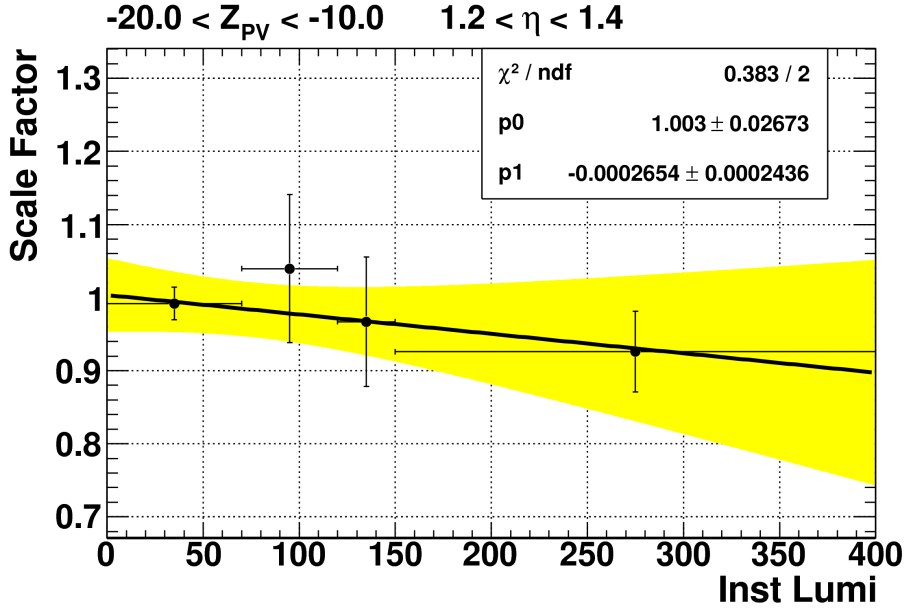
VC1- ntrkM0 > 1
VC2- cpf0 > 0.5
VC3- cpf0 > 0.85 || cpf0 = -1 (single top request)
VC4- ntrkM0 && taggable
VC5- taggable (on the top of ntrkM0)

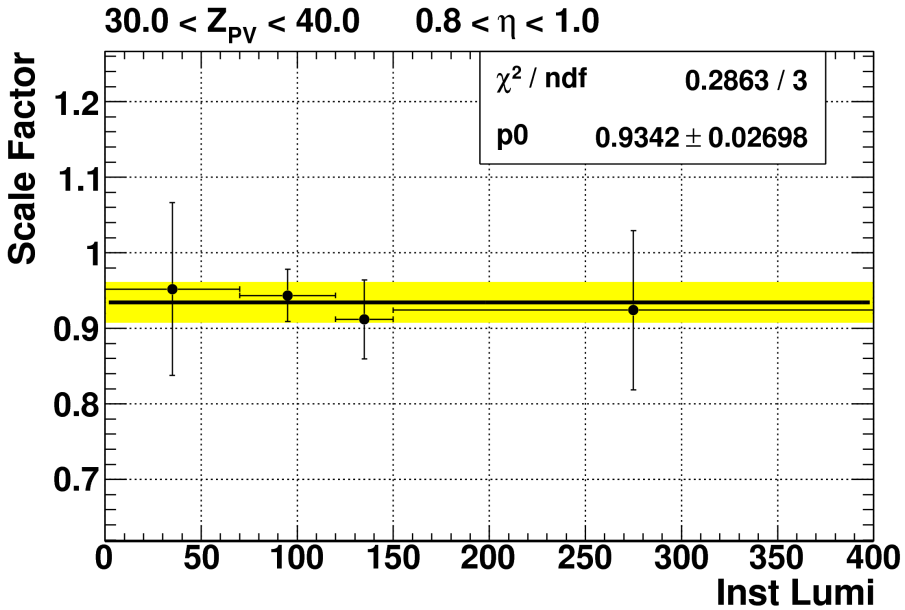
INSTLUMI DEPENDENCE

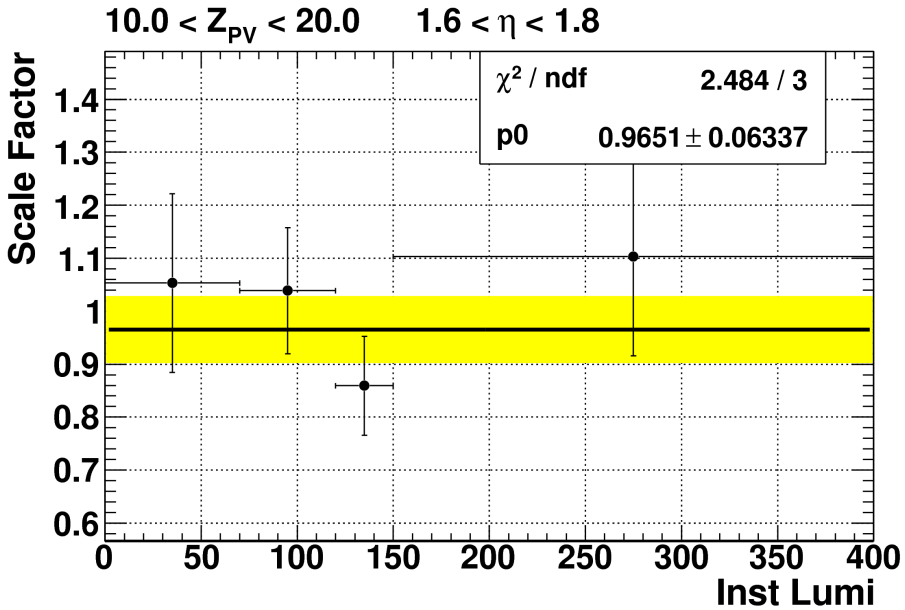
Since there are enough statistics, the events were binned in jet eta and PVz.

If a significant InstLumi is observed, fit a linear function, if not, just a constant fit.

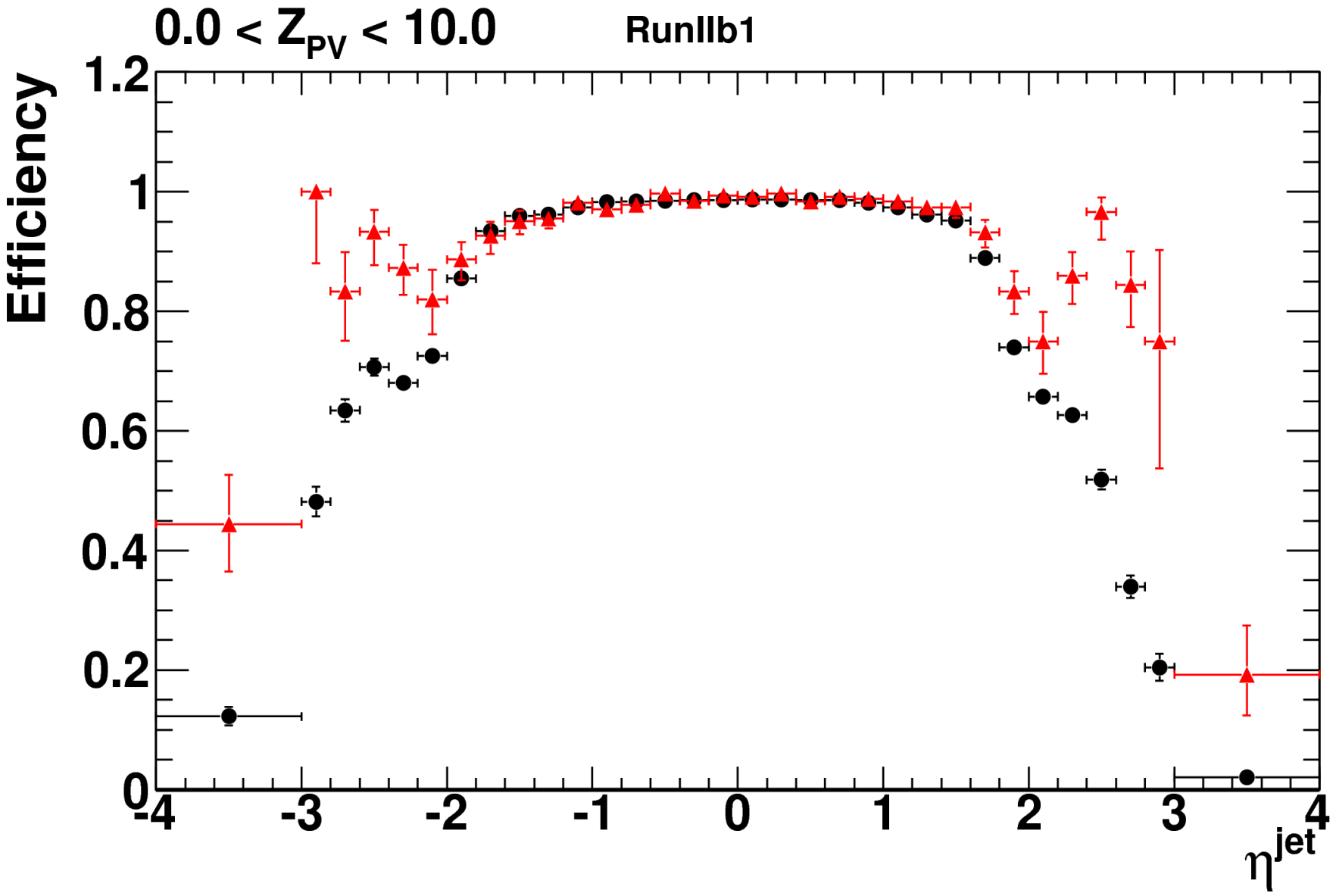




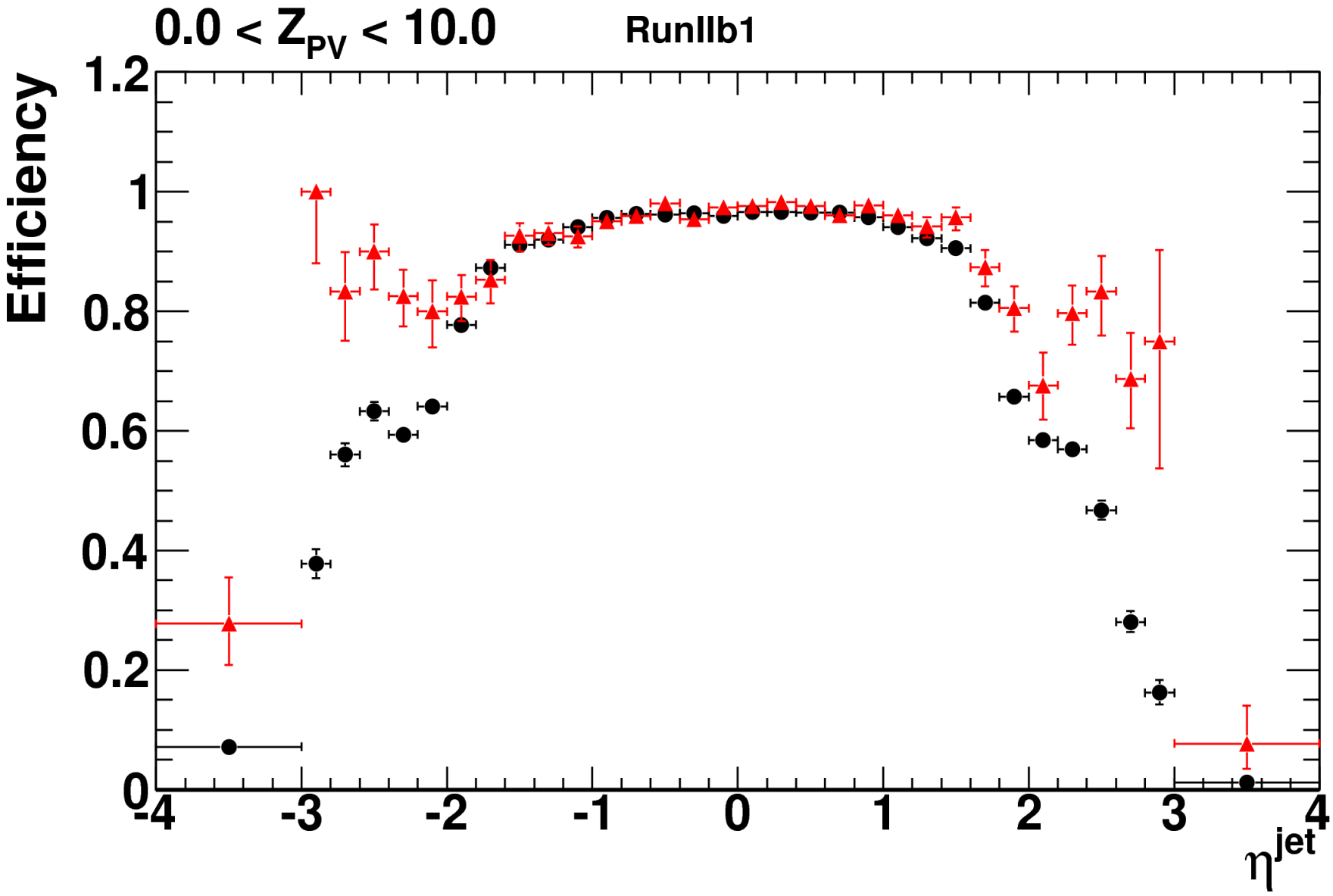




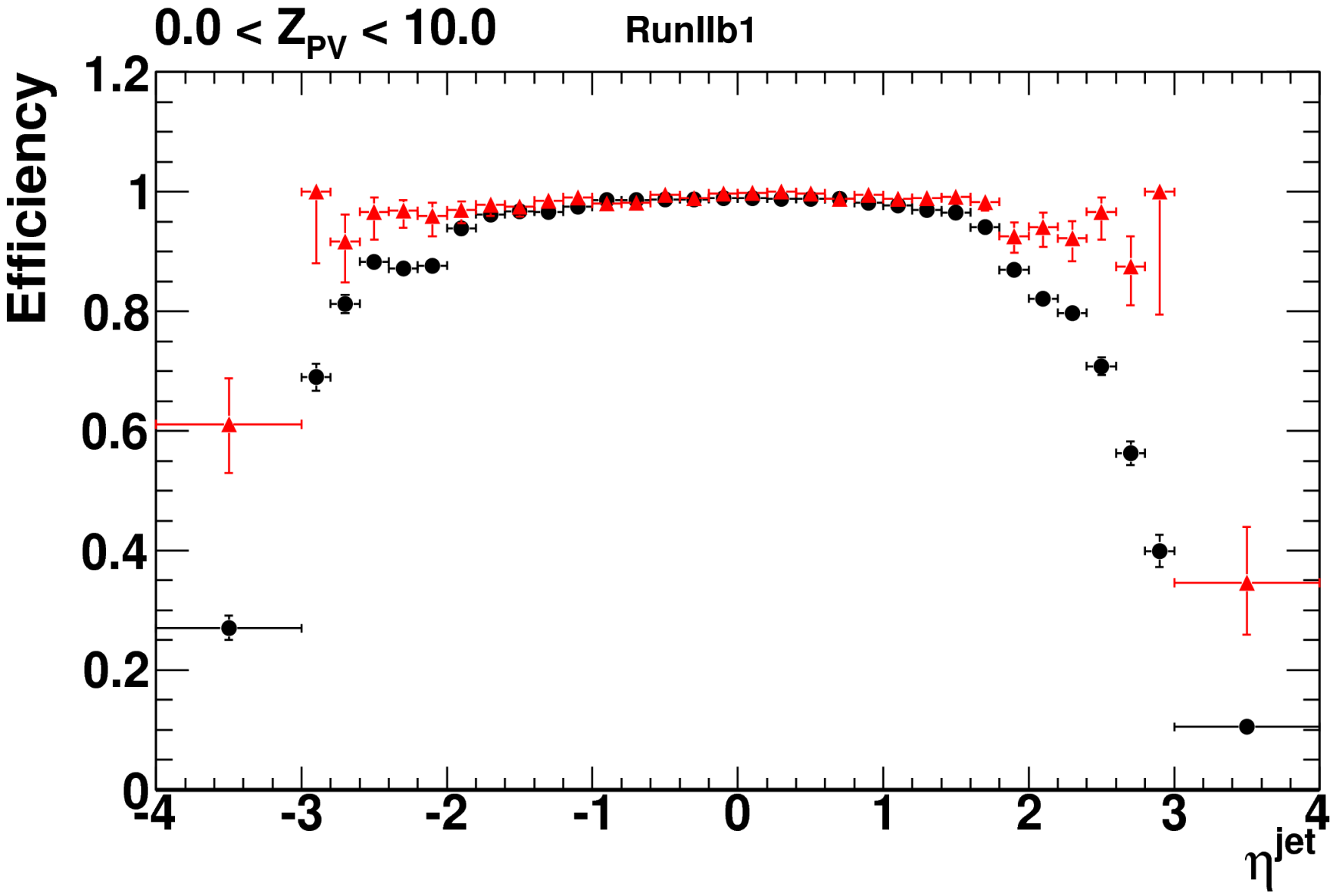
FOR VC1 (ntrkM0>1)



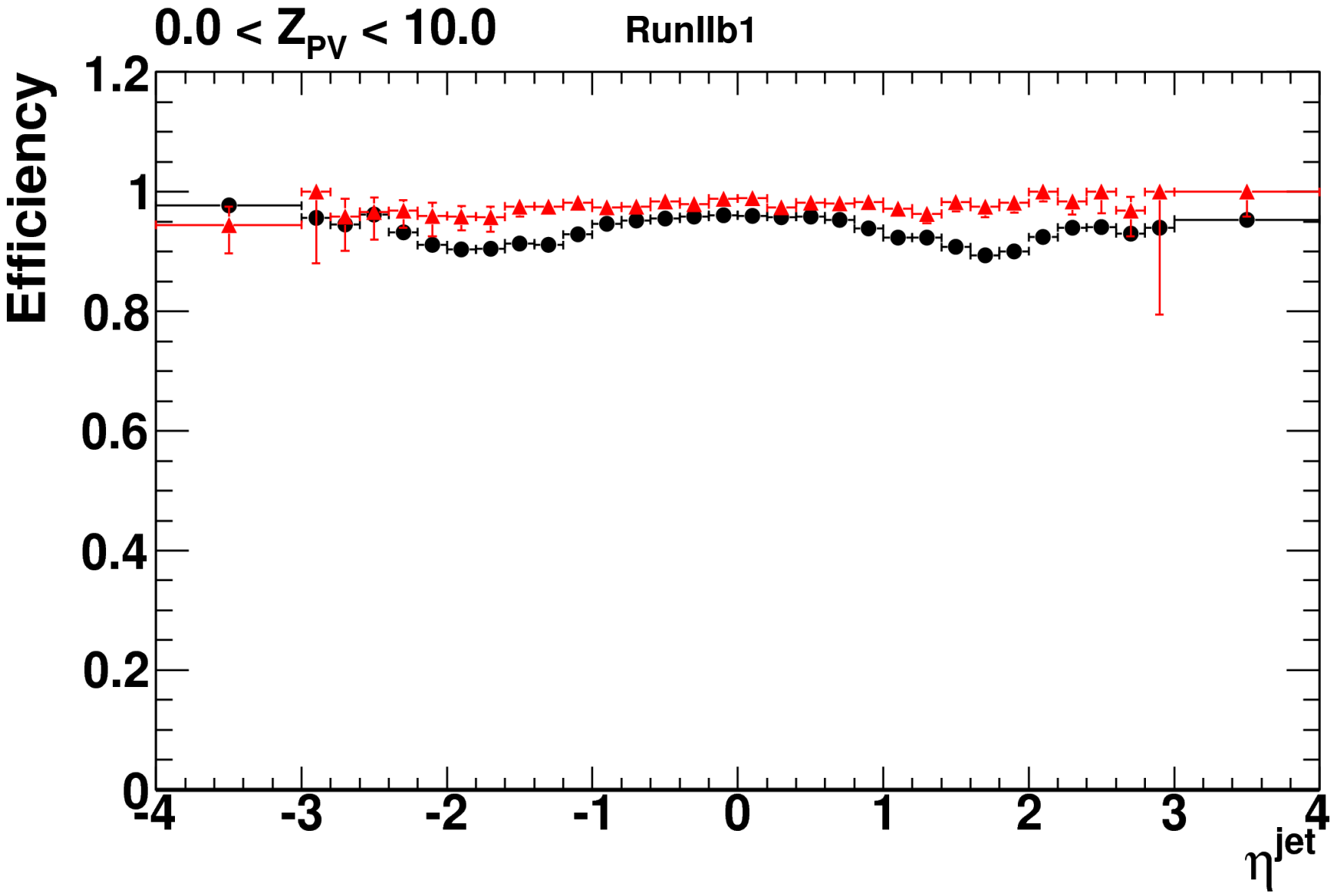
FOR VC4 (ntrkM0>1 and taggable)



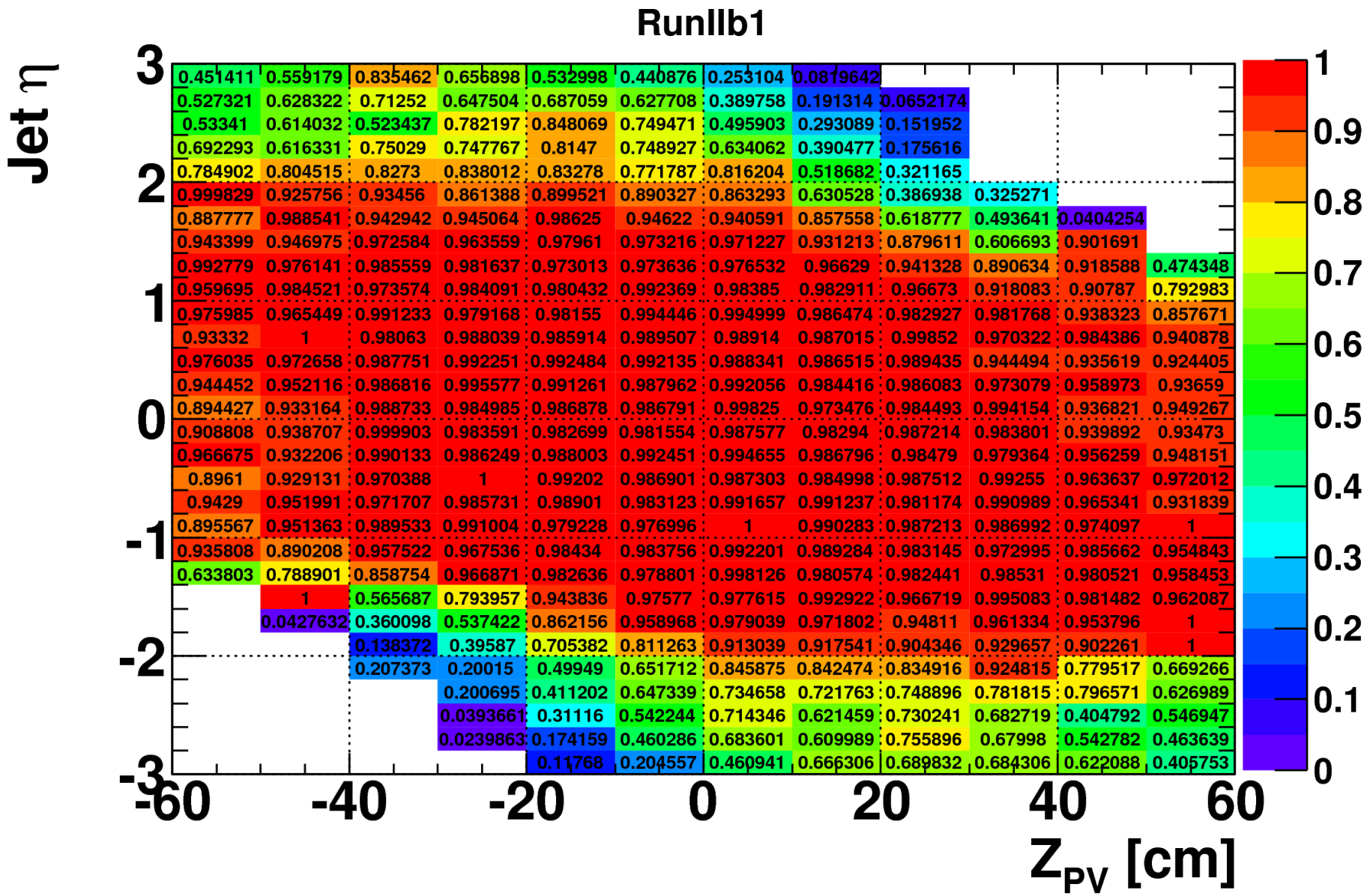
FOR VC2 (cpf0>0.5)



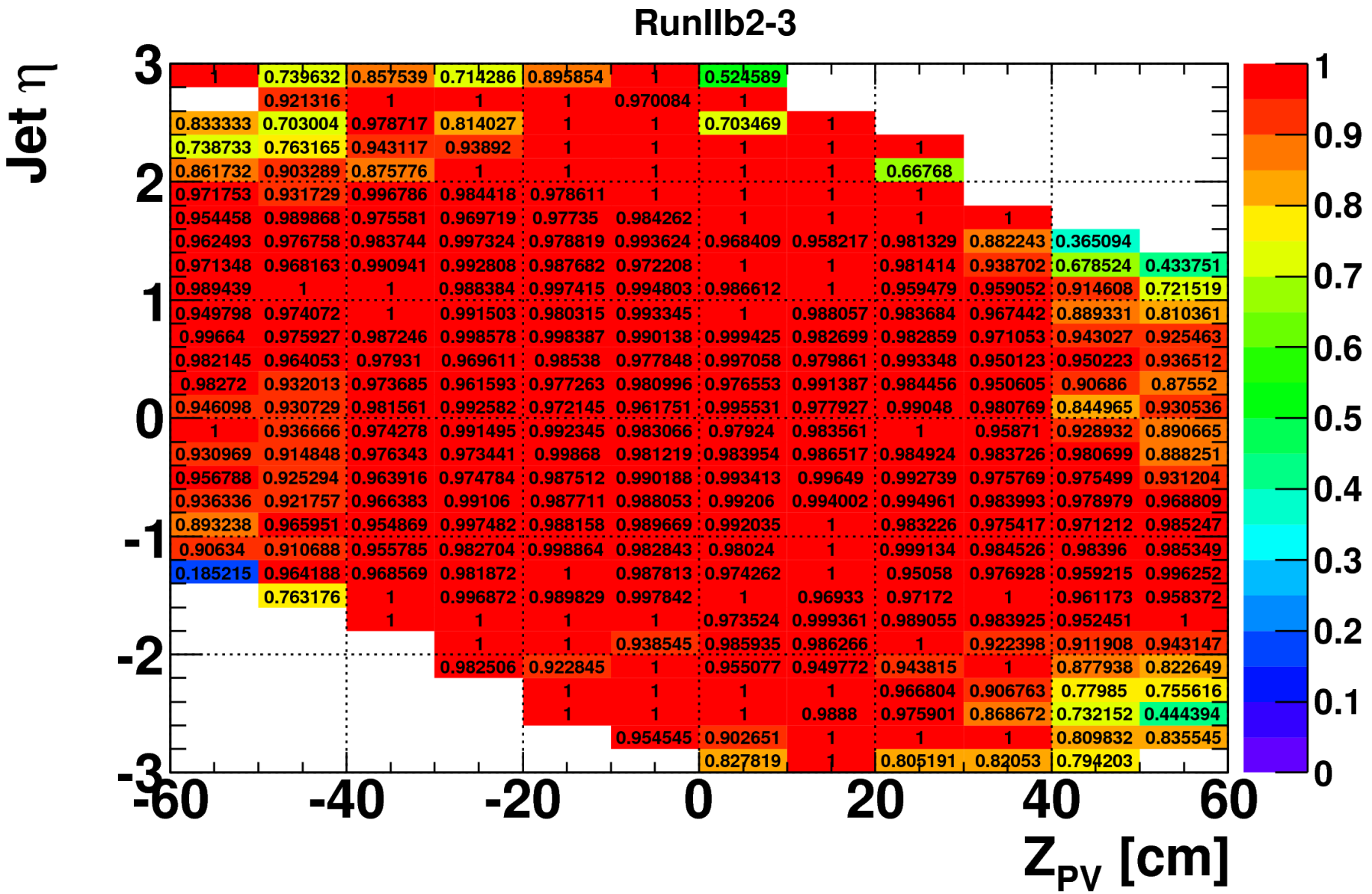
FOR VC3 (cpf0>0.85 || cpf0 == -1)



FOR VC1 AND INSTLUMI = [100,120]



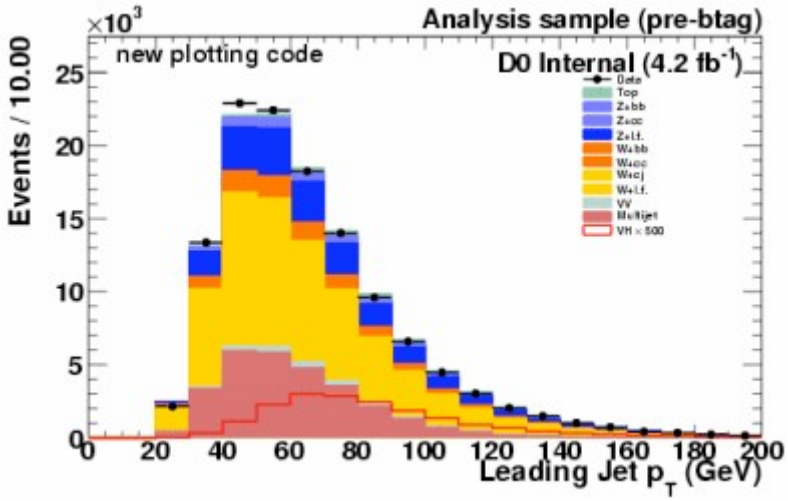
FOR VC1 AND INSTLUMI = [100,120]

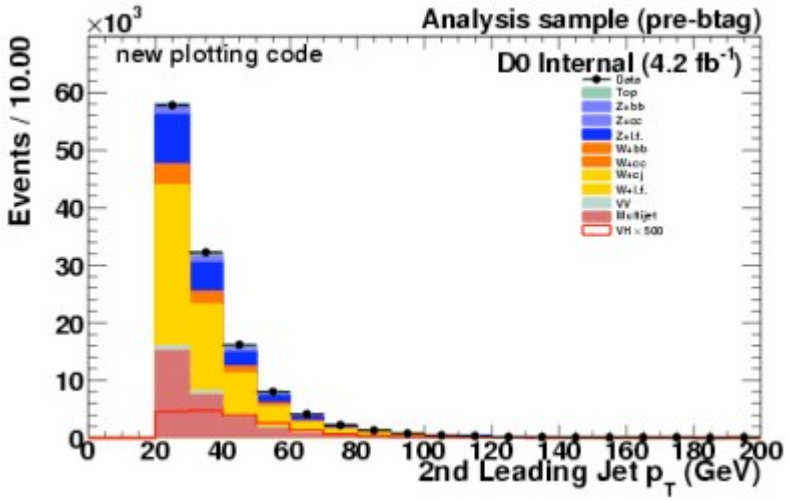


SUMMARY

- Certified all jet related SFs for summer

- Already tested in the ZH->nunubb analysis and it looks good.





- Need feedback as soon as possible.

BACKUP