JET-ID SCALE FACTORS FOR SUMMER

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OUTLINE:

Introduction

Results

Summary

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 2^{rd} 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_war mcellfix

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:

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

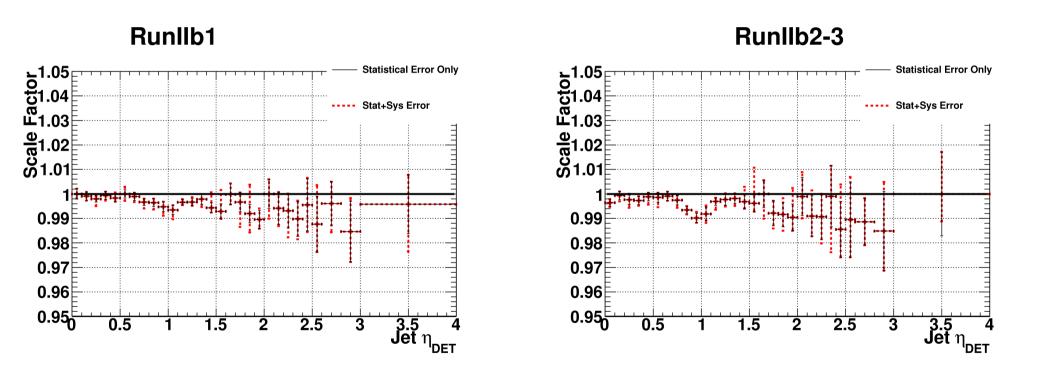
Instructions are posted in the Jet-ID web site. http://www-d0.fnal.gov/phys_id/jets/jetid.html

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.



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JET-VC SF

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

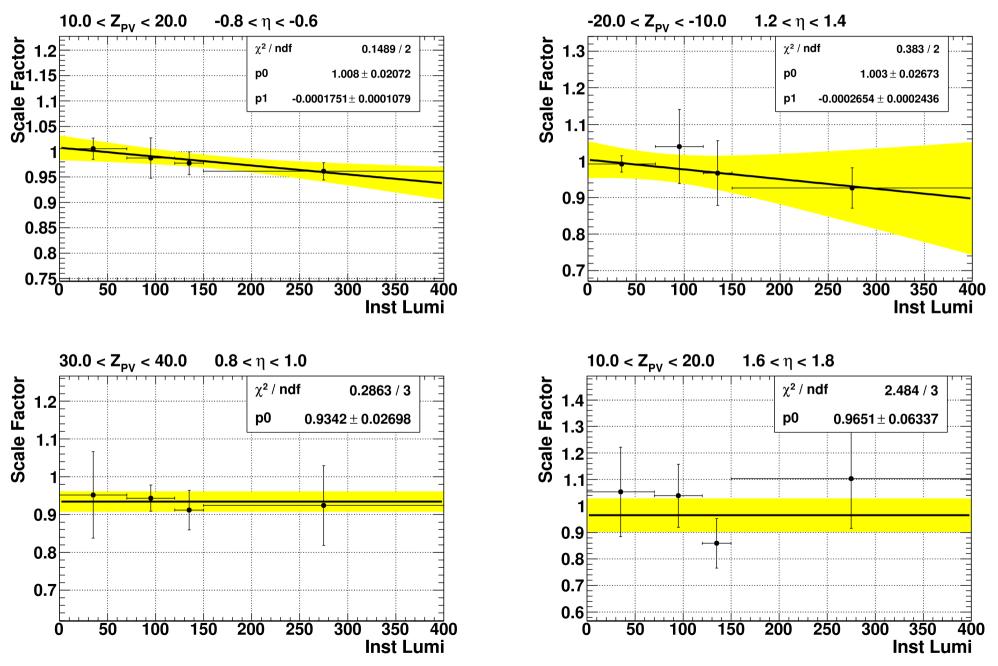
The tag selection requires the probe jet to be good.

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

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

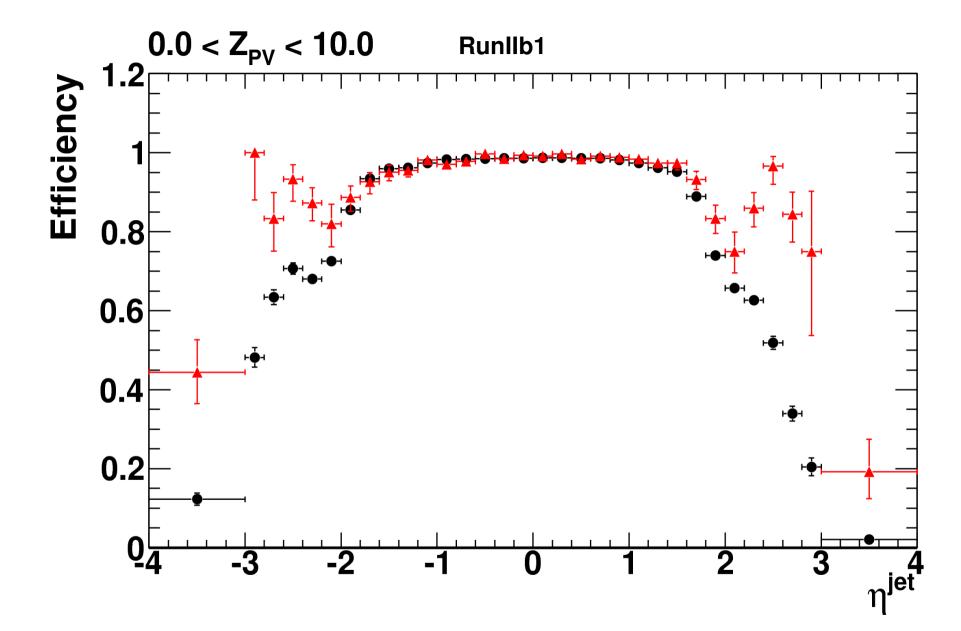
INSTLUMI DEPENDENCE

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.

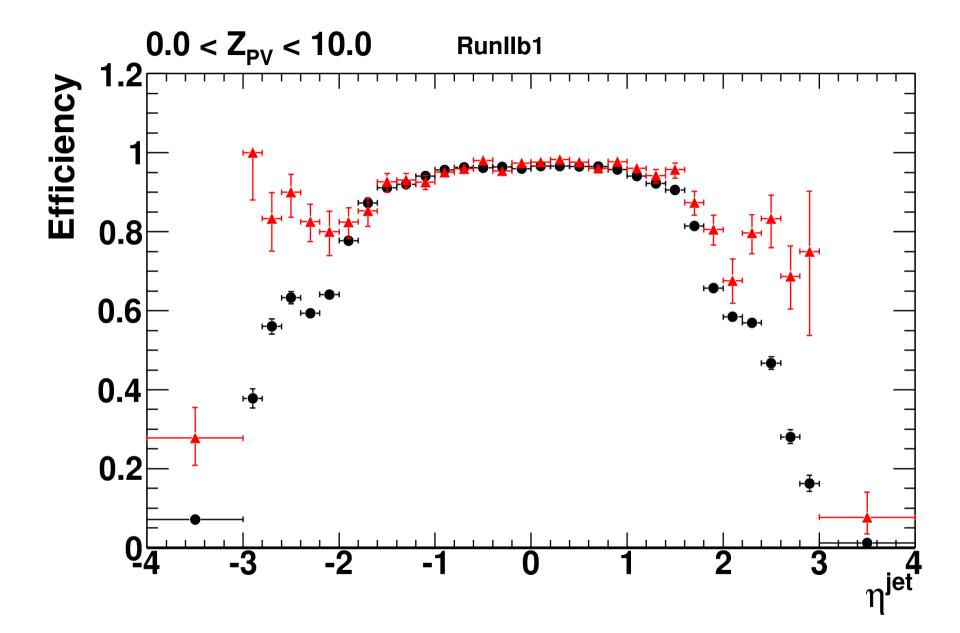


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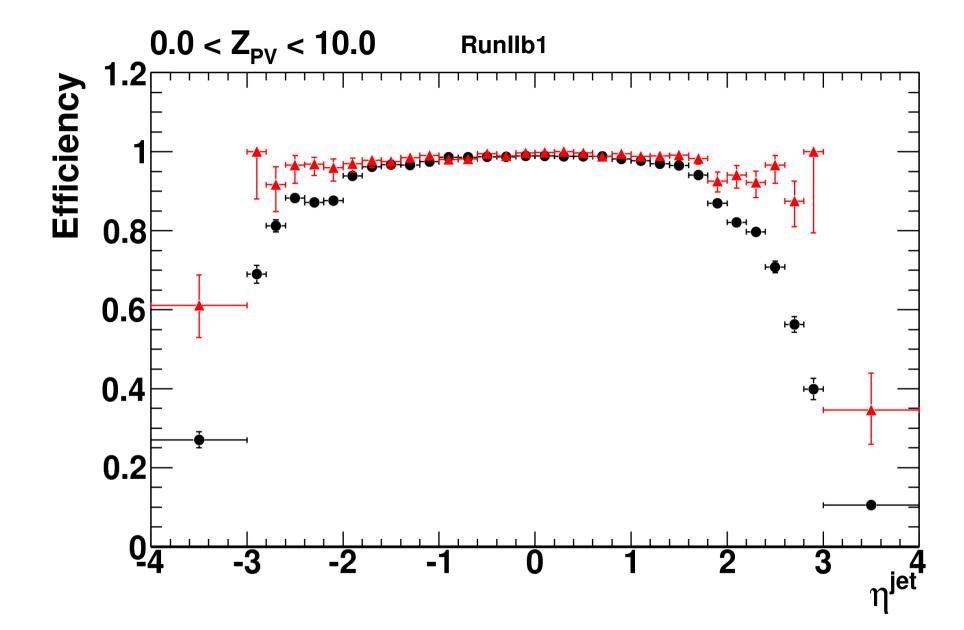
FOR VC1 (ntrkM0>1)



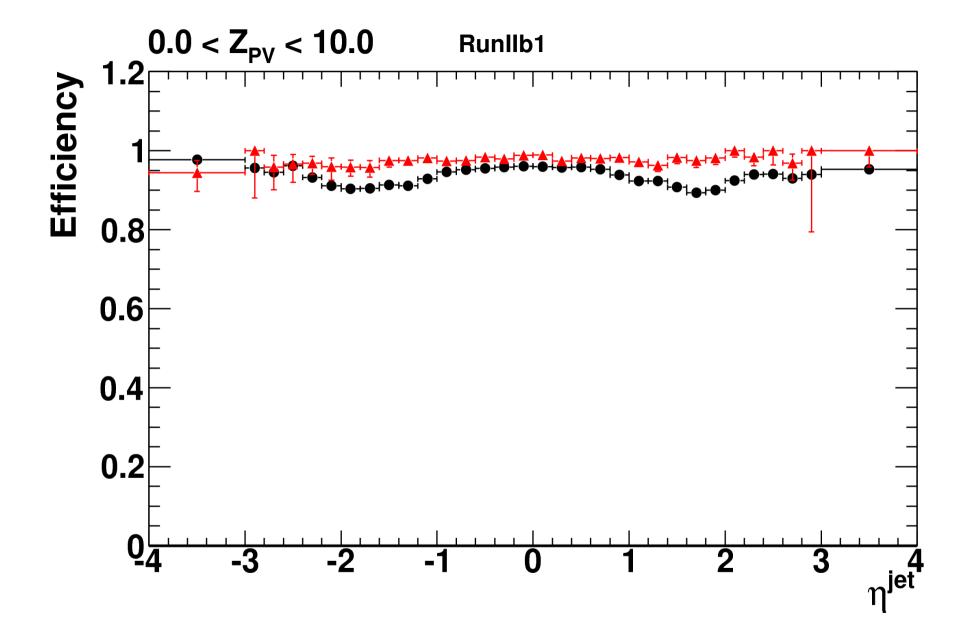
FOR VC4 (ntrkM0>1 and taggable)



FOR VC2 (cpf0>0.5)



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



FOR VC1 AND INSTLUMI = [100,120]

Runllb1

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		i.	0.0239863	0.174159		0.683601		0.755896		: 0.542782 0.622088		
_			0.0393661			0.714346						
_						0.734658		0.748896			0.626989	
_		0.207373	0.20015	0.49949		0.845875		0.834916	0.924815		0.66926 <u>6</u>	
		0.138372	0.39587	0.705382	0.811263	0.913039	0.917541	0.904346	0.929657	0.902261	1	
_	0.0427632	0.360098	0.537422	0.862156	0.958968	0.979039	0.971802	0.94811	0.961334	0.953796	1	
	1	0.565687	0.793957	0.943836	0.97577	0.977615	0.992922	0.966719	0.995083	0.981482	0.962087	
	0.788901			0.982636		0.998126		0.982441	0.98531	0.980521	0.958453	
0.935808		0.957522	0.967536	• • • • • • • • • • • • •	0.983756	0.992201	0.989284	0.983145	0.972995	0.985662	0.954843	
0.895567	0.951363	0.989533	0.991004	0.979228	0.976996	1	0.990283	0.987213	0.986992	0.974097	1	
0.9429	0.951991	0.971707	0.985731	0.98901		0.991657		0.981174	0.990989	0.965341	0.931839	
0.8961	0.929131		1	0.99202		0.987303		0.987512	0.99255	0.963637	0.972012	
	0.932206	0.990133	0.986249	0.988003		0.994655	0.986796	0.98479	0.979364	0.956259	0.948151	
	0.938707	0.999903	0.983591	0.982699	0.981554	0.987577	0.98294	0.987214	0.983801	0.939892	0.93473	
_	0.933164	0.988733	0.984985	0.986878	0.9867902	0.99825	0.973476	0.984493	0.994154	0.936821	0.93059	
	0.972656	0.986816	0.992251	0.992484	0.992135	0.988341	0.986515	0.986083	0.944494	0.935619	0.924405	
0.93332	0.972658	0.98063		0.985914	0.989507	0.98914	0.987015	0.99852	0.970322	0.984386	0.94087 <u>8</u> 0.924405	
	0.965449	0.991233	0.979168	•		0.994999		+				
	0.984521		0.984091		0.992369	0.98385	0.982911	: 0.96673	0.918083	0.90787	0.792983	
		0.985559		0.973013		0.976532		-	0.890634	0.918588	0.474348	_
_		0.972584		0.97961		0.971227			0.606693		0.471010	
		0.942942	0.945064	0.98625		:0.940591	0.857558			0.0404254		
_		0.93456	0.861388			0.863293						
	0.804515	0.8273	0.838012			0.816204		0.321165				
	0.616331	0.75029	0.747767	0.8147		0.634062		0.175616			_	
	0.614032		0.782197			0.495903					_	
0.527321	0.628322	0.71252	0.647504	0.687059	0.627708	0.389758	0.191314	0.0652174		-	_	
0.431411	0.559179	0.035402	0.000000	0.532990	0.440676	0.253104	0.0019042			!	_	

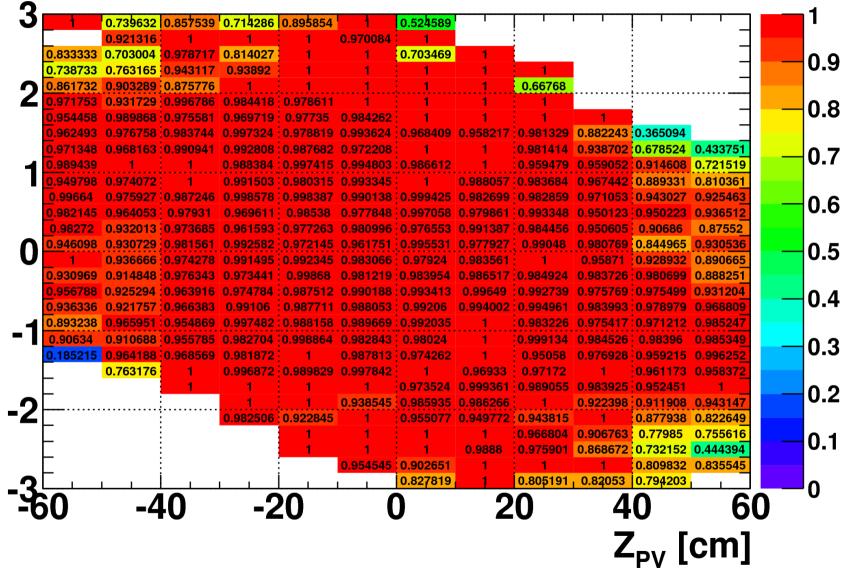
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FOR VC1 AND INSTLUMI = [100,120]

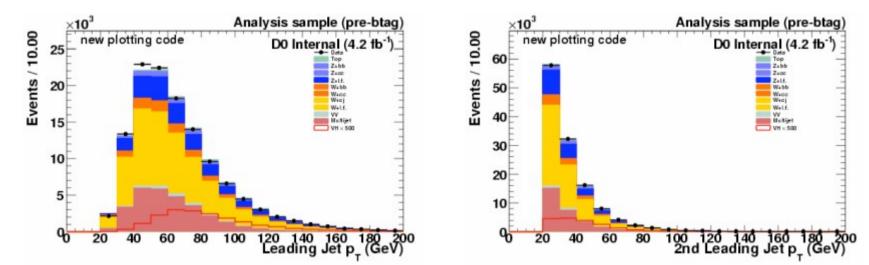
Runllb2-3



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Jet

- 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

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