HF jets analysis

08-12.01.2021 ALICE@IFJ meeting

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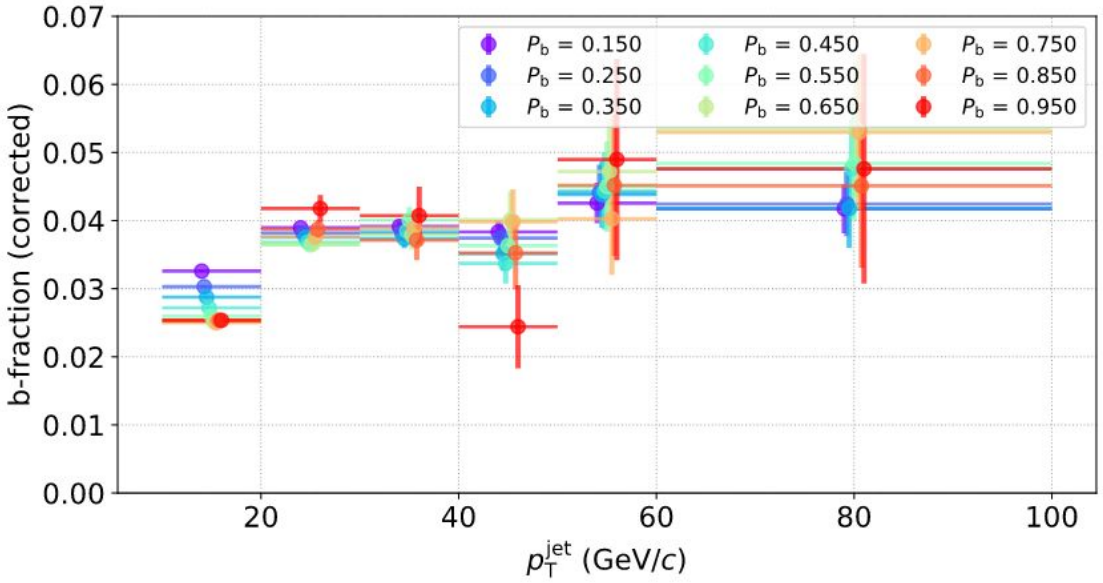
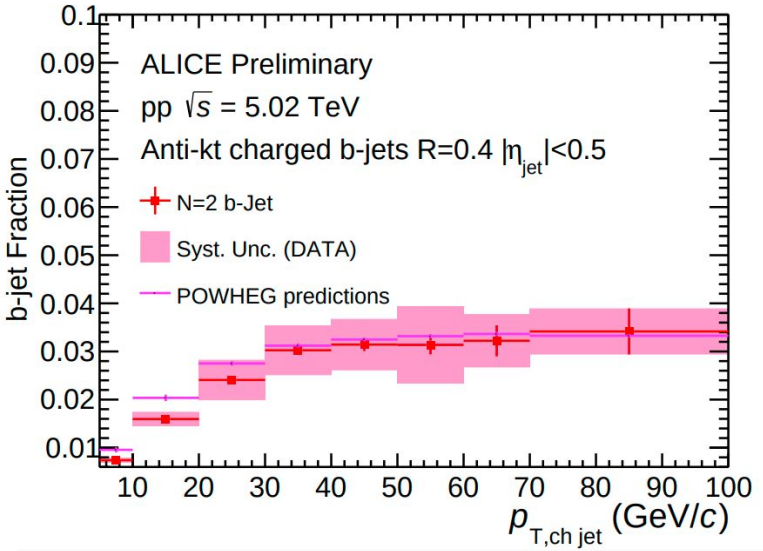
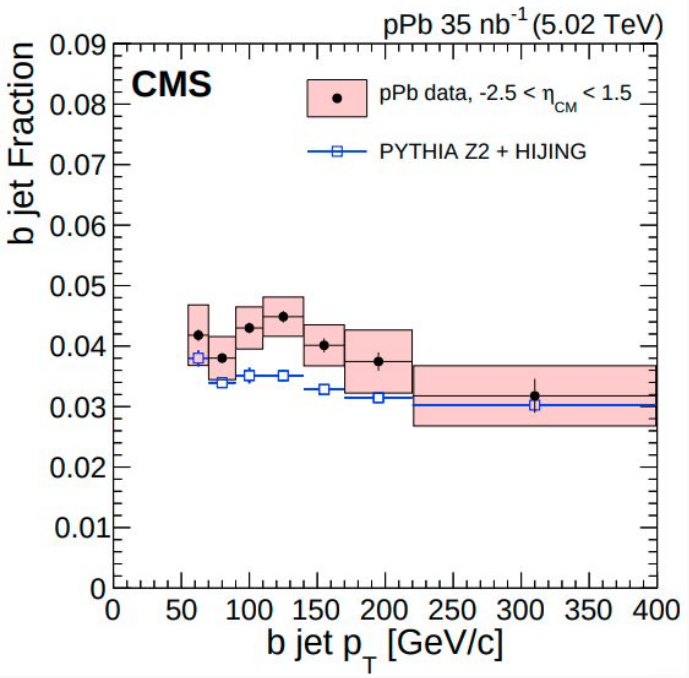
Incompatible results?

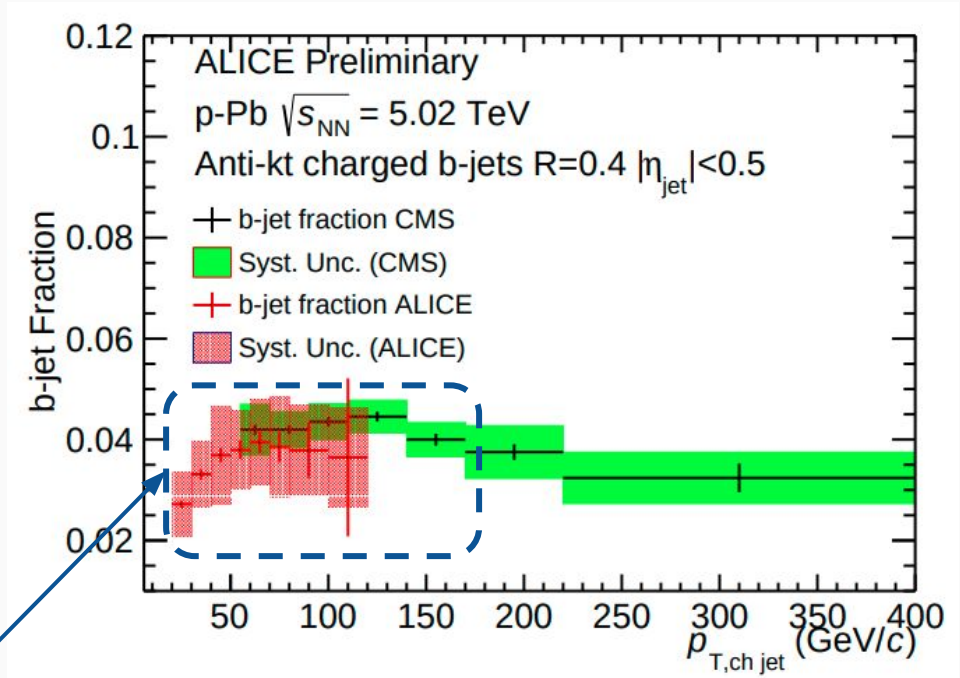




Incompatible results? CMS pPb

CMS paper about b-jets @ 5.02 TeV but in pPb not pp: https://arxiv.org/abs/1510.03373





optimistically: hint of slight underestimation in ALICE pPb results (*IP method*) transfers also to underestimation in pp

data-driven methods in IP and SV ana.

1. IP analysis:
   template fits to:
   - JetProb p. 18-19, Fig. 13 and Fig. 76-79

   and as systematics:
   - jet mass – consistent w/ JetProb, (Fig. 39) not discriminating? (Fig. 38 and 80-83)
   - SVfE – good discrimination (Fig. 40,), large diff. w.r.t. JetProb 15-30% of ε (Fig. 42)
2. SV analysis:
   - SV inv. mass sec. quite complicated procedure, sec. 6.2, p.15-25
     (most displaced passing topo. criteria)

they are used to validate in data-driven way efficiency and purity calculated previously on MC

Validation in my analysis

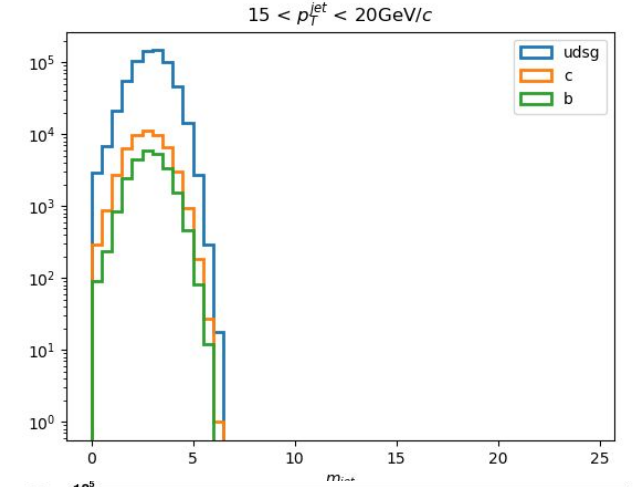
1) jet mass, SV mass – drawback: not really discriminating?

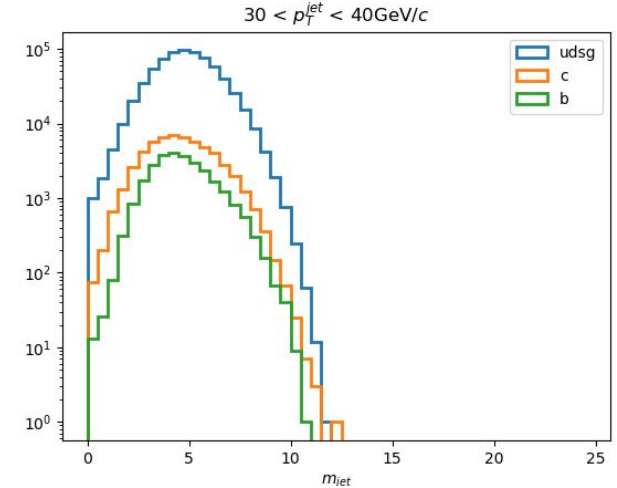
2) train on tracks – validate on SV (via template fitting) and vice versa?

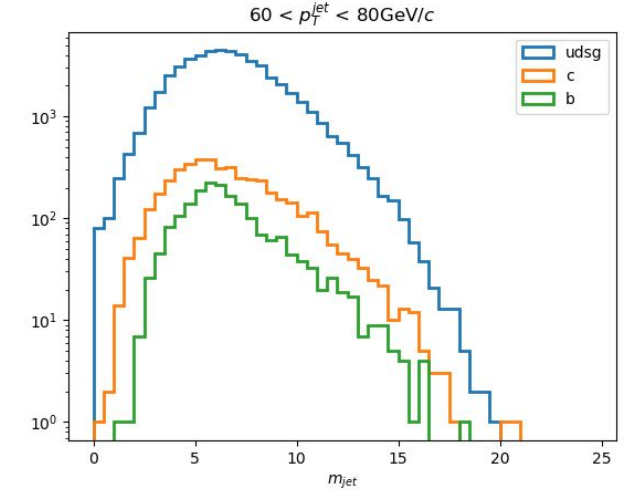
I have access to: jet mass (same looking as in IP ana.), SV mass(?)

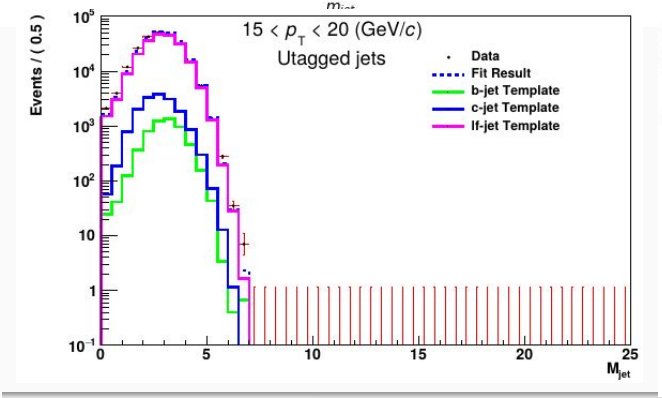
I don’t have access to: JetProb, SVfE(?),

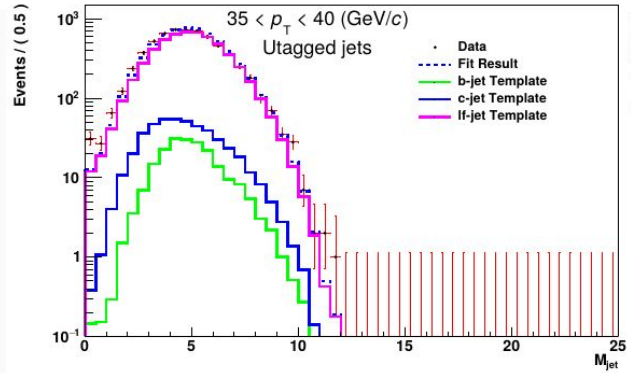
jet mass templates (compared to Fig. 80 in IP analysis)

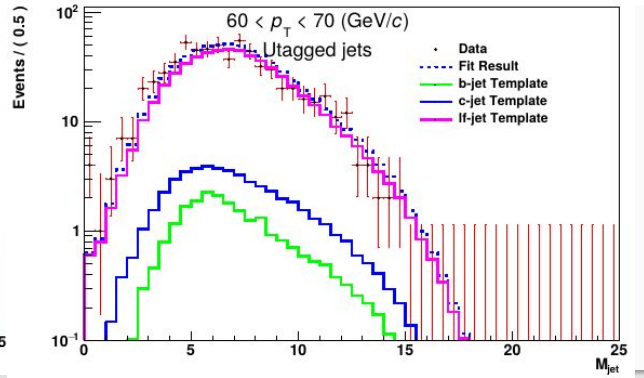




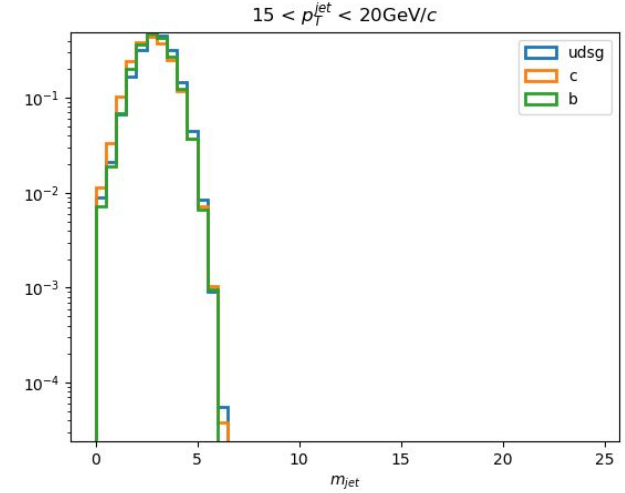


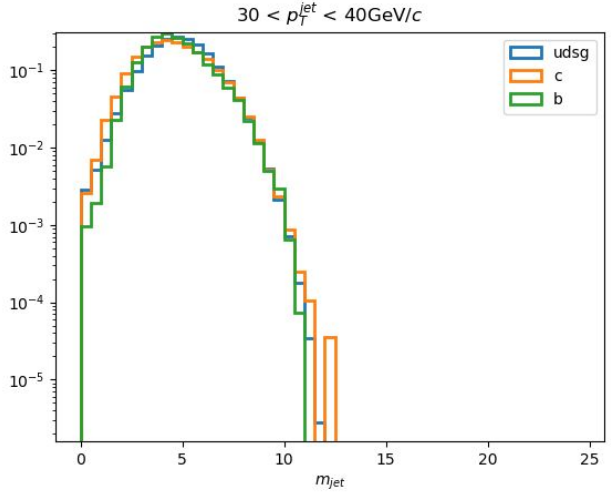


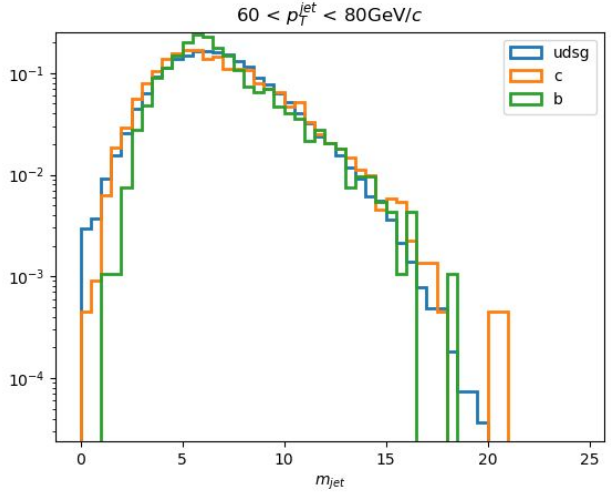




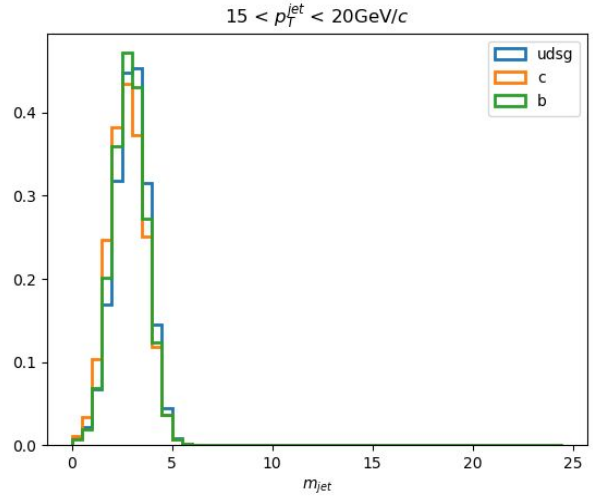
jet mass templates (log y, normed)

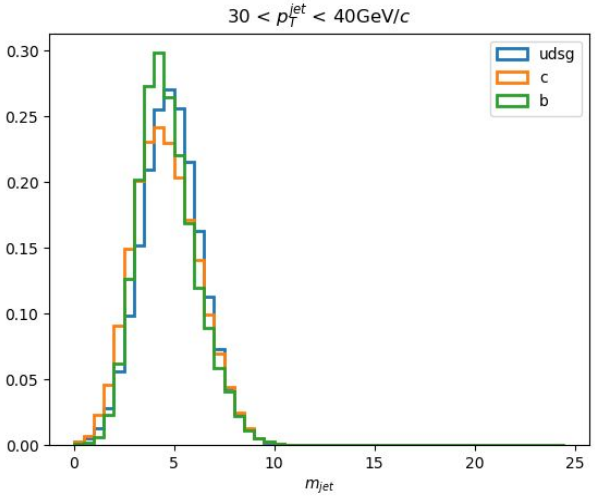


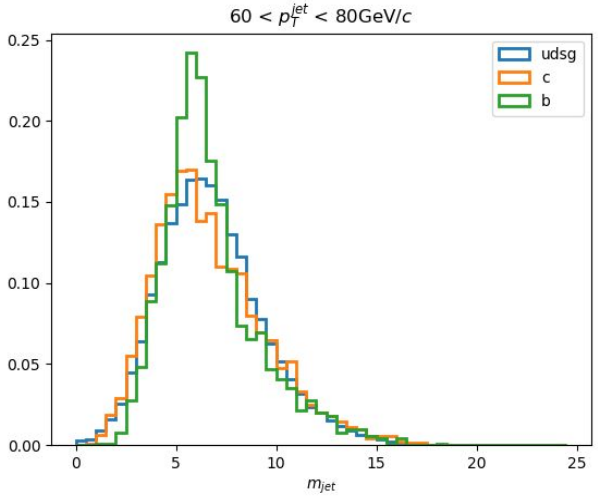




jet mass templates (linear y, normed)

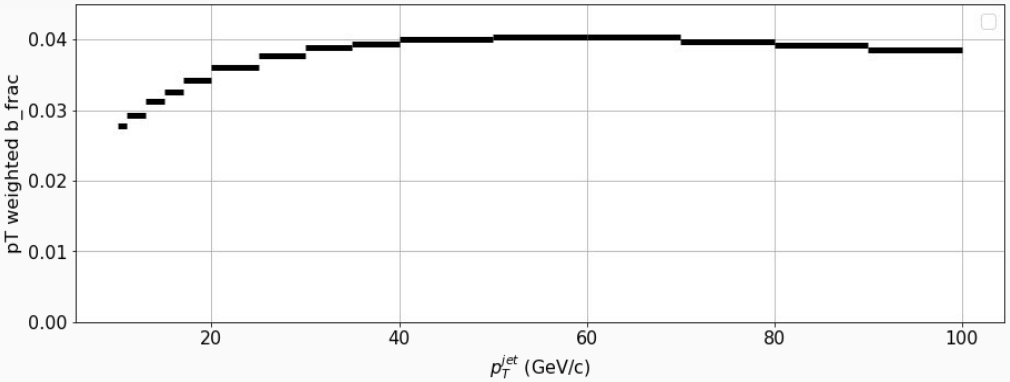


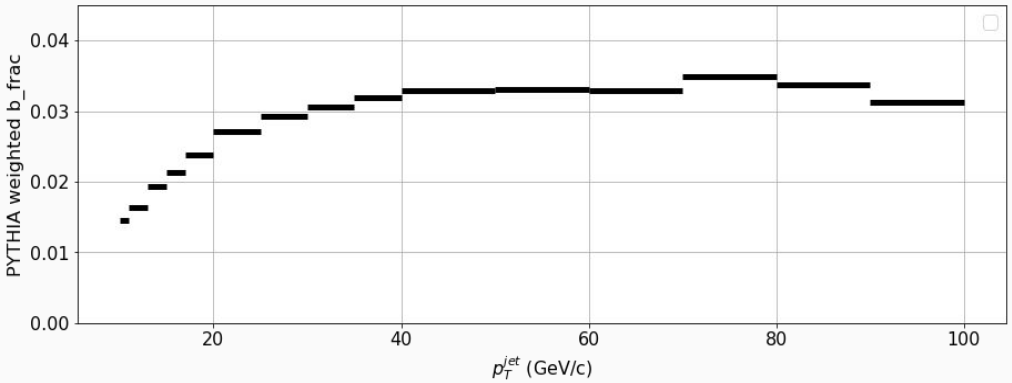




beginning of slides for 12.01.2021

PYTHIA–weights VS pT–weights





<u>true b-frac from MC</u>

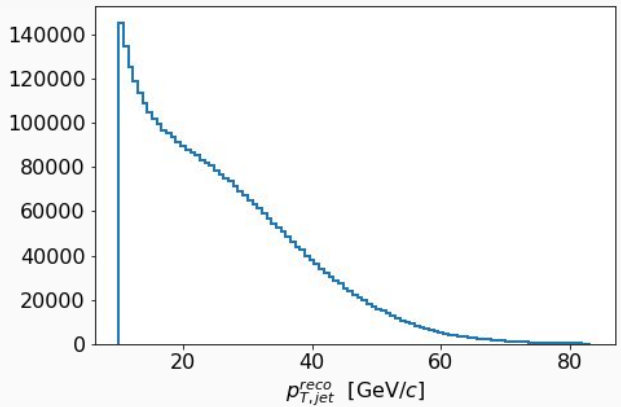
pT–weights
-> reproduction of shape of p_T distr. from data, function of (p_T)

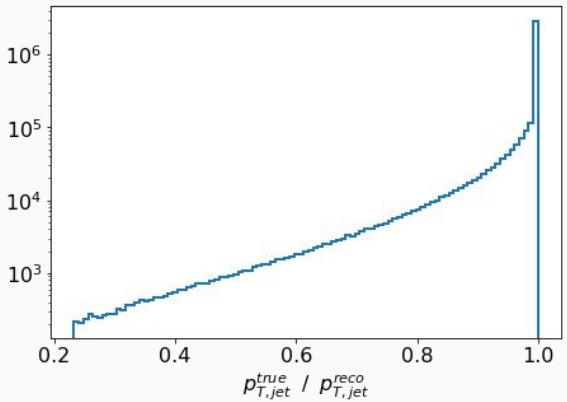
PYTHIA–weights
-> based on generator info,
function of (*pythia bin id*)

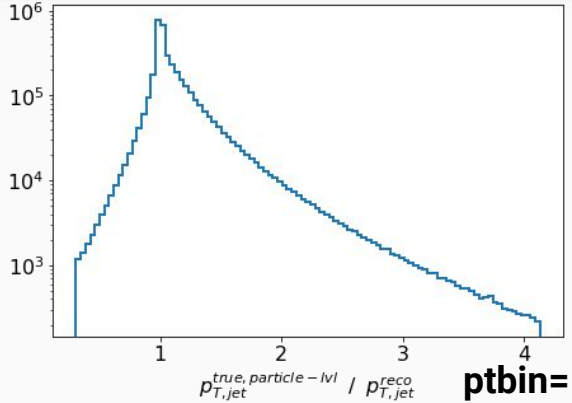
difference changing w/ p_T from 1.2% to 0.6% (relatively: 80-20%)
most pronounced at low p_T

dependence very similar to my VS ALICE results

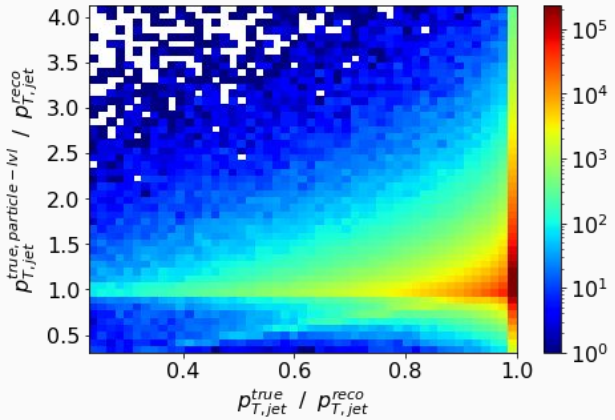
JES, definitions: link

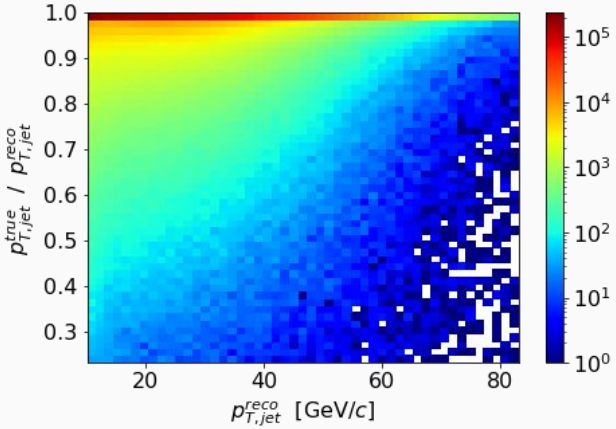


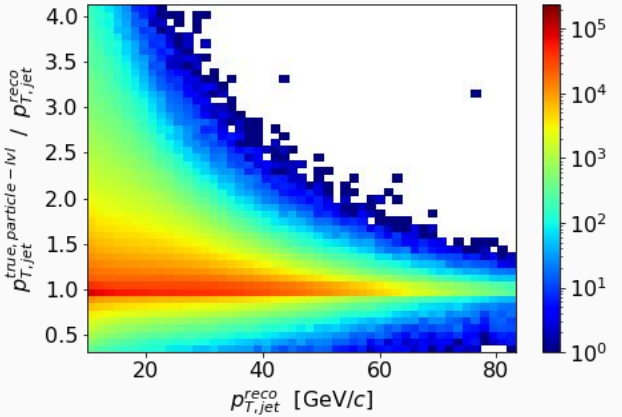




ptbin=10







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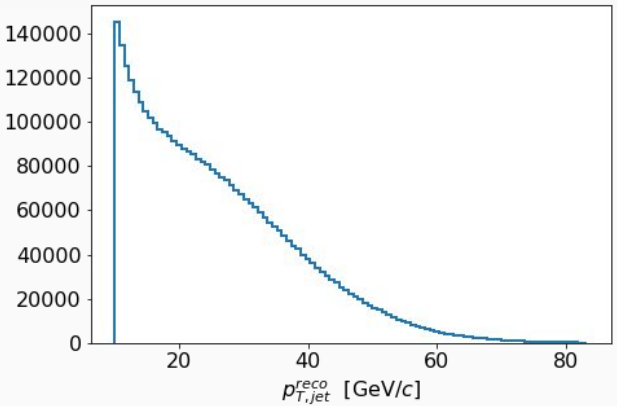
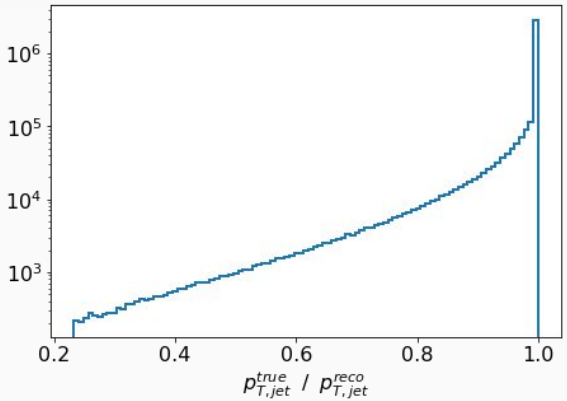
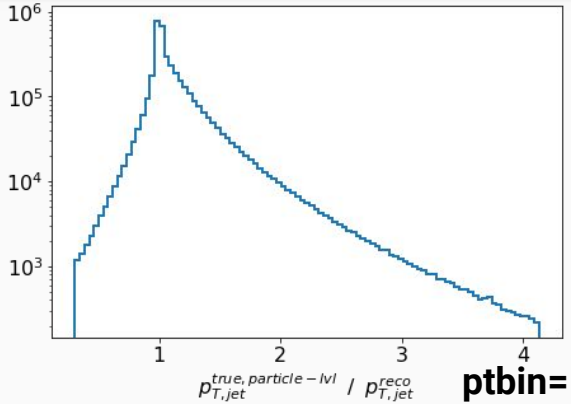






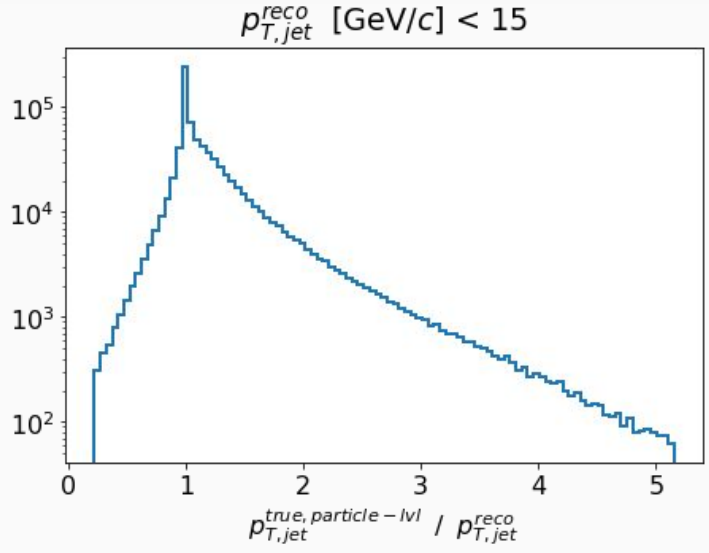
ptbin=10

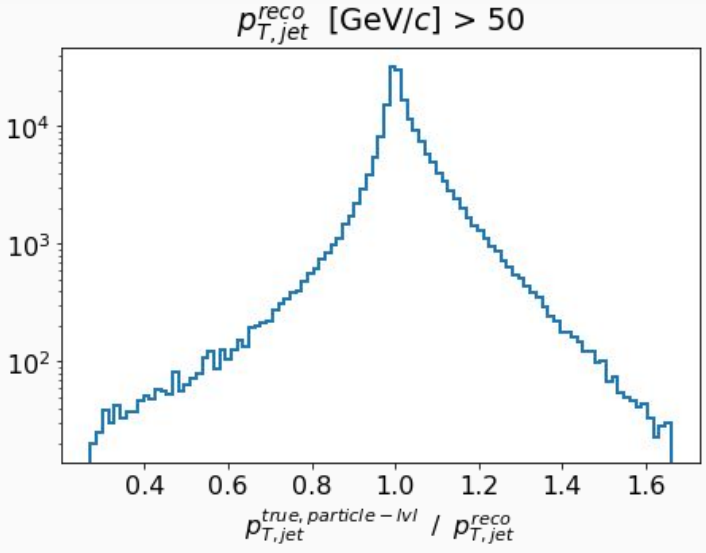
after the discussion:

`Jet_MC_TruePtFraction` (middle plot):
(sum of constit. w/ positive labels) / (sum of constit.), i.e. tracks not well reconstructed are not included.

`Jet_MC_TruePtFraction_PartLevel` (right):
(sum of MC particles in the cone, may be not reco.) / (sum of constit.)
i.e. eff x reco. correction but on a jet-by-jet basis (e.g. jets not reco. at all are not included)

JES – large parton level pT-frac





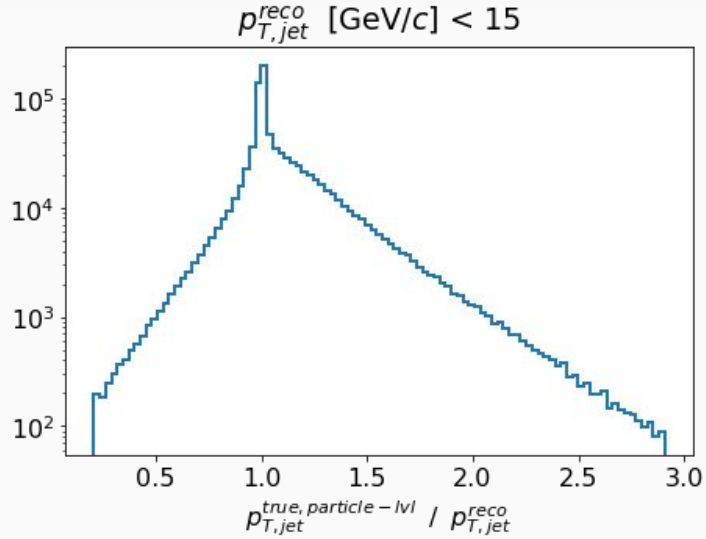
PYTHIA hardptbin = 10
$p_{T,gen}$ = 56–72 GeV/c

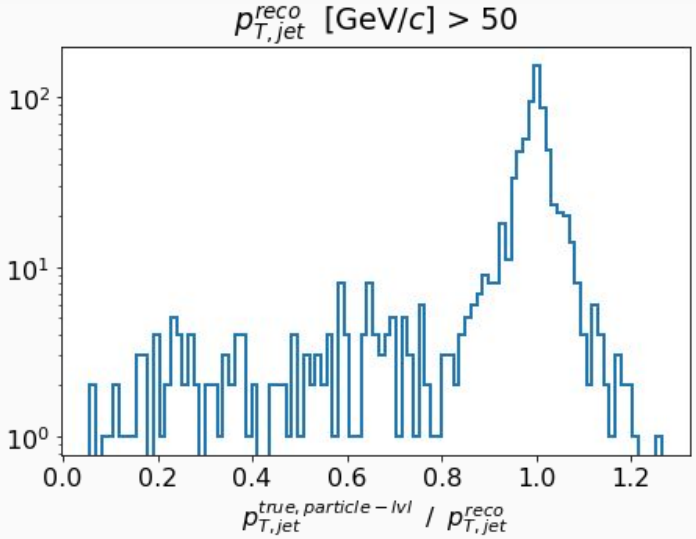
Jet_Pt:	12.34 +/- 1.44
Jet_MC_TruePtFraction:	0.97 +/- 0.08
Jet_MC_TruePtFraction_PartLevel:	1.25 +/- 0.52

Jet_Pt:	58.46 +/- 9.04
Jet_MC_TruePtFraction:	0.97 +/- 0.09
Jet_MC_TruePtFraction_PartLevel:	1.02 +/- 0.11

there are a lot of jets with particle level fraction quite different from 1, especially for lower reco. pT but even for jets with reco. pT > 50 GeV/c 2σ = 20% which is over 10 GeV/c !

JES – large parton level pT-frac





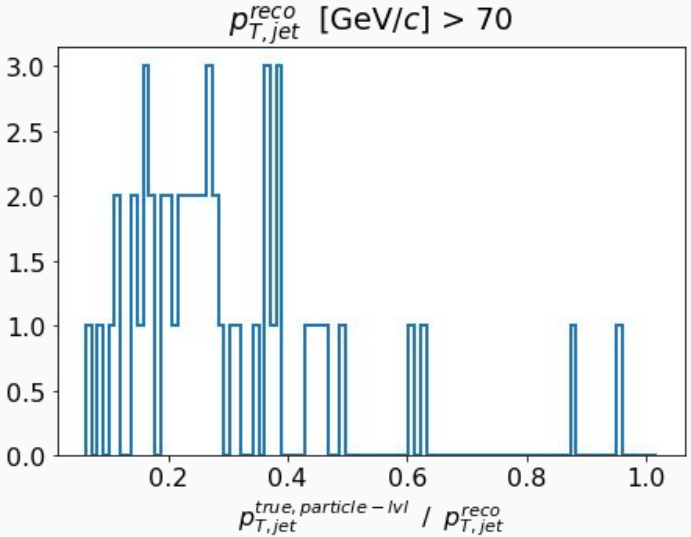
PYTHIA hardptbin = 7
$p_{T,gen}$ = 26–38 GeV/c

Jet_Pt:	12.31 +/- 1.44
Jet_MC_TruePtFraction:	0.98 +/- 0.08
Jet_MC_TruePtFraction_PartLevel:	1.12 +/- 0.28

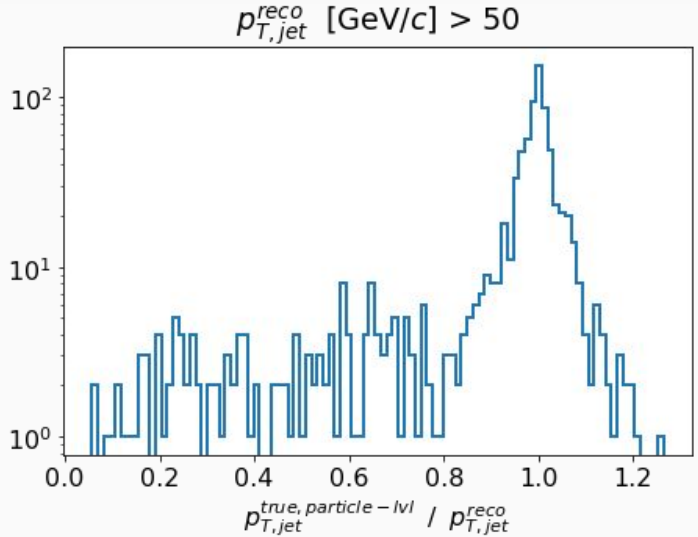
Jet_Pt:	57.21 +/- 15.38
Jet_MC_TruePtFraction:	0.92 +/- 0.23
Jet_MC_TruePtFraction_PartLevel:	0.91 +/- 0.22

TruePtFraction strongly dependent on generated pT

JES – large parton level pT-frac



Jet_Pt: 105.47 +/- 32.60
Jet_MC_TruePtFraction: 0.41 +/- 0.43
Jet_MC_TruePtFraction_PartLevel: 0.31 +/- 0.20



Jet_Pt: 57.21 +/- 15.38
Jet_MC_TruePtFraction: 0.92 +/- 0.23
Jet_MC_TruePtFraction_PartLevel: 0.91 +/- 0.22

PYTHIA hardptbin = 7
$p_{T,\,gen}$ = 26–38 GeV/c

For $p_{T,\,reco} >> p_{T,\,gen}$ TruePtFraction is small