HF jets analysis

26.05.2020 ALICE@IFJ meeting

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Outline

1. Pass3 re-merging
2. Progress in HF-jets analysis
3. Questions & issues
4. Plans for next week

pass3 re-merging status

- re-merging completed
- problem with trending.root files --
  - with new AliPhysics/AliDPG versions they have different structure
  - my columns concerning chunk info + detector working conditions are missing

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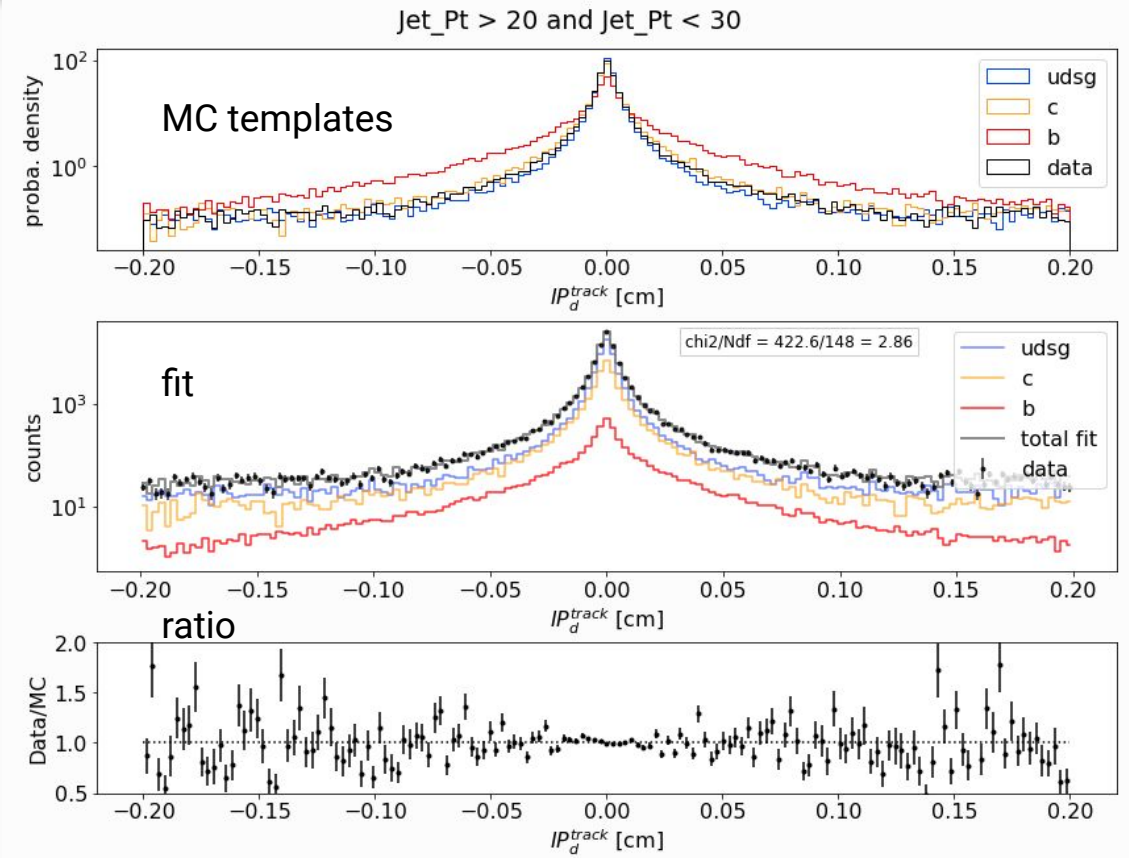
template fit with DCA



impact parameter distribution yields quite unstable results:
usually ~5-9% b-jets and ~17-25% c-jets

- due to similar shape of *udsg-* and *c-jets* templates?
- it would be much easier with signed (asymmetric) IP

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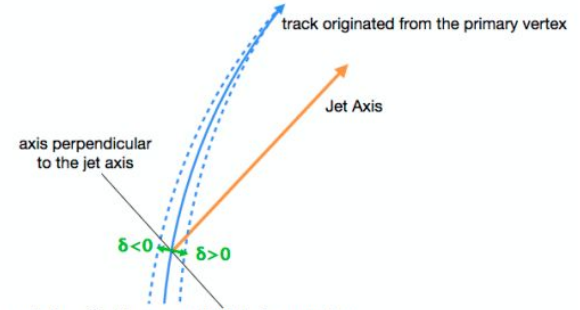

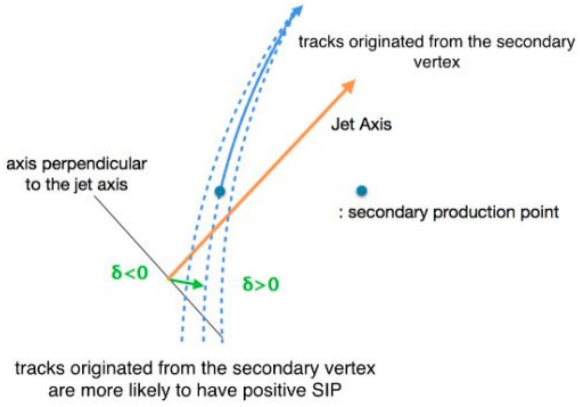

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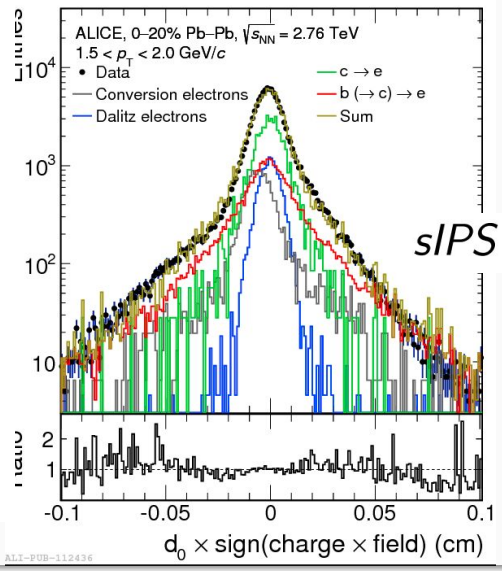
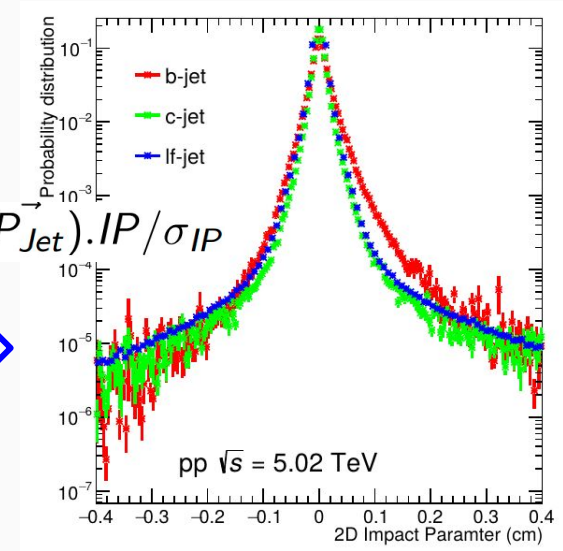


$$sIPS = sign(\vec{IP}.\vec{P_{Jet}}).IP/\sigma_{IP}$$



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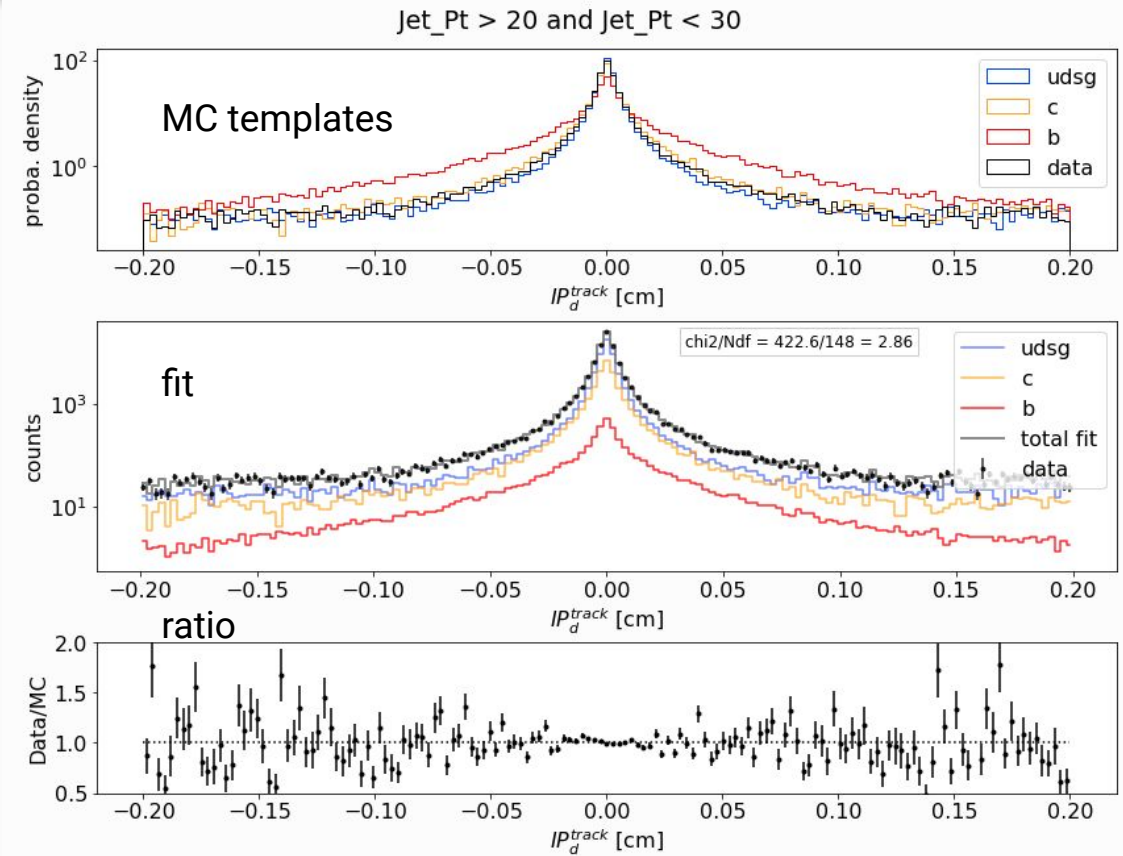

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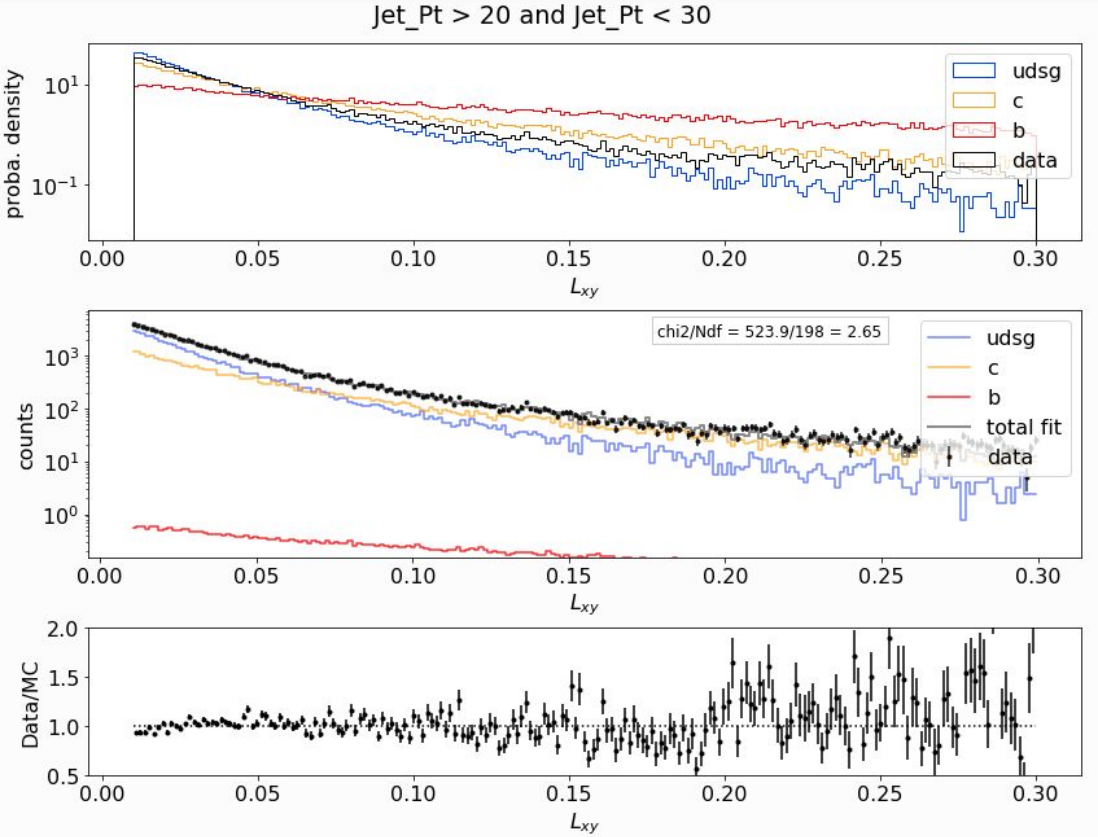
potential solution is to fix c-to-b ratio to some reasonable value, e.g. from other analysis
(c2b ratio = 2-3 for jet pT > 20 GeV/c)

for c2b ratio ~2.5:
c-jets: 17-23%, *b-jets*: 9-10%

If one focus only on minimizing chi2/Ndf, then lowest values are obtained for very small *b-* (1.5-4%) and large (43-52%) *c-jets* fraction (c2b ratio >= 10) as in example on the left

all abovementioned results of HF fraction are probably far too high (expected *b*: 2-3% and *c*: 5-7%)

template fit with Lxy



similar story as for IP: one can get fairly good fit but the obtained flavour fractions vary too much

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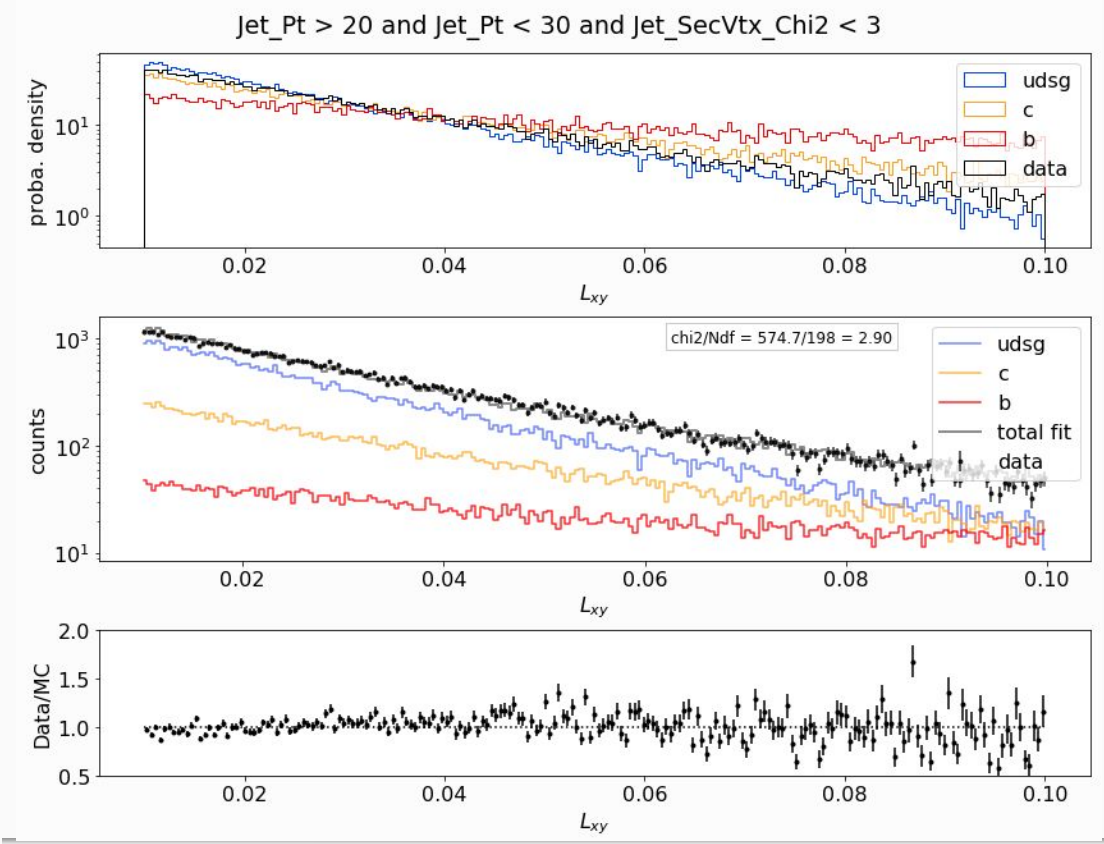

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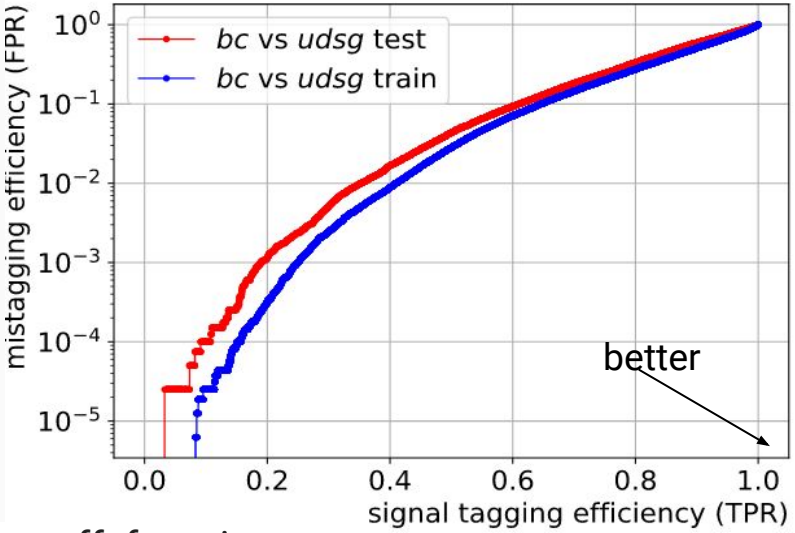
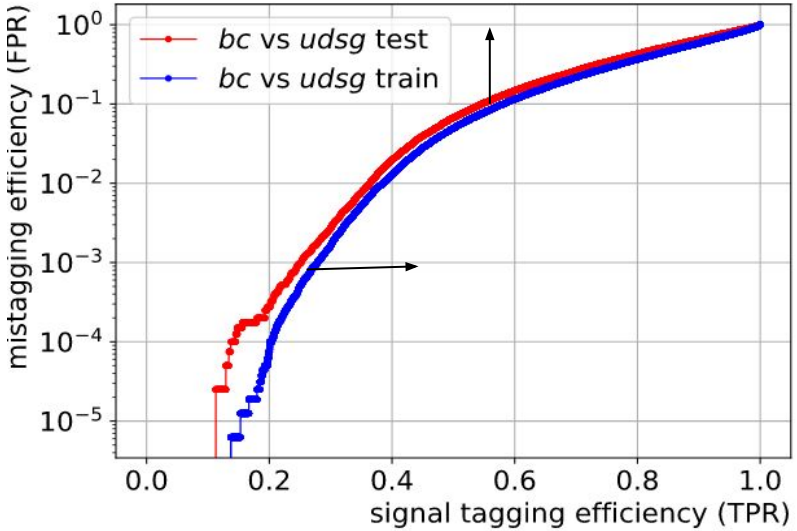
model selection - SV sorting

sort by abs(Lxy/sigma)



sort by Dispersion or Chi2 or adding cuts



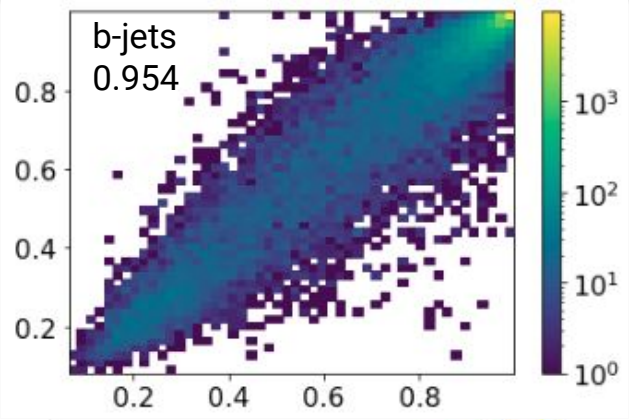
tagging eff. for mistag.

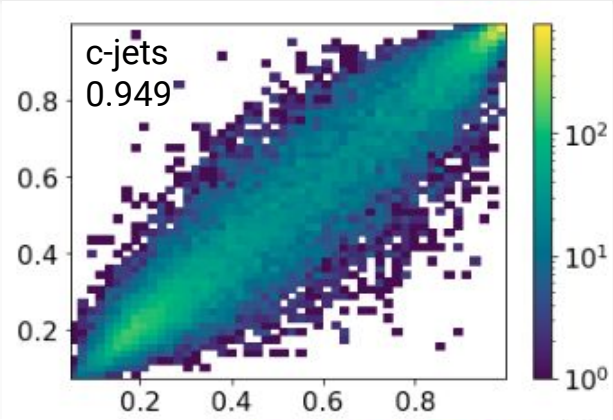
rate = 10^-3, 10^-2, 10^-1: 19.0 - 35.3 - 61.1%

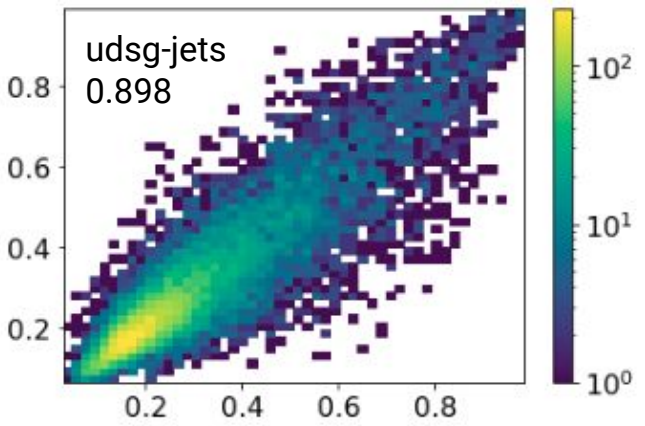
25.2 - 36.4 - 54.6%

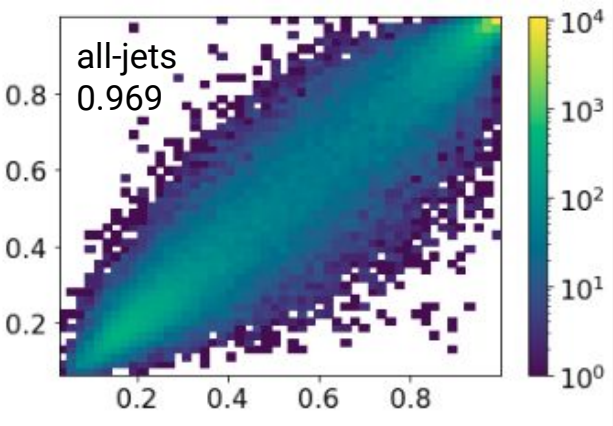
similar effect observed also for tracks: IPd and Pt
effect is weaker if more SV are added or SV & tracks are combined

model selection - models yields similar scores









x-axis: score from model trained on tracks sorted by IPd

y-axis: … sorted by Pt

very high overall corr. = 0.969

model selection

150+ experiments done

total improvement:
from: 28.8 - 43.7 - 66.3%
to: 32.1 - 45.9 - 67.4%

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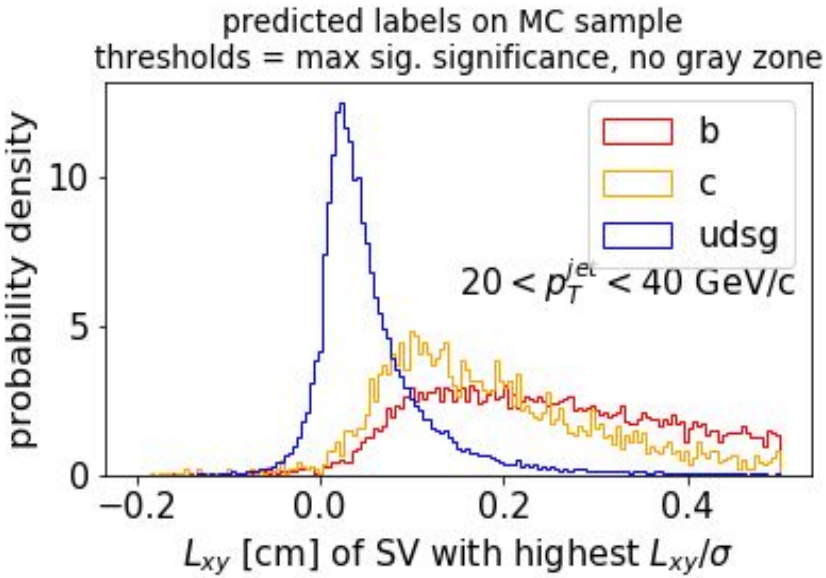
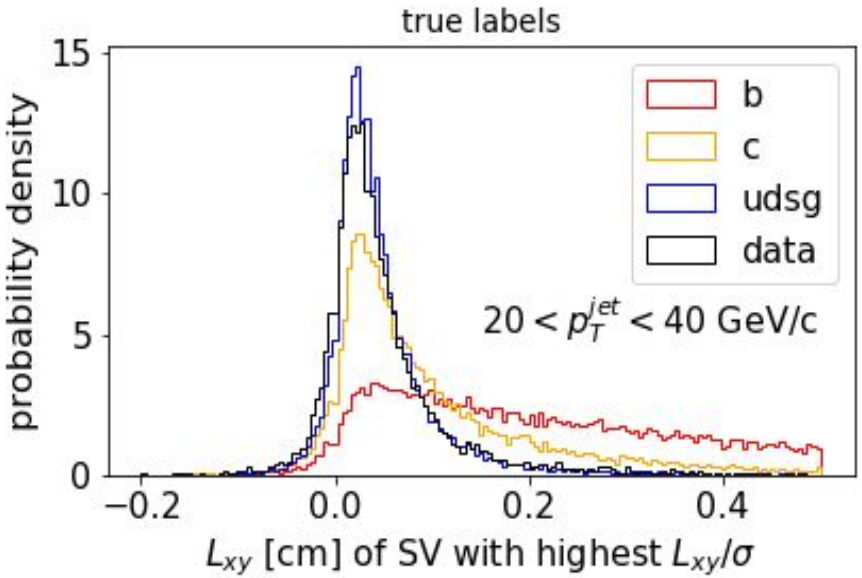
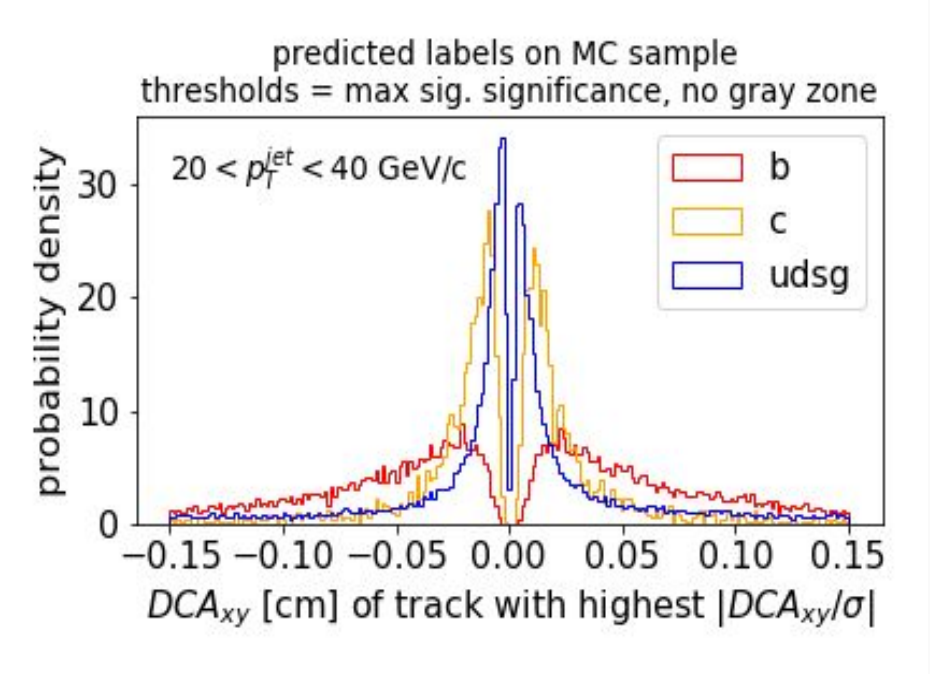
Lxy of most signific. displaced SV

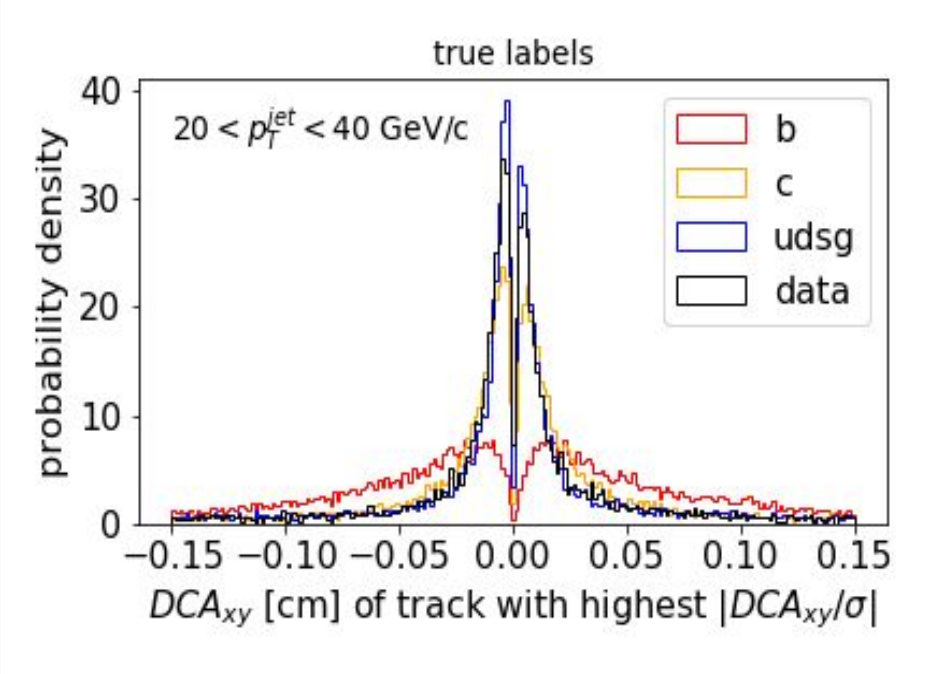




this observable is used extensively by model

IPd (= DCA_xy) of most displaced track





Backup

discussion about ML in PWG-JE

- discussion initiated during HP approvals during PF, analysis by Laura & Hannah (Yale) presentation analysis-note
- LHC15o
- biggest concern: bias from using PYTHIA fragmentation, potential solutions:
  - use JEWEL - works fine in PbPb in CMS/ATLAS - but: not integrated in ALICE framework
  - use pp embedded in PbPb - but: embedding is challenging (in timescale of HP)
  - variation = quark-gluon fragmentation - already done
  - change training

discussion about ML in PWG-JE: q-vs-g fragmentation

- the question if quark and gluon fragmentations are large enough variation:

YES

-

NO

- Peter:
  - q/g is fine syst. variation but not representative of quenching effects
  - g -> q+qbar or q radiating hard gluon - ambiguous definition
  - mechanism generating q/g differences is different than Eloss in medium - multiple soft gluons emissions

Peter

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  - g -> q+qbar or q radiating hard gluon - ambiguous definition
  - mechanism generating q/g differences is different than Eloss in medium - multiple soft gluons emissions
  - Toy model with tuned qhat

Mateusz

q/g differences are substantial, *vide* http://jets.physics.harvard.edu/qvg/

the issue is whether this difference captures the variations in the shower induced by interactions in the QG

James