Weekly meeting

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1. (FCFM-BUAP) 2.(ICN-UNAM)

ACORDE meeting

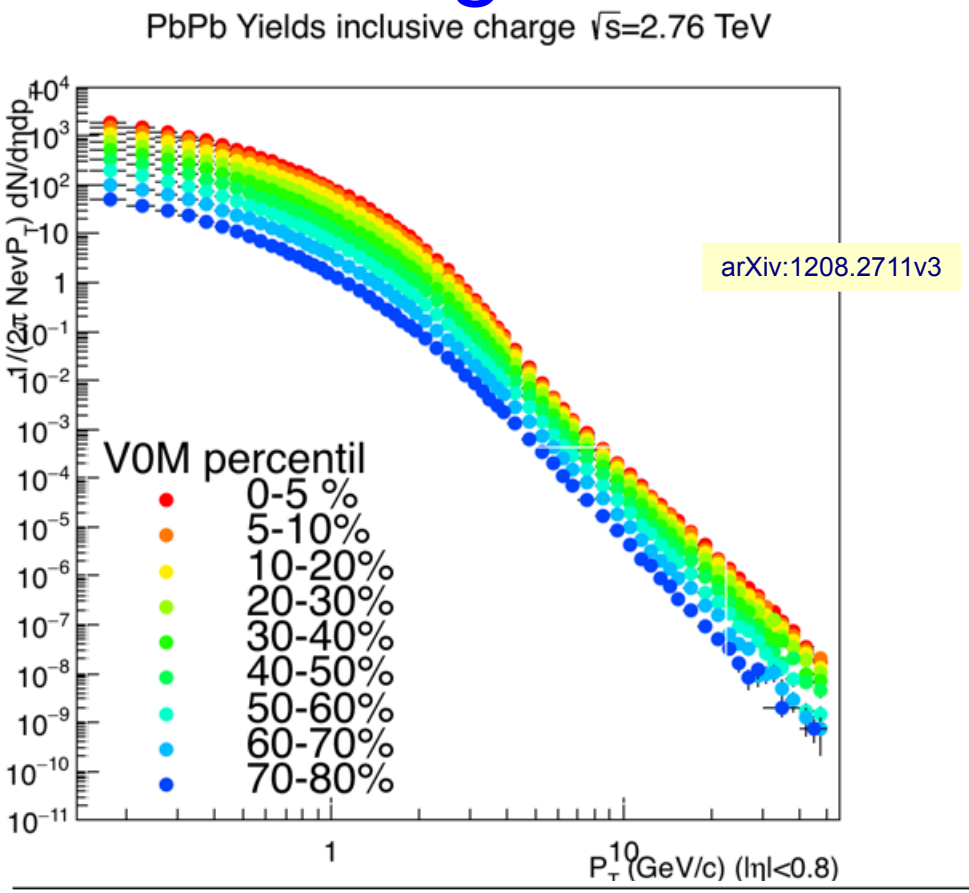
13 agosto 2016

Summary

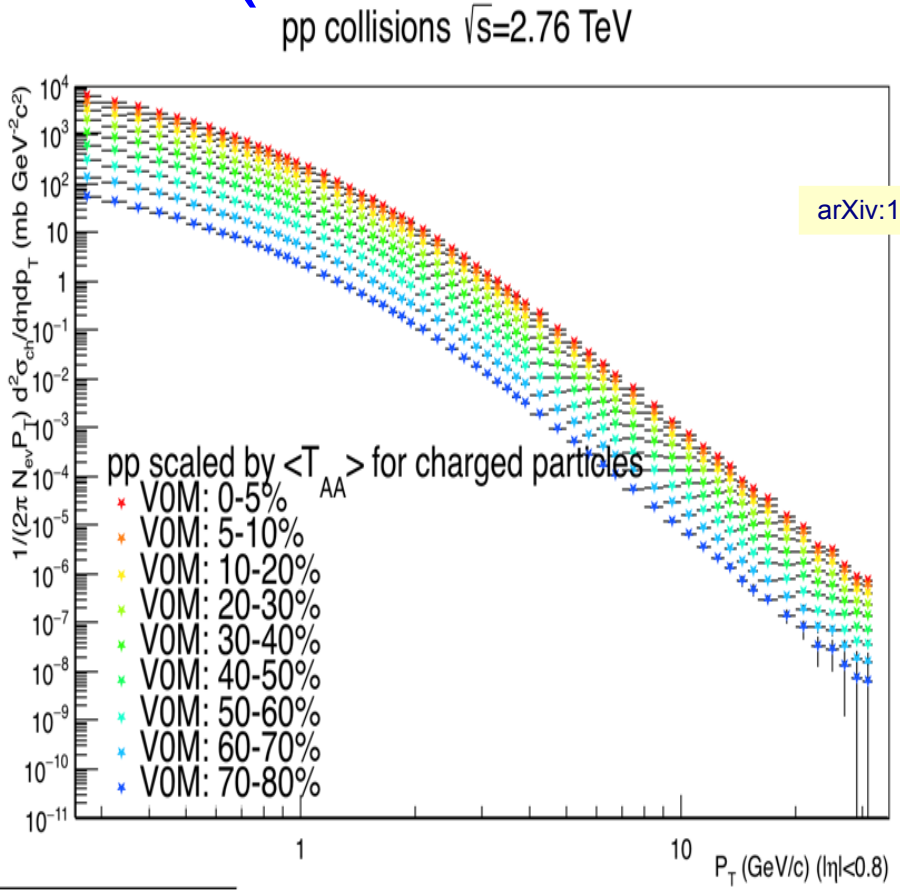
- Peter Christiansen text corrections for paper done, plotting style corrections under work.
- Work with ALICE data for S_loss
- Work related to spherocity “technical note”

Work with pp and PbPb data at 2.76 GeVs for S_loss

Yield Charge for 0.276 TeVs (Durham database)



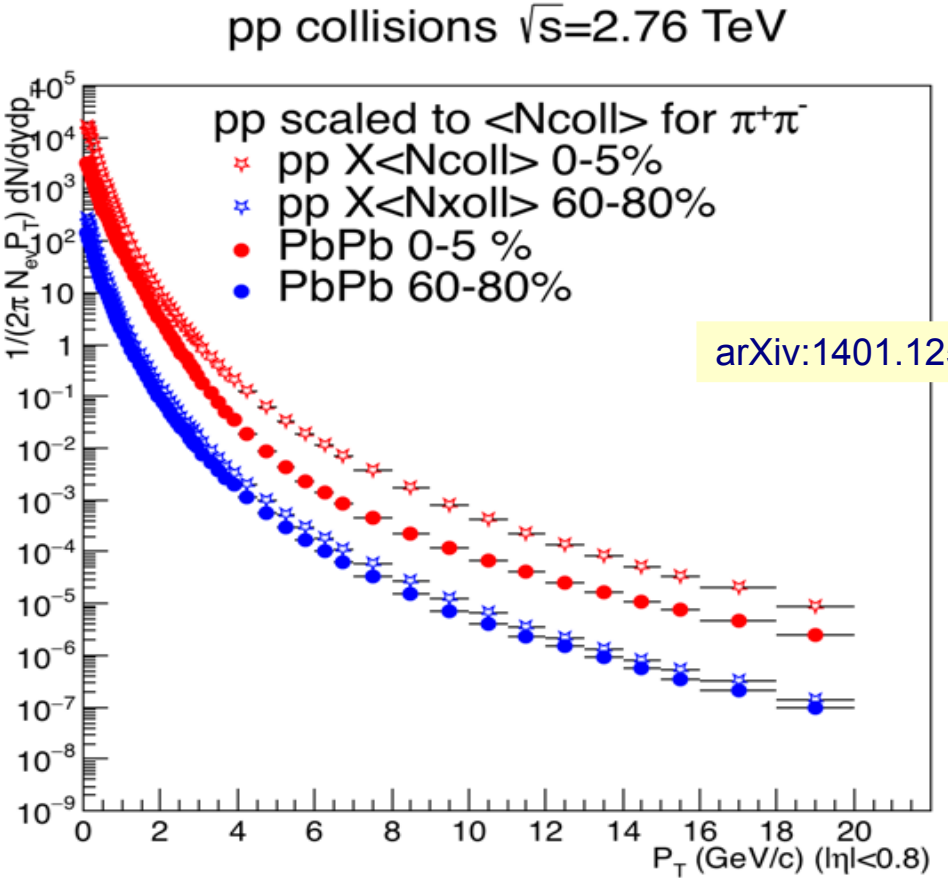
arXiv:1208.2711v3



arXiv:1307.1093v3

Centrality	$\langle N_{\text{part}} \rangle$	$\langle T_{AA} \rangle$ (mb^{-1})
0–5%	383 ± 3	26.4 ± 1.1
5–10%	330 ± 5	20.6 ± 0.9
10–20%	261 ± 4	14.4 ± 0.6
20–30%	186 ± 4	8.7 ± 0.4
30–40%	129 ± 3	5.0 ± 0.2
40–50%	85 ± 3	2.68 ± 0.14
50–60%	53 ± 2	1.32 ± 0.09
60–70%	30.0 ± 1.3	0.59 ± 0.04
70–80%	15.8 ± 0.6	0.24 ± 0.03

Yield $\pi^+\pi^-$ for 0.276 TeVs (Durham database)



arXiv:1401.1250v4

Now pp scaled is ok, greater than PbPb

arXiv:1301.4361v3

Centrality	$b_{\min}$ (fm)	$b_{\max}$ (fm)	$\langle N_{\text{part}} \rangle$	RMS	(*sys.*)	$\langle N_{\text{coll}} \rangle$	RMS	(*sys.*)	$\langle T_{\text{AA}} \rangle$ 1/mbarn	RMS 1/mbarn	(*sys.*) 1/mbarn
0–5%	0.00	3.50	382.7	17	3.0	1685	140	190	26.32	2.2	0.85
5–10%	3.50	4.94	329.4	18	4.3	1316	110	140	20.56	1.7	0.67
10–20%	4.94	6.98	260.1	27	3.8	921.2	140	96	14.39	2.2	0.45
20–40%	6.98	9.88	157.2	35	3.1	438.4	150	42	6.850	2.3	0.23
40–60%	9.88	12.09	68.56	22	2.0	127.7	59	11	1.996	0.92	0.097
60–80%	12.09	13.97	22.52	12	0.77	26.71	18	2.0	0.4174	0.29	0.026
80–100%	13.97	20.00	5.604	4.2	0.14	4.441	4.4	0.21	0.06939	0.068	0.0055

Tsallis fit.

Several reviews of, in:

Tsallis distribution — Azmi, M et al. Eur. Phys. J. C (2015) 75: 430

Tsallis for pt Spectra — Acta Physica Polonica B42, 2047 (2012): arXiv:1210.3661v3

Tsallis-Pareto — J.Phys.Conf Series 270 012008 2011

The ALICE way:

Levy-Tsallis fit

Production of protons, pions and kaons at pp collisions at s^{1/2}=900 GeVs with ALICE at LHC

arXiv:1101.4110v3

$$\frac{\mathrm{d}^2N}{\mathrm{d}p_\mathrm{t}\mathrm{d}y} = p_\mathrm{t} \times \frac{\mathrm{d}N}{\mathrm{d}y} \frac{(n-1)(n-2)}{nC(nC+m_0(n-2))} \left(1 + \frac{m_\mathrm{t}-m_0}{nC}\right)^{-n}$$

3 parameters for the fit: dN/dy,C,n

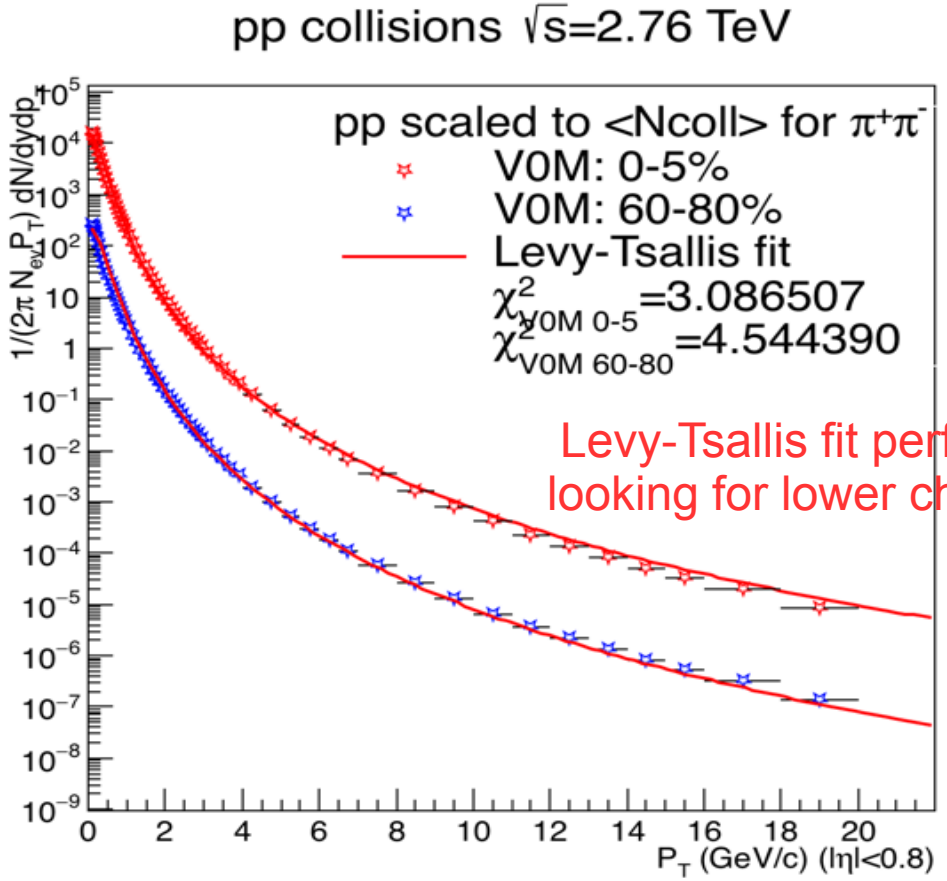
code: $ALICE_PHYSICS/PWGLF/SPECTRA/UTILS/SpectraUtils.C

- Note: Modification is needed based on equation.

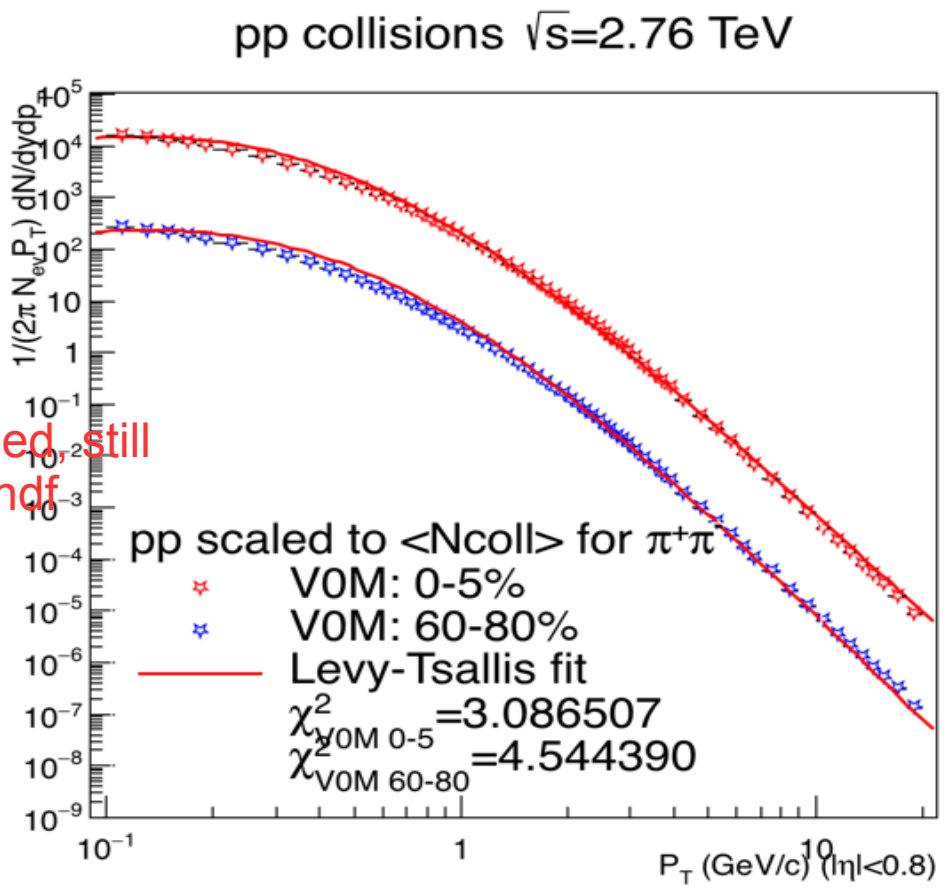
Change `Double_t part4 = 1. + (mt - mass) / n / C;` by

`Double_t part4 =1. + (mt - mass) / (n*C);`

Fit for pp scaled <Ncoll> Yield $\pi^+\pi^-$ for 276 GeV

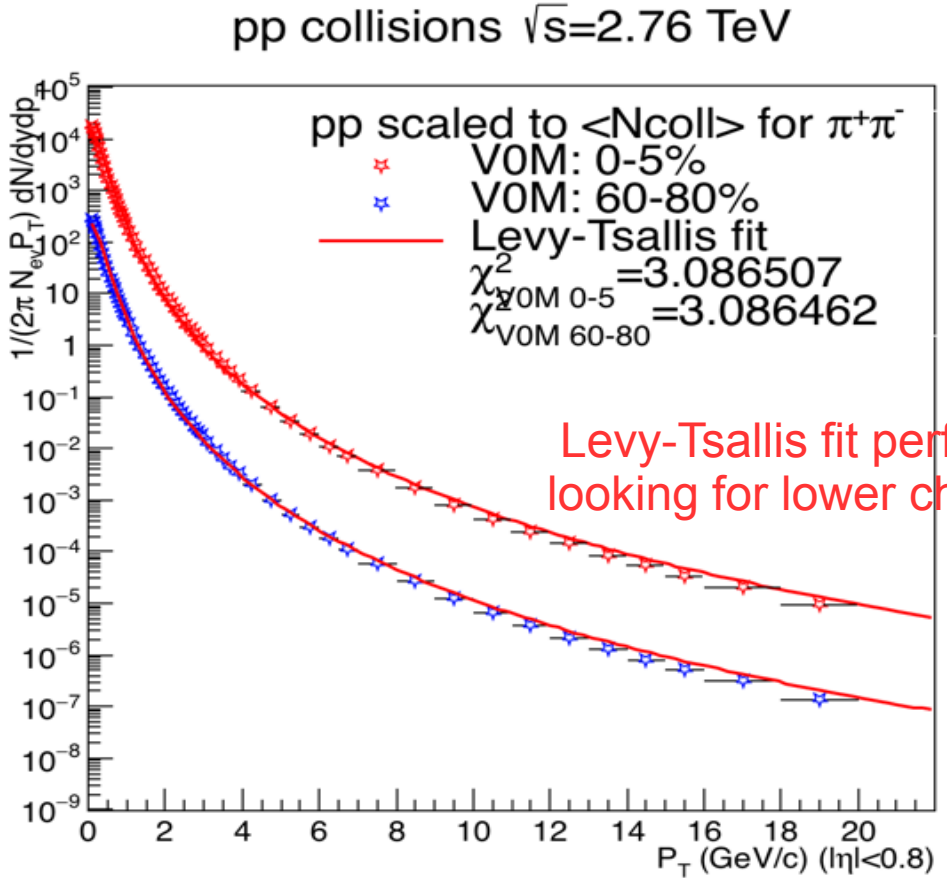


Levy-Tsallis fit perfomed, still looking for lower chi2/ndf



Levy-Tsallis fit pt range: 0.1- 20
Pion Mass: 0.139 GeVs
V0M: 0-5% n=7.47 , c=7.53x10^-2, dN/dy=4.61x10^3
V0M: 60-80% n=7.97 , c=8.2x10^-2, dN/dy=7.68x10^1

Fit for pp scaled <Ncoll> Yield $\pi^+\pi^-$ for 276 GeV



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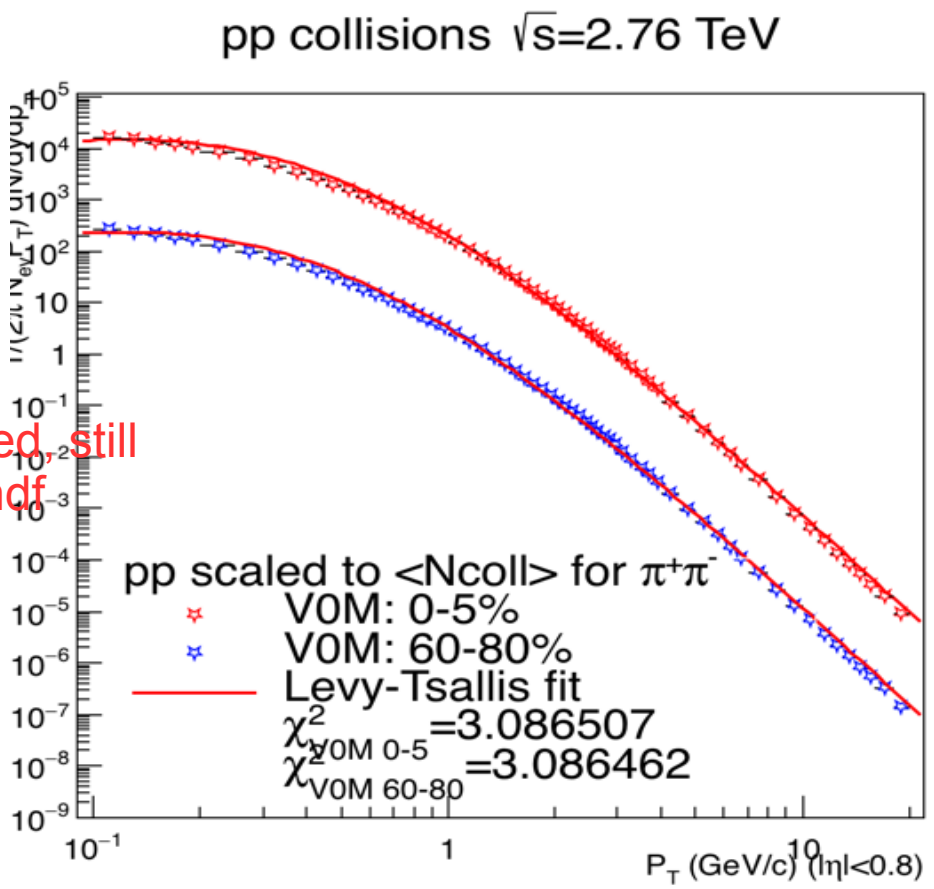

Levy-Tsallis fit pt range: 0.1- 20
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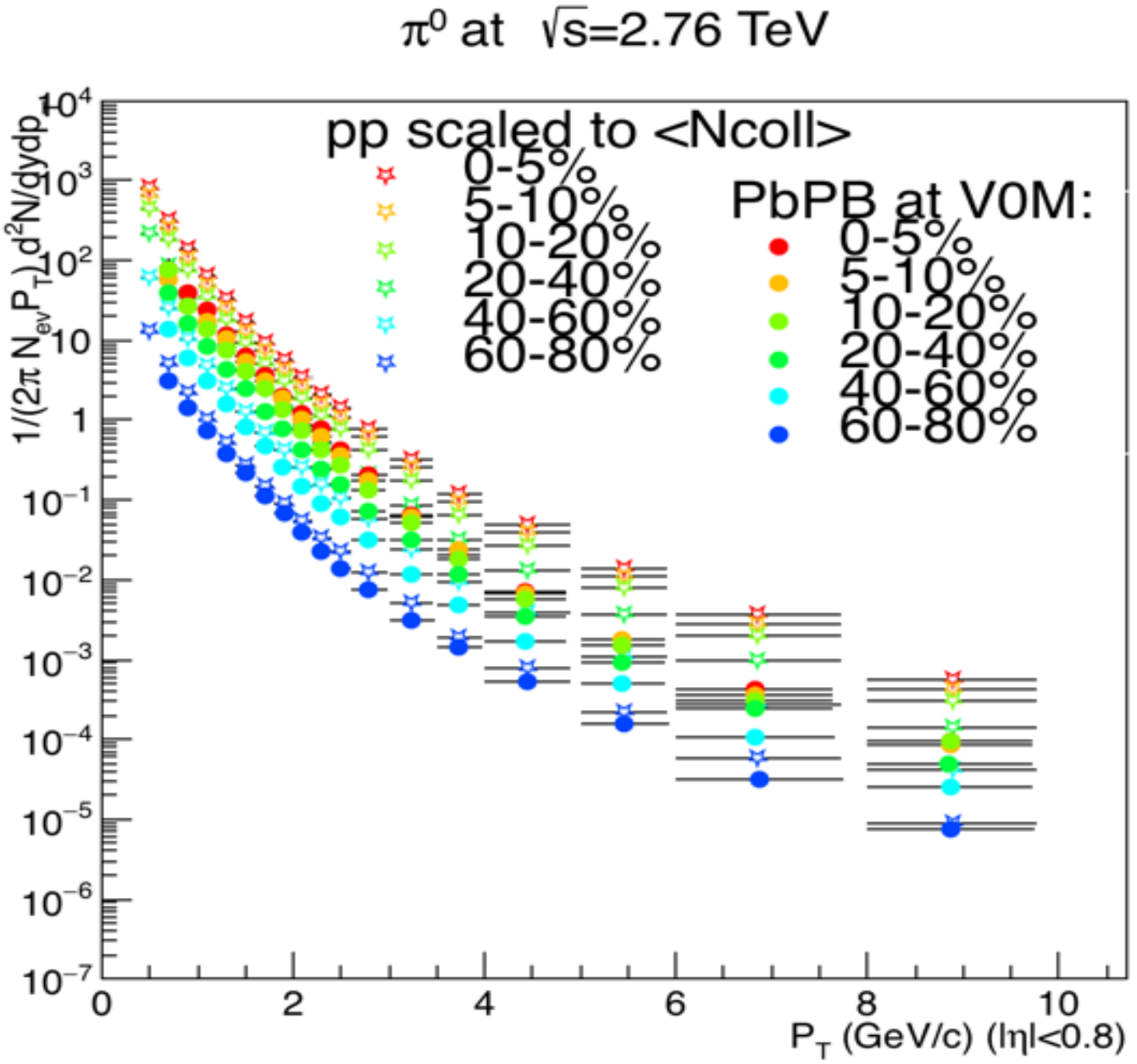
V0M: 0-5% n=7.47 , c=7.53x10^-2, dN/dy=4.61x10^3
V0M: 60-80% n=7.47 , c=7.53x10^-2, dN/dy=7.31x10^1

Yield π° for 0.276 TeVs (Durham database)

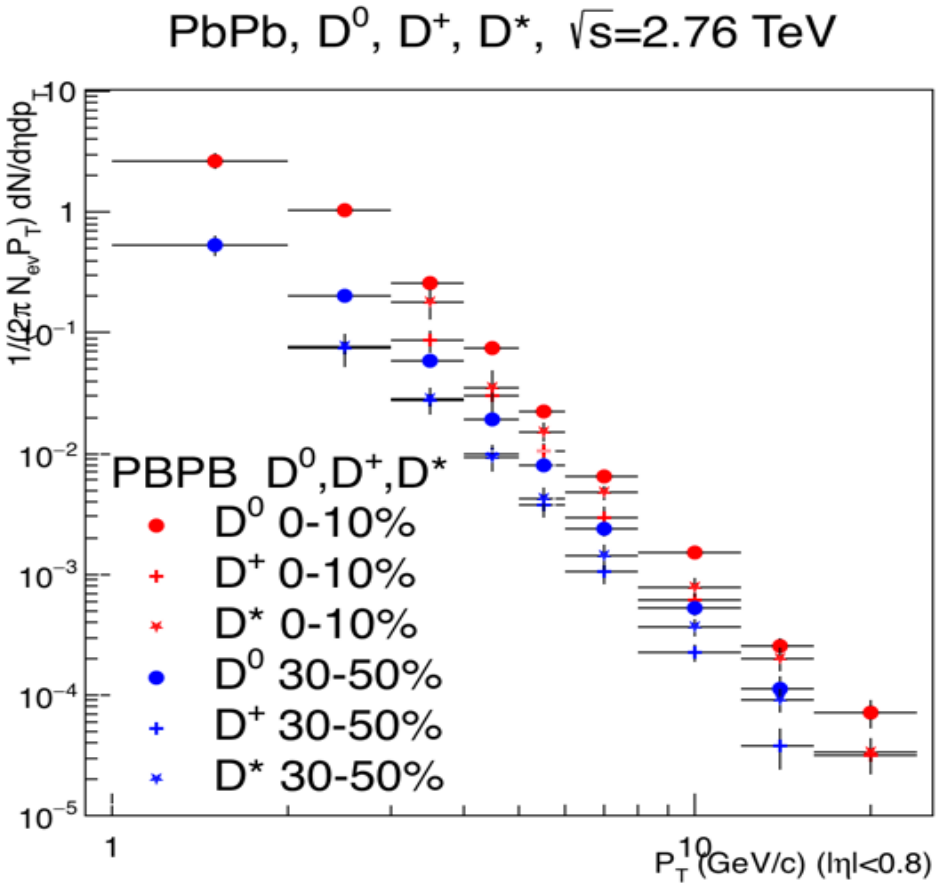


Now pp scaled is ok, greater than PbPb

Need to perform Levy-Tsallis fit

arXiv:1405.3794v2

$D^+D^oD^*$ Yield for 0.276 TeVs (Durham database)



No pp data for yields
Has been found in
Durham data base
I'll ask to Renu

ARXIV:1509.06888

Centrality class	$\langle T_{AA} \rangle$ (mb^{-1})	N_{events}	L_{int} (μb^{-1})
0–10%	23.44 ± 0.76	16.4×10^6	21.3 ± 0.7
30–50%	3.87 ± 0.18	9.0×10^6	5.8 ± 0.2

Work related to Spherocity
“Technical note”
(priority)

In order to document the basis for any spherocity note

Analysis and run selection

Software: Aliroot:`v5-07-20` Aliphysics:`vAN-20160204`
Event shape classes: (PWGLF/SPECTRA/Spherocity)
Analysis macros: `AddTransverseEventShapeTask.C`
`AliAnaTransverseEventShapeTask.cxx`
`AliAnaTransverseEventShapeTask.h`

LHC15f pass2: (44.6 mill of evts) (after all ev selection)
LHC15g3a3 Monash Tune (43.2 mill of evts) (after all ev selection)
good runs*:
226500, 226495, 226483, 226476, 226472, 226468, 226466,
226452, 226445, 226444, 226225, 226220, 226170, 226062,
225768, 225766, 225763, 225762, 225757, 225753, 225719,
225717, 225716, 225710, 225709, 225708, 225707, 225705,
225587, 225586, 225579, 225578, 225576, 225322, 225315,
225314, 225313, 225310, 225309, 225307, 225305, 225106,
225052, 225051, 225050, 225043, 225041, 225037, 225035,
225031, 225026

(*) http://twiki.cern.ch/twiki/bin/viewauth/ALICE/PWGLF13TeVanalysis

Event, track and physics selection

Event Selection

Trigger: KINT7
Rejection of AliESDEvent::IsIncompleteDAQ
Vertex selection
SPD Pile-up rejection
Background rejection
Multivertex Pile-up rejection
low diagonal cut OFO &V0M applied
Vertex conditions for 2015 data (NEW added) (this reduce the sample of evts)
https://twiki.cern.ch/twiki/bin/view/ALICE/PWGPPEvSelRun2pp
**https://twiki.cern.ch/twiki/bin/view/ALICE/AliceHMTFCodeSnippets#Physics_Selection

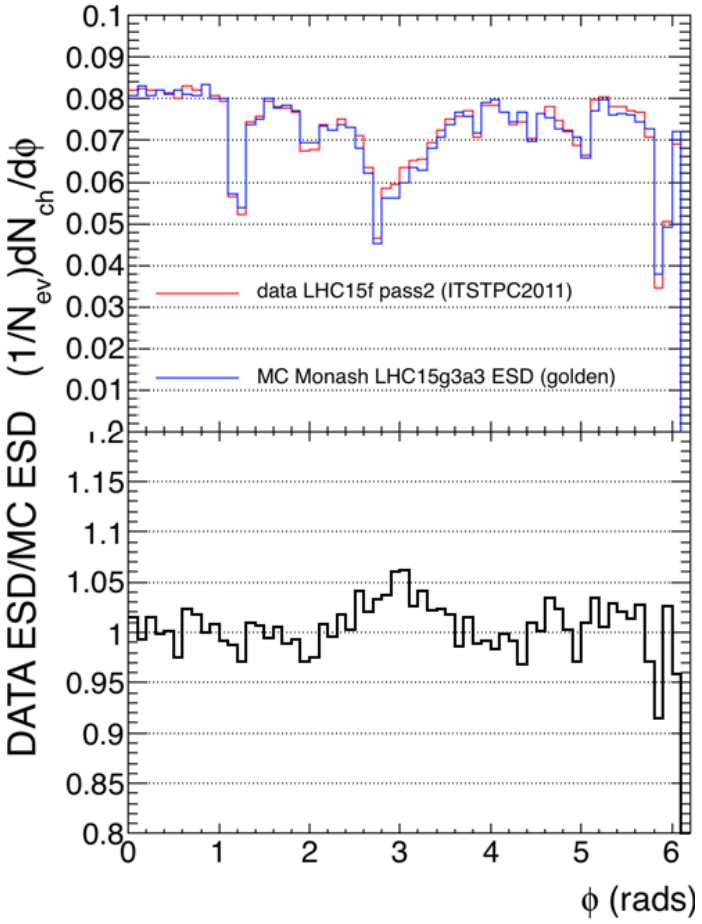
Physics Selection

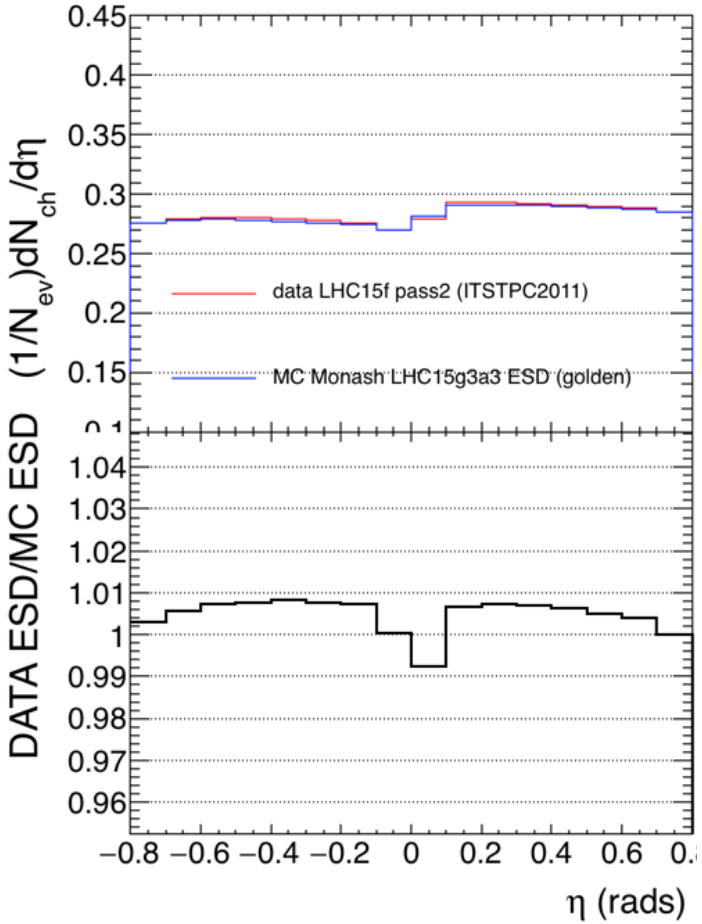
- MinNCrossedRowsTPC = 120; *
- MinRatioCrossedRowsOverFindableClustersTPC=0.8;
- MaxFractionSharedTPCCluster = 0.4;
- Maxchi2perTPCcl=4.;
- Max dcaz ITSTPC=2.0;
- SetDCAToVertex2D(kFALSE);
- SetRequireSigmaToVertex(kFALSE);
- RequireTPCRefit(kTRUE);
- RequireITSRefit(kTRUE);
- AcceptKinkDaughters(kFALSE);
- MaxDCAToVertexXYPtDep("0.0182+0.0350/pt^1.01"); *
- SetMaxChi2TPCConstrainedGlobal(36.);

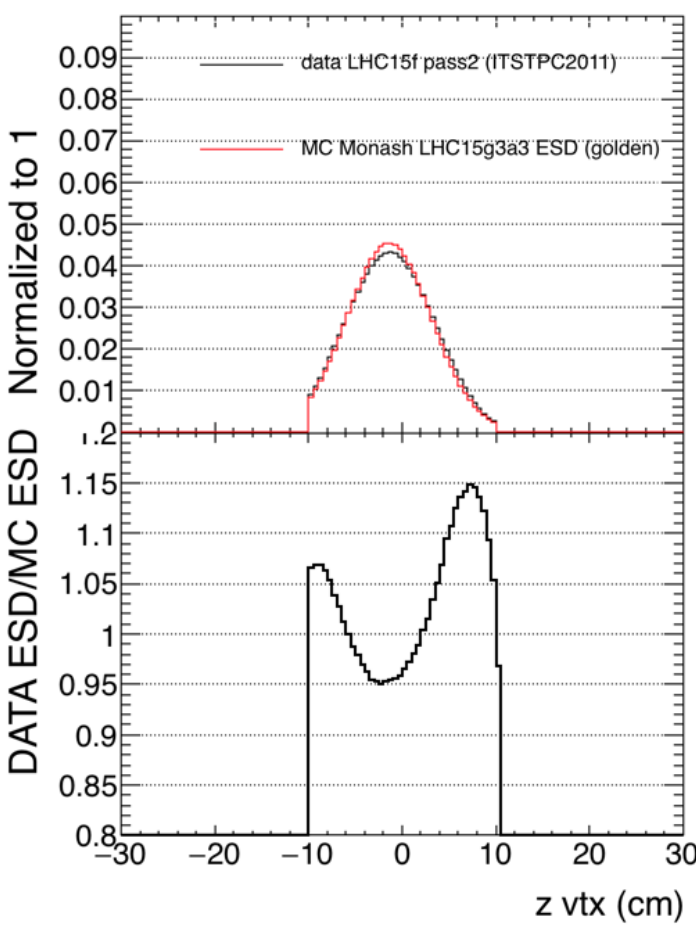
Track selection taken for each analysis:

- So Analysis, Hybrid-track cuts for primary charged particles with $|\eta|<0.8$ and $0.15<p_T<10$ GeV/c.
- $\langle p_T \rangle$ Analysis, Golden-track cuts with $|\eta|<0.8$ and $0.15<p_T<10$ GeV/c.
- Multiplicity:
  - Reference multiplicity selection with $|\eta|<0.8$
  - V0M percentil selection

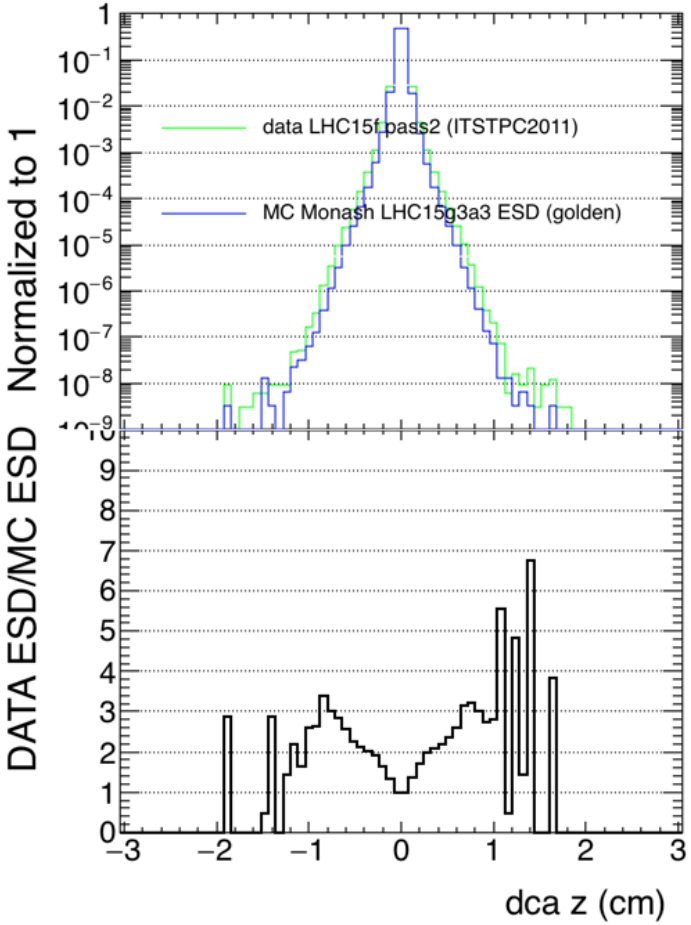
To study MC/DATA dependence for different cuts: -ITSTPC2011 vs golden

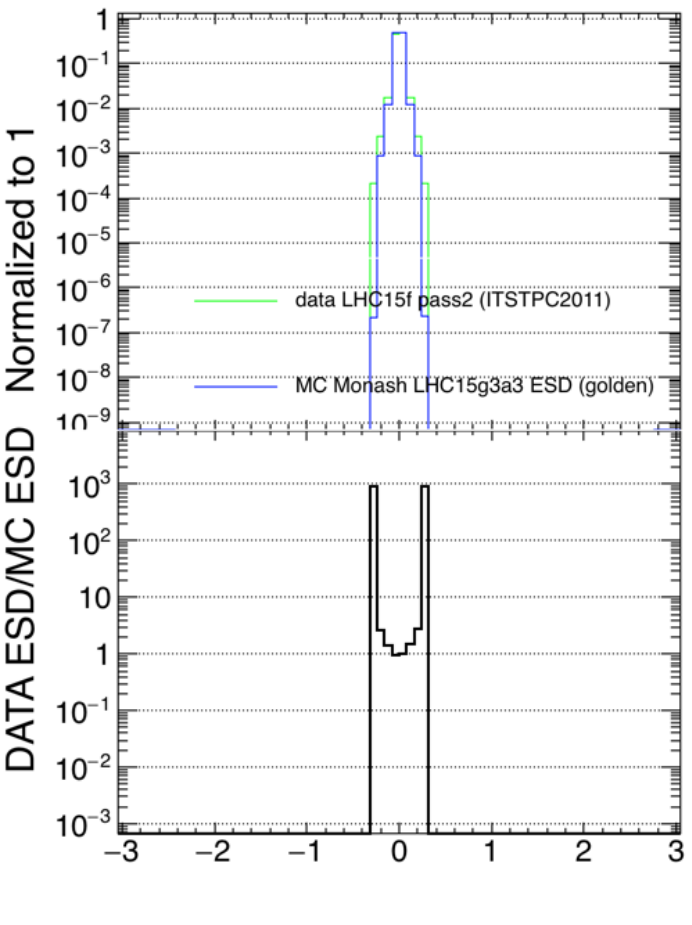


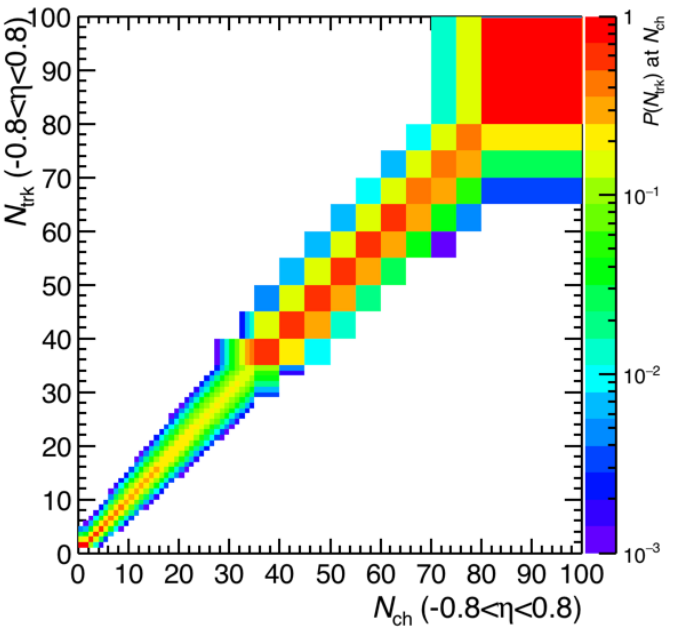




To study MC/DATA dependence for different cuts: -ITSTPC2011 vs golden








```
const Int_t multbins = 47;
Double_t
nchBins[multbins+1]={ 0,1,2
,3,4,5,6,7,8,9,10,11,12,13,
14,15,16,17,18,19,20,21,22,
23,24,25,26,27,28,29,30,31,
32,33,34,35,40,45,50,55,60,
65,70,75,80,100,120,140 };
```

To do for continue

same comparison DATA/MC:

-golden ITSTPC2011cuts (done)

-TPC only cuts (to send to grid)

-Hybrid cuts (to send to grid)

To do for S_loss:

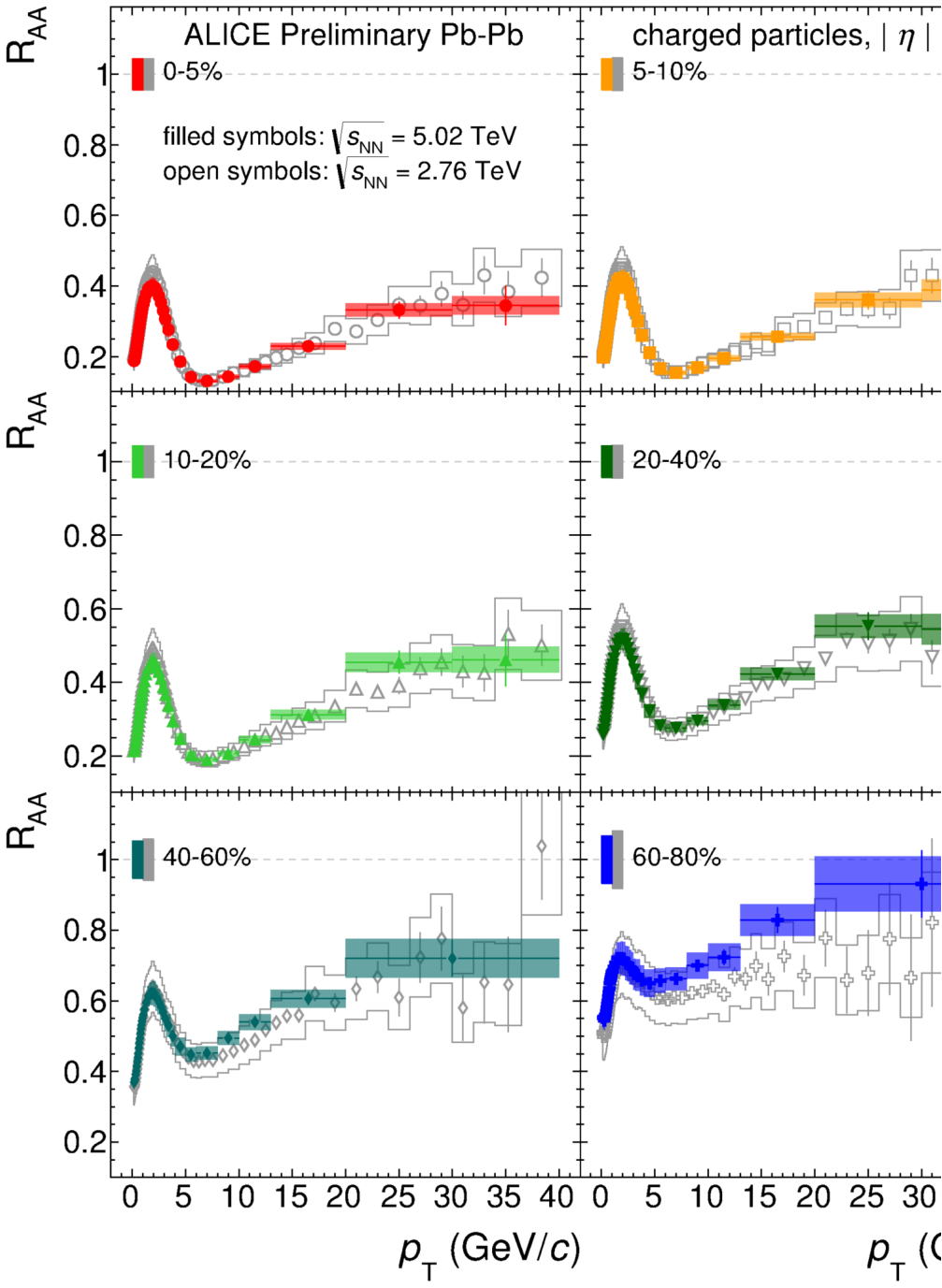
- To get better chi2 for the Levy-Tsallis fits.
- Perform Levy-Tsallis fit for pp (for neutral pi, and D) also for PbPb collisions
- I need to get pp data for Dmesons yields (its in paper but not in Durham data base).

BACKUP:

Motivations

2 important points:

- a) Recent preliminary plots on RAA and discusions on the ALICE col., same suppresionis seen for 2.76 Te and 5.02 TeV, data.



Hèctor Bello

Motivations

2 important points:

- b) RAA_pi ~ RAA_D (no color charge dependence)

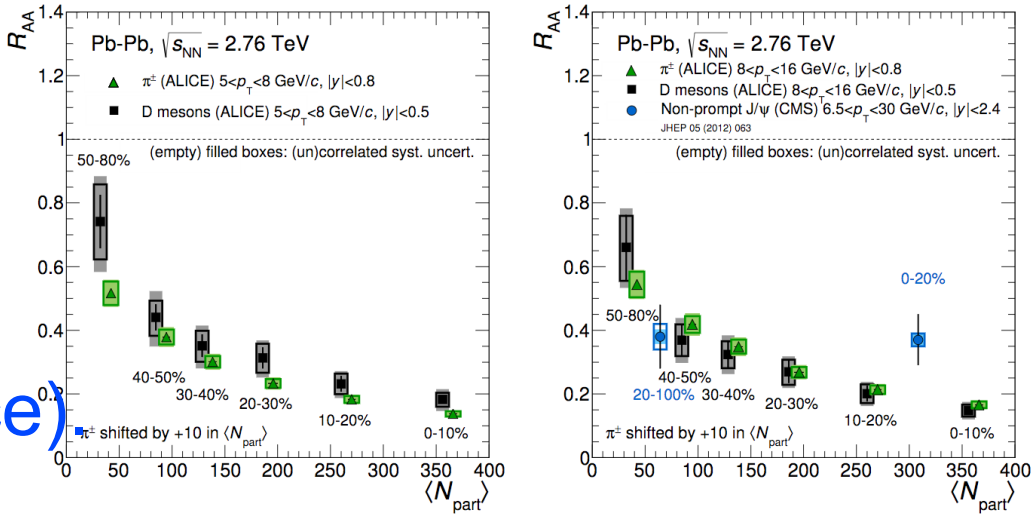


Figure 3. Comparison of the D meson R_{AA} (average of D^0, D^+ and D^{*+}) and of the charged
V/c (left) and in 8 < p_T < 16 GeV/c (right). The right panel
ompt J/ψ mesons in 6.5 < p_T < 30 GeV/c measured by the
rtical bars represent the statistical uncertainties. The D meson
ayed as in the previous figures. The total systematic uncertainties
xes. The centrality-dependent systematic uncertainties are shown
oints.

arXiv:1506.06604 JHEP11(2015)205

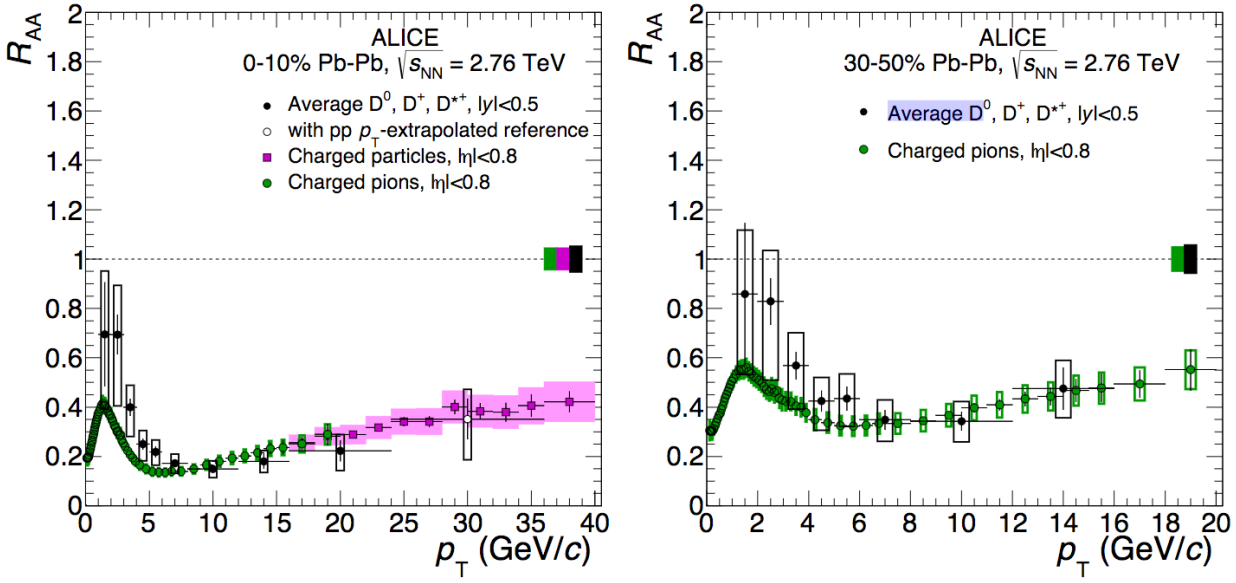


Figure 10: Prompt D-meson R_{AA} (average of D^0, D^+ and D^{*+}) as a function of p_T compared to the nuclear modification factors of pions [72] and charged particles [73] in the 0–10% (left) and 30–50% (right) centrality classes. Statistical (bars), systematic (empty boxes), and normalisation (shaded box at $R_{AA} = 1$) uncertainties are shown. Horizontal bars represent bin widths. Symbols are placed at the centre of the bin.

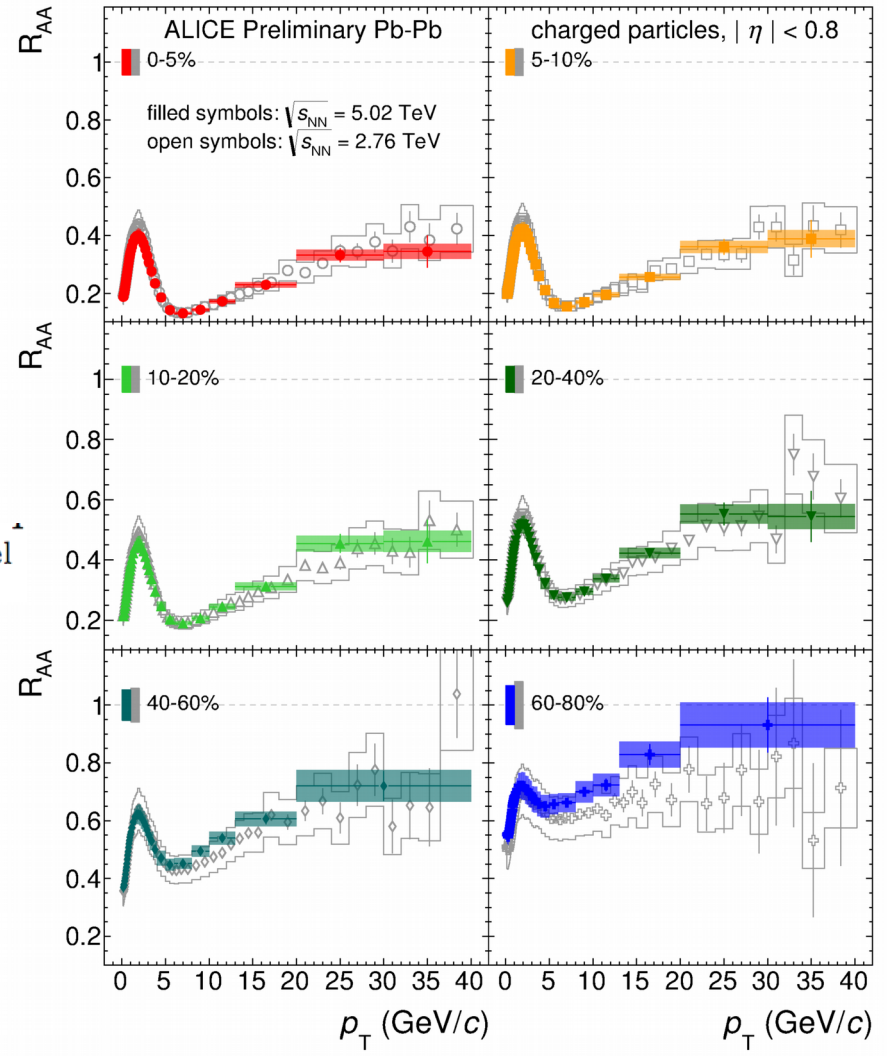
arXiv:1509.06888v2

A review of the paper http://arxiv.org/pdf/1509.06735v2

Scaling properties of fractional momentum loss of high-pT hadrons in nucleus-nucleus collisions at √sNN from 62.4 GeV to 2.76 TeV

In heavy ion collisions a hot, dense medium is rapidly formed, capable of interacting with the high pT partons in primordial hard scattering and making them lose some energy.

$$R_{\rm AA}(p_T) = \frac{(1/N_{\rm AA}^{\rm evt})\mathrm{d}^2N_{\rm AA}^h/\mathrm{d}p_T\mathrm{d}y}{\langle T_{\rm AA}\rangle \times \mathrm{d}^2\sigma_{\rm pp}^h/\mathrm{d}p_T\mathrm{d}y}; \quad \langle T_{\rm AA}\rangle = \langle N_{\rm coll}\rangle / \sigma_{pp}^{\rm inel}$$



RAA=1, it is usually assumed that the yield measured in A+A collisions is explained by the primordial hardproduction as observed in p+p collisions with no nuclear or medium effec

RAA<1 (suppression) the A+A yield at a given pT is less than that expected from the scaled p+p.

Parton energy loss is expected to depend both on system size and collision energy, but RAA is similar.

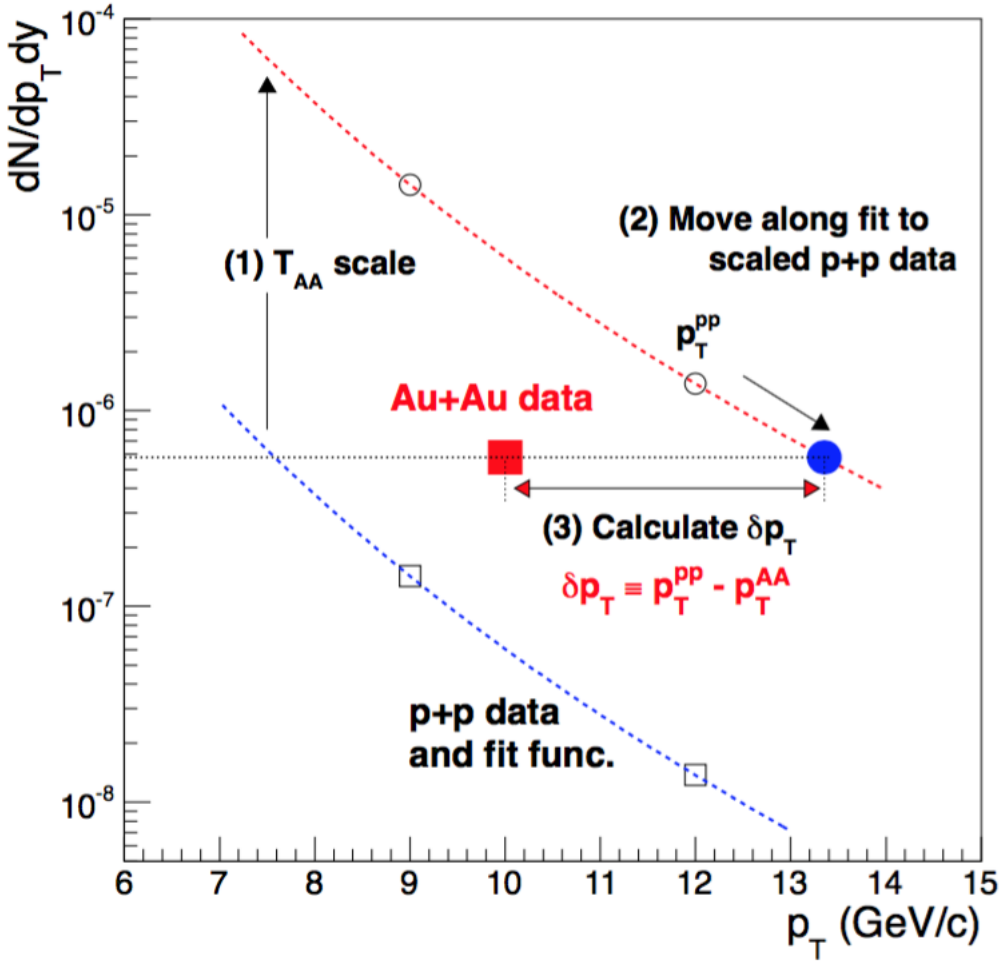
the fractional energy loss of partons, $\Delta E/E$ indeed significantly different between LHC and RHIC even though the RAA is similar

S_loss

Instead of RAA one can employ the fractional Momentum loss (Sloss) of high pT hadrons as a measure of parton energy loss wich would Reflect the average fractional energy loss of the initial partons. $\langle \Delta E/E \rangle \sim S_{\rm loss}$

Sloss is defined as

$$S_{\rm loss} \equiv \delta p_T / p_T = \frac{p_T^{pp} - p_T^{AA}}{p_T^{pp}}$$



- **http://arxiv.org/pdf/1509.06735v2.pdf**

S_loss

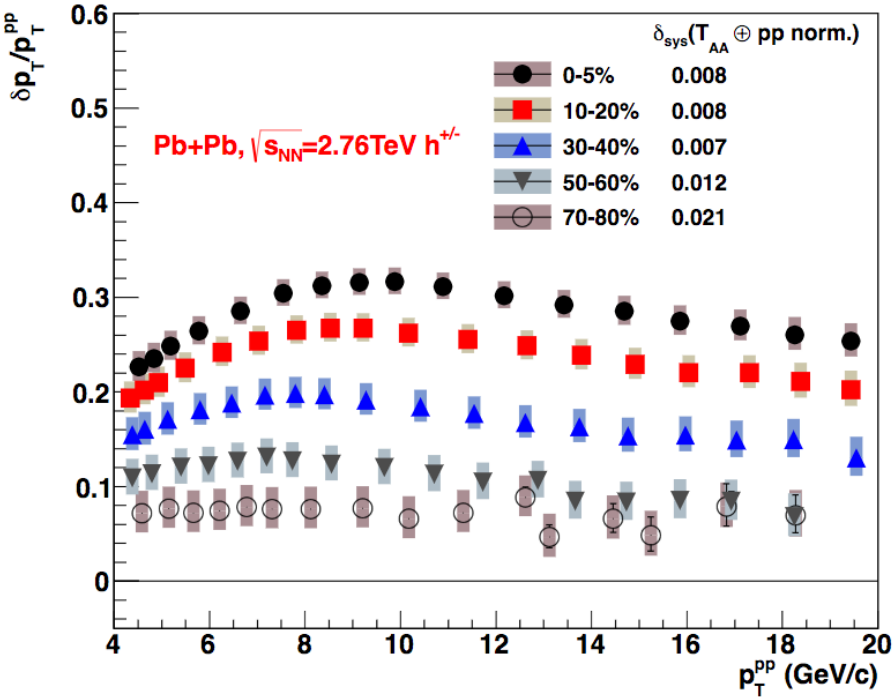


FIG. 7. (Color online) p_T^{pp} dependence of $S_{\rm loss}$ for charged hadrons in 2.76 TeV Pb+Pb collisions using the result from the ALICE experiment [16, 19]. $\delta_{\rm sys}(T_{AA} \oplus$ pp norm) are Type-C errors and show the absolute amount that the data points would move.

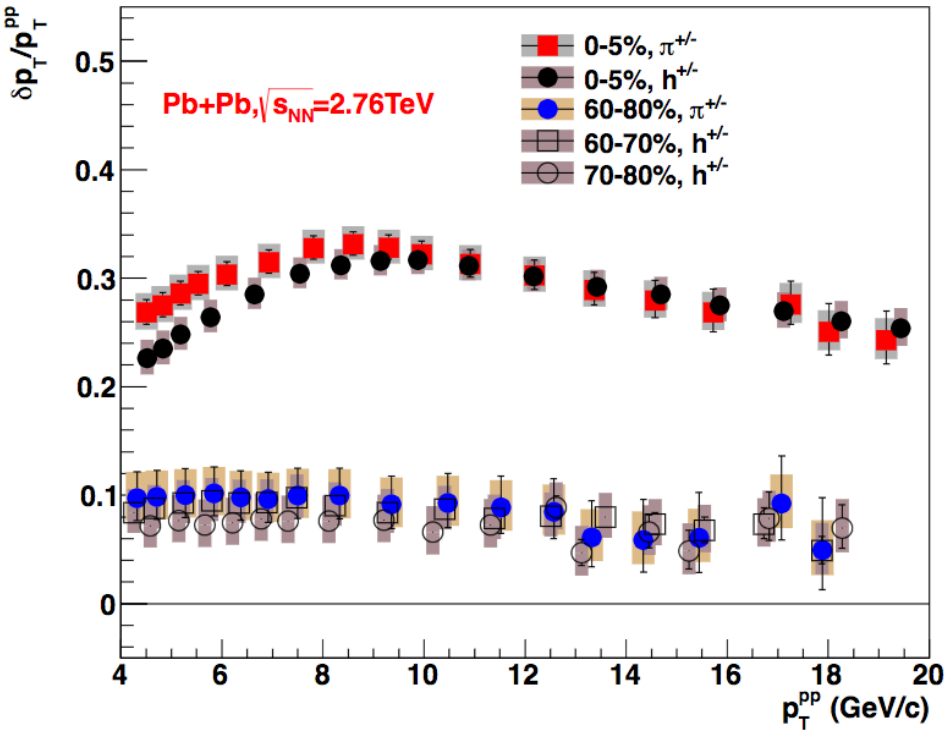


FIG. 8. (Color online) p_T^{pp} dependence of $S_{\rm loss}$ for charged pions in 2.76 TeV Pb+Pb collisions together with those for charged hadrons from the same collision system. The charged pion result is from the ALICE experiment [17].

- **http://arxiv.org/pdf/1509.06735v2.pdf**

pp Yield for 0.276 TeVs (Durham database)