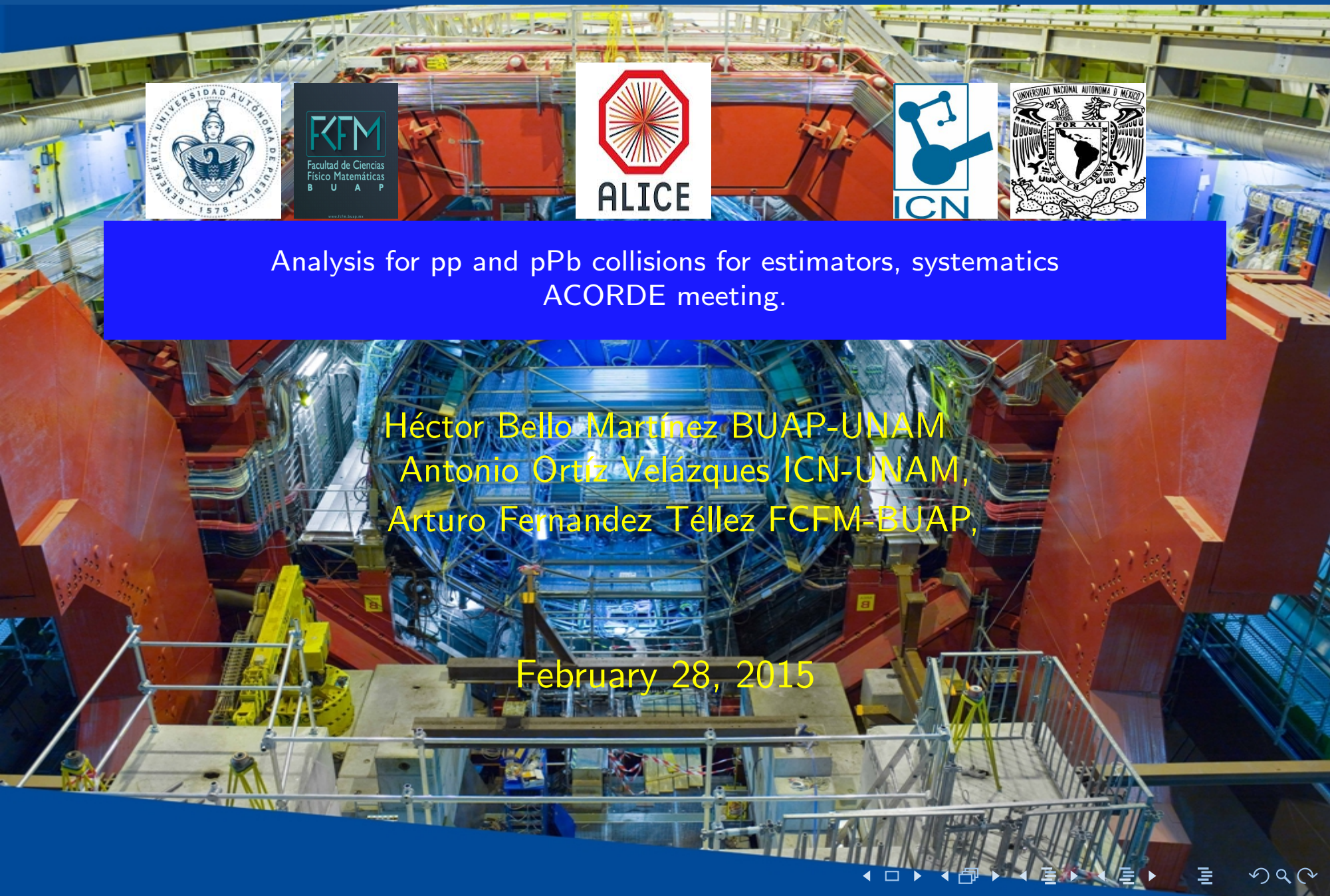

# Analysis for pp and pPb collisions for estimators, systematics ACORDE meeting.

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# Outline

Systematics errors:

- I obtain the $< p_T >$ for the variation in z cuts =5,15, 20cm, and the systematics
- I obtain the $< p_T >$ for the systematics corresponding to the vertex reconstruction bias.
- I obtain the $< p_T >$ for the systematics corresponding to the trigger bias.

For pp collisions at 7 TeV: MCdata period LHC10f6a (Pythia) (44 mill ev), and real data period LHC10d pass 2 (113 mill ev) runs:

- 122374, 125085, 125134, 125632, 125844, 125850, 126007, 126081, 126097, 122375, 125097, 125296, 125633, 125847, 125851, 126008, 126082 , 124751, 125100, 125628, 125842, 125848, 125855, 126073, 126088, 125023, 125101, 125630, 125843, 125849, 126004, 126078, 126090.
- 122374, 125085, 125097, 125134, 125296,125630, 125632, 125633, 125842, 125847, 125848, 125849,125850, 125851, 125855, 126004, 126007, 126008, 126073, 126978, 126081, 126082, 126088, 126090, 126097, 126158, 126160, 126168, 126284, 126351, 126352, 126359, 126404, 126406, 126407, 126808, 126409, 126422, 126424, 126425, 126432.

(hybrid tracks with $p_T$ in $|\eta| < 0.3$ and the acceptance estimator $-0.3 < \eta < 0.3$, $0 < \eta < 0.8$, and $5 < p_T < 10$.)

## $< p_T >$ in pp collisions at 7 TeV for zcuts.

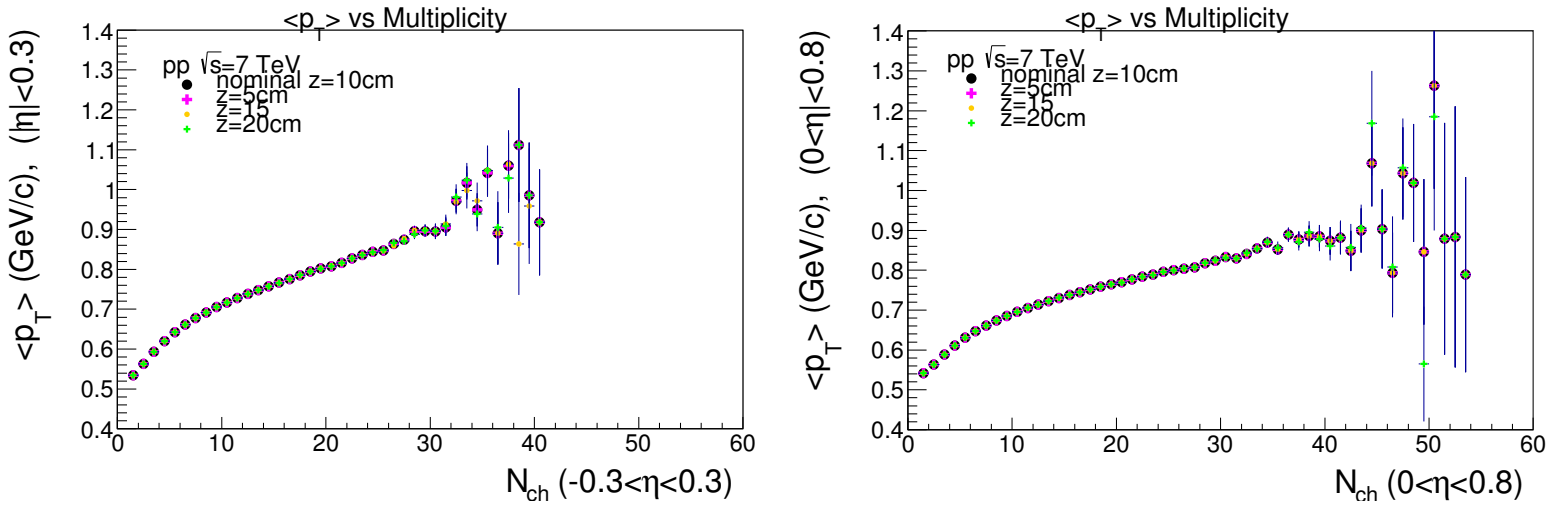



Figure 1 : a) for $-0.3 < \eta < 0.3$, b) for $0 < \eta < 0.8$.

systematics from the maximum fractions with the nominal cut z=10cm.

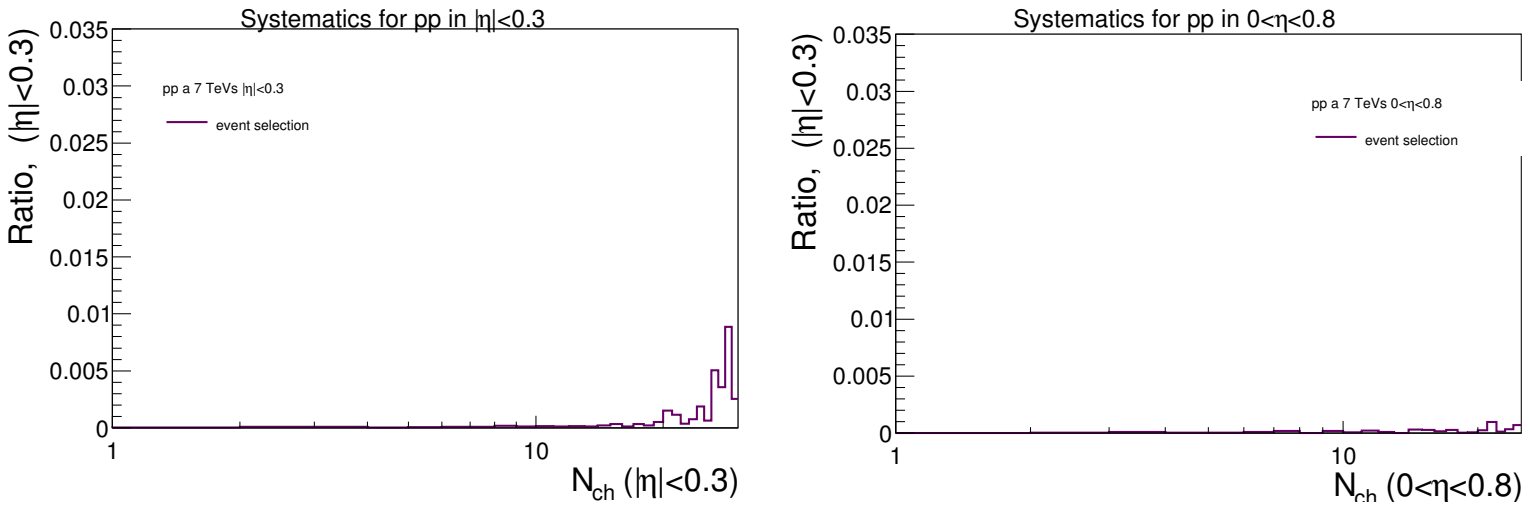



Figure 2 : systematics a) for $-0.3 < \eta < 0.3$, b) for $0 < \eta < 0.8$.

the contribution effect for the event cuts is very low as in note. (see next)

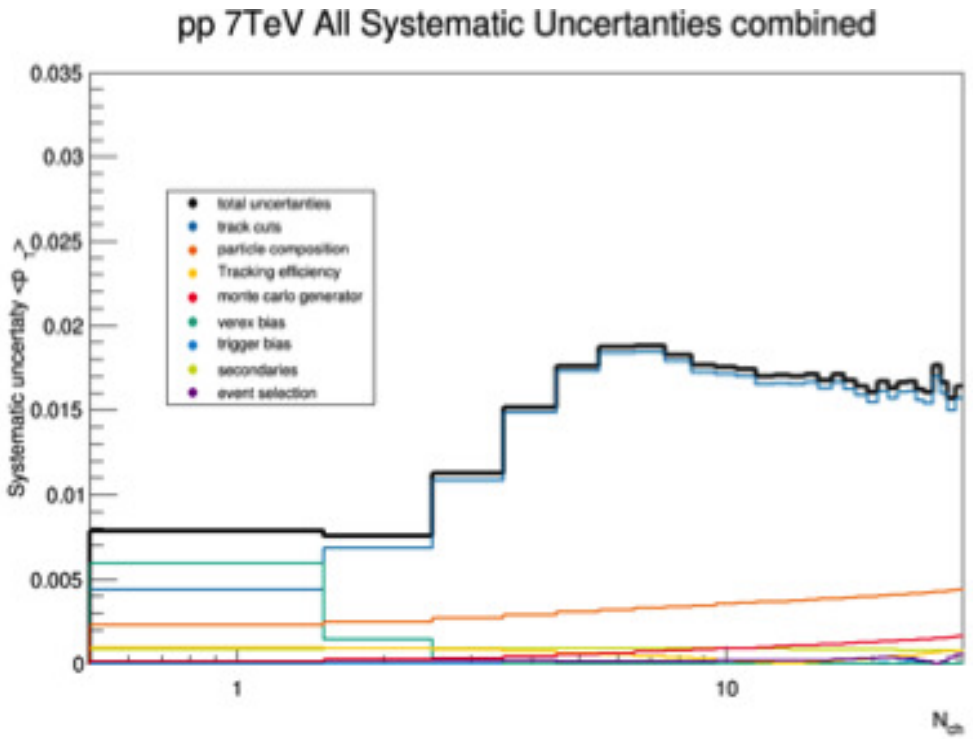



Figure 3 : systematics from Analisis note

The Vertex reconstruction, and the trigger bias contributions are calculated by

$$Sys_{VTX} = 1 - \frac{G_{trig}}{G_{trigvtx}} \quad (1)$$

$$Sys_{trigger} = 1 - \frac{G_{trig}}{G_{all}} \quad (2)$$

where $G_{eventclass}$ is the generated sample with the corresponding event class, which can be: (all), for all events without trigger, (trig) for triggered events, (trigvtx ) for triggered events with reconstructed vtx. The corresponding calculations are shown in the next slide

## $< p_T >$ in pp collisions at 7 TeV for trigger bias with PYTHIA.

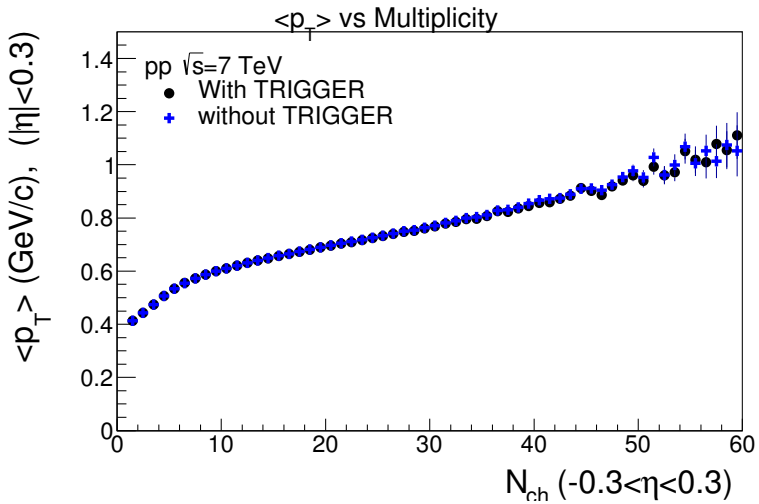
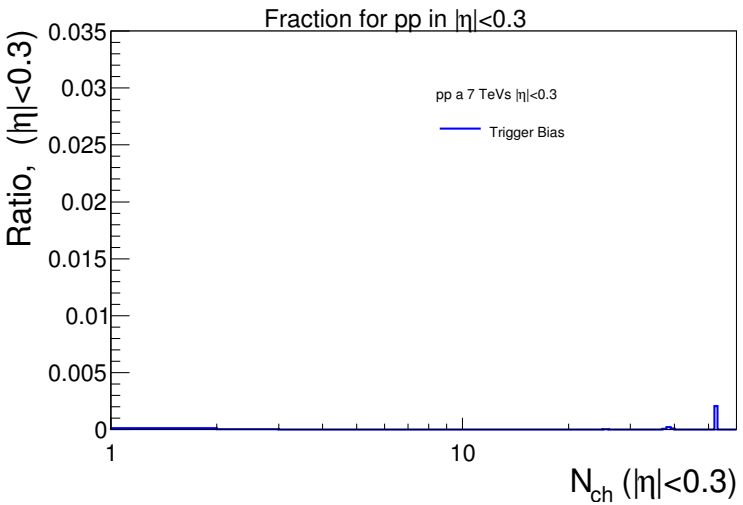



Figure 4 : for trigger bias.

## systematics for trigger bias, pp 7 TeVs, $|\eta| < 0.3$ with PYTHIA



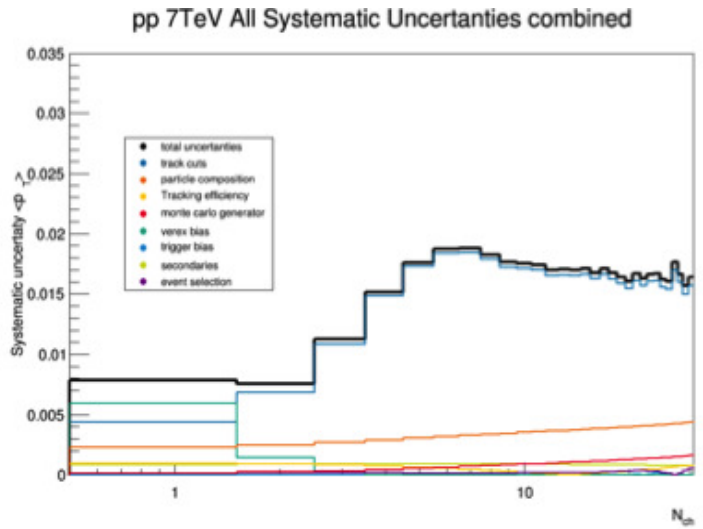




Figure 5 : systematics for trigger bias, b) Analisis note

$< p_T >$ in pp collisions at 7 TeV for vertex reconstruction, $|\eta| < 0.3$ with PYTHIA.

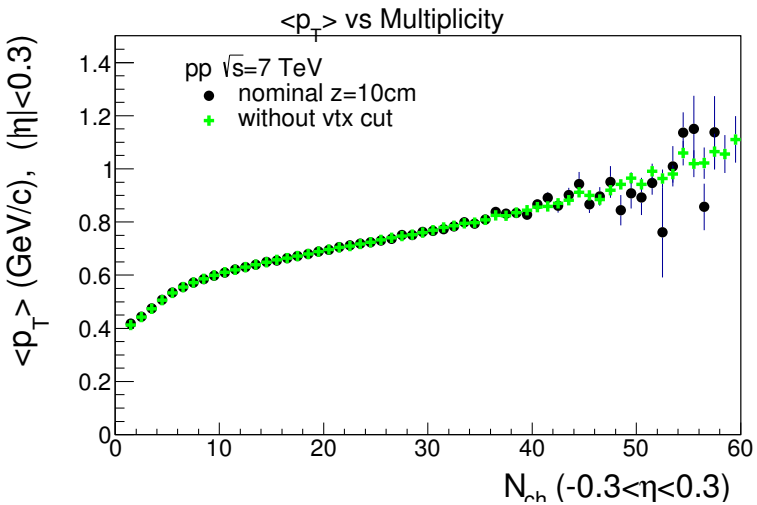
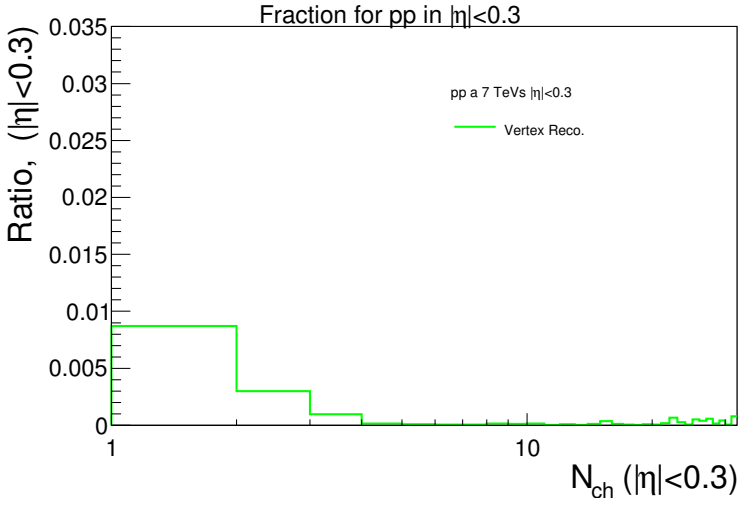



Figure 6 : for vertex reconstruction.

systematics for vtx reconstrucction, pp 7 TeVs, $|\eta| < 0.3$ with PYTHIA.



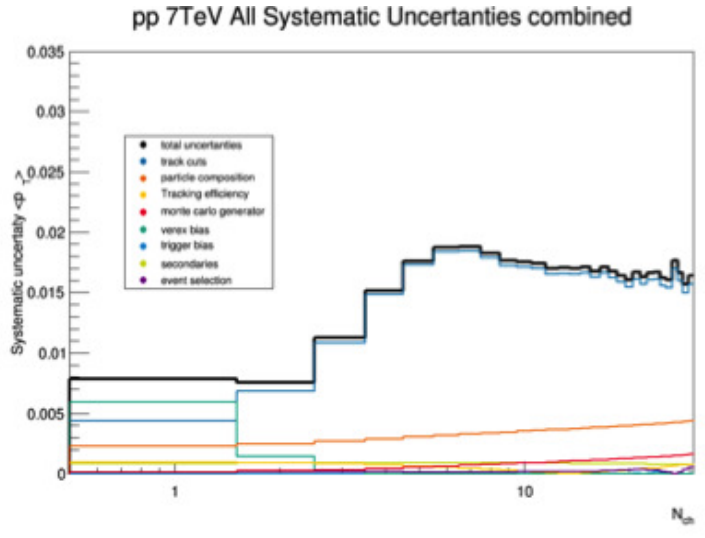




Figure 7 : systematics for vertex reconstruction, b) Analisis Note.

we see the effect in low Nch, but little higher.

# Conclusions

- We obtain the systematics corresponding to the event selection and vtx reconstruction and trigger bias.

Things to do:

- obtain the systematics corresponding to the event selection and vtx reconstruction and trigger bias for the other eta ranges and for pPb, also I need to include the spherocity cuts and calculate the sistematics.
- obtain this systematics including the spherocity cuts (macros in progress)
- We need to calculate the other individual contributions for systematics.

THANK YOU!

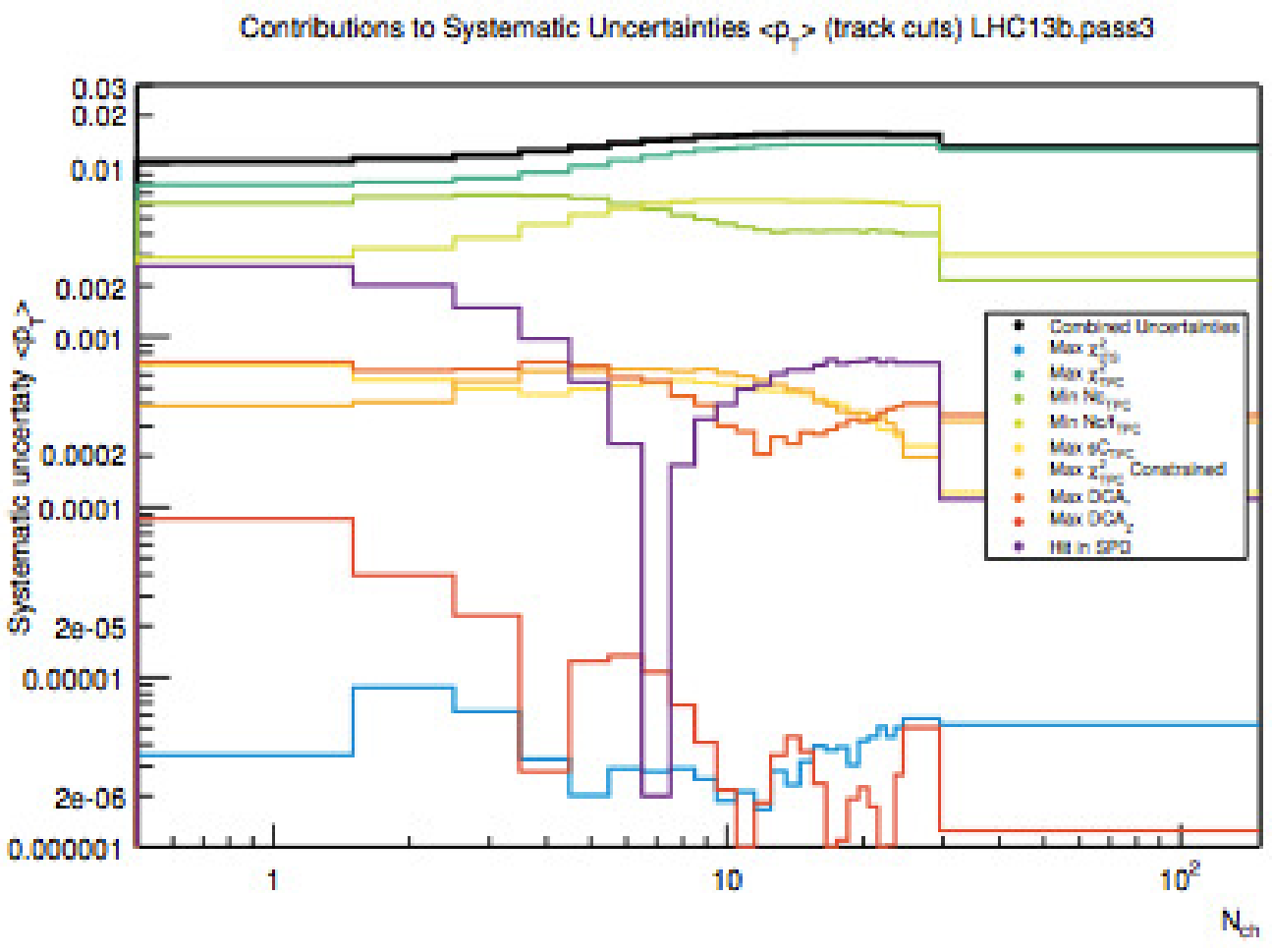
# backup

The ESAPackage is formed by the clases and headers named as:
AliESABase, AliESACorrections, AliESAObservables,
AliESAMeanPtVsMultiplicity, AliESAMeanPtVsMultiplicityMC,
also the headers AliESABaseCint.h, LinkDef.h, Include.h
And a Makefile which produce the libESAAnalysis.so.
With the macro runAnalysisSept.C we call the functions:

- CalculateCorrections (which call the AliESACorrections) MC.
- MakeAnalysisForData (call the AliESAObservables) Data.

The parameters for the macro are:
AliESABase::ModeCuts cutsforNtrk = AliESABase::kTPCOnly;
AliESABase::ModeCuts cutsforPt = AliESABase::kGolden;
AliESABase::ModeCuts cutsforESA = AliESABase::kHybrid;
AliESABase::ModeESA shape_var = AliESABase::kSpherocity;
AliESABase::ModeEstimator modeNtrk = AliESABase::kTracks;

The next figure shows a compilation of individual contributions to the systematic uncertainties in p-Pb.



The systematic uncertainties are:

| source | pp | p-Pb | Pb-Pb |
|---|---|---|---|
| track selection | 0.5-1.8% | 1.1-1.5% | 1.1-1.2% |
| Particle composition | 0.2-0.4% | 0.7-0.8% | 0.2-0.3% |
| Tracking efficiency | 0.1% | 0.2-0.4% | 0.1% |
| Monte Carlo generator | 0.0.2% | 0.1-0.2% | 0.2% |
| Multiplicity Estimator | 1.9-2.6% | 1.0% | 1.0% |
| Reweighting procedure | 0.8-4.6% | 0.4-1.6% | 1.2% |
| Total | 3.4-5.5% | 2.9-4.1% | 1.4-4.0% |

## Track cuts

The variation of the track cuts gives another contribution to the systematic uncertainty. All cuts except the cut on track $p_T$ and pseudo-rapidity range (acceptance cuts) have been varied in the ranges listed in the next table

| cut | nominal | variati |
|---|---|---|
| max. DCAz | 2 cm | 1 cm; 5 |
| max. DCAr | 7 $\sigma$ | 4$\sigma$; 1( |
| min # of TPC crossed rows | 120 | 100,1 |
| max ratio of crussed rows over clusters in TPC | 0.8 | 0.7,0 |
| max fraction of shared TPC clusters | 0.4 | 0.2,1 |
| max. $\chi^2$ per TPC cluster | 4 | 3,5 |
| one hit in the SPD | required | not requ |
| max $\chi^2$ | 36 | 25,4 |

The individual sources of systematic uncertainties are:

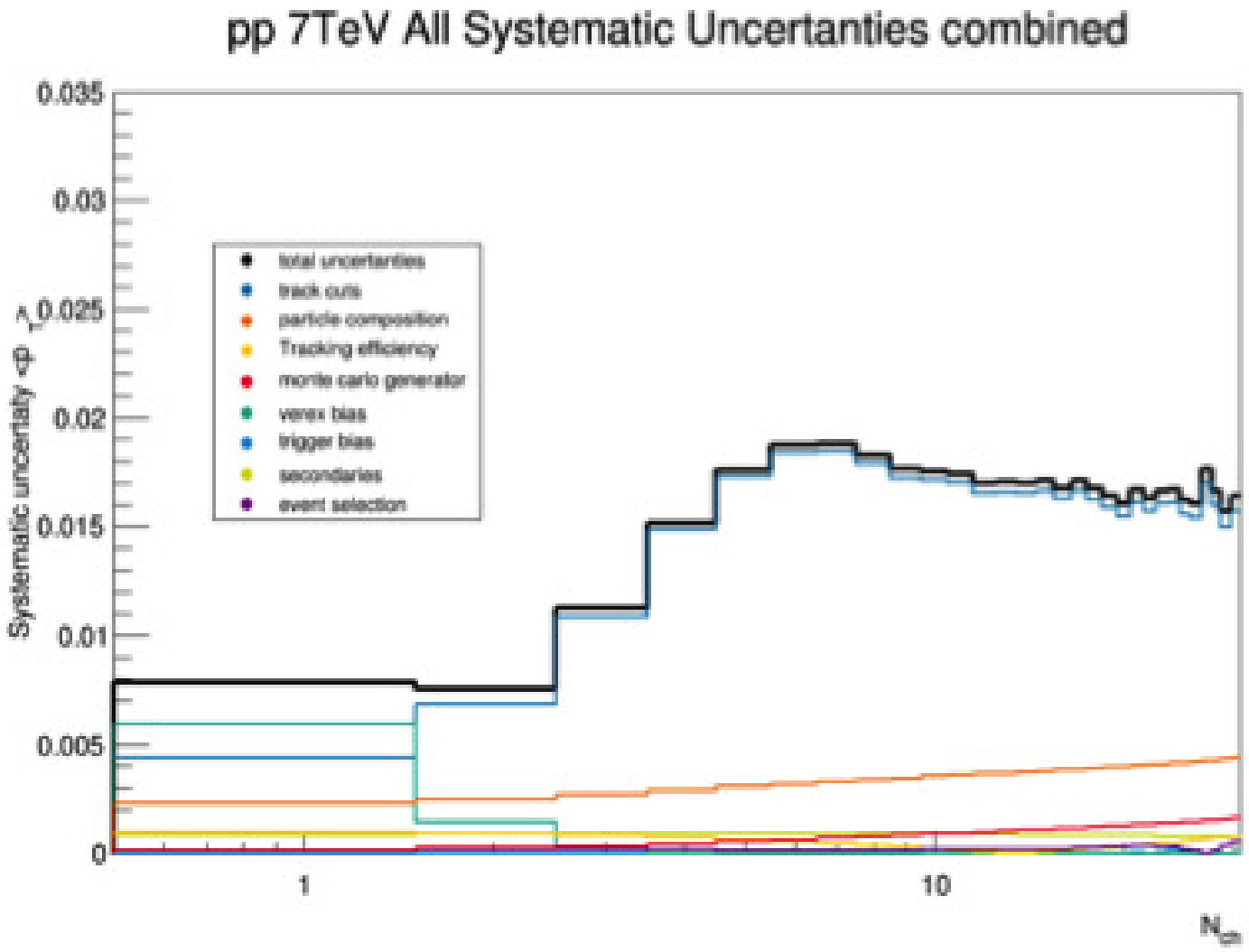
- **Event Cuts (done)**
- **Track cuts**
- **$p_T$ resolution**
- **particle composition**
- **Material budget**
- **Strangeness scaling**
- **Tracking efficiency**
- **MC generator**
- **Acceptance correction**
- **textcolorredReweighting procedure (done)**

Based on Analysis Notes:

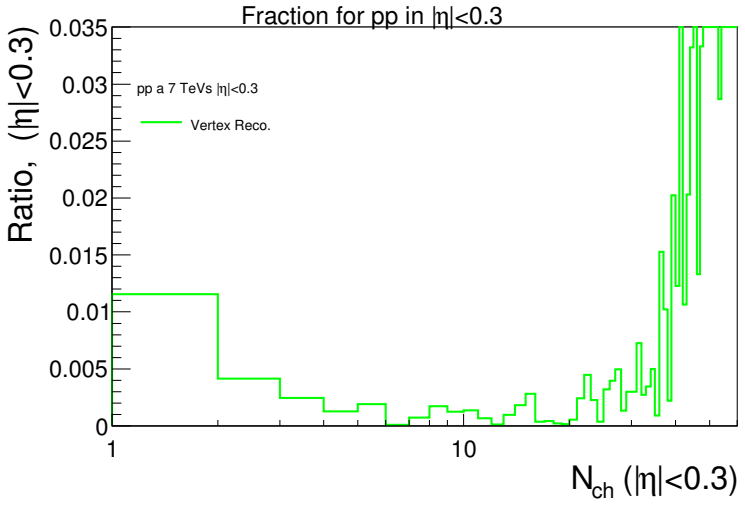
Multiplicity Dependence of the Average Transverse Momentum in pp, p-Pb and Pb-Pb Collisions, A. Andronic et all

Nuclear Modification Factor of Charged Particles in p-Pb 2013 Data, A. Andronic

Next figure shows a compilation of all and individual contributions to the systematic uncertainties in pp collisions at 7 TeV.



OTHER TRY systematics for vtx reconstrucction, pp 7 TeVs, $|\eta| < 0.3$ with PYTHIA.



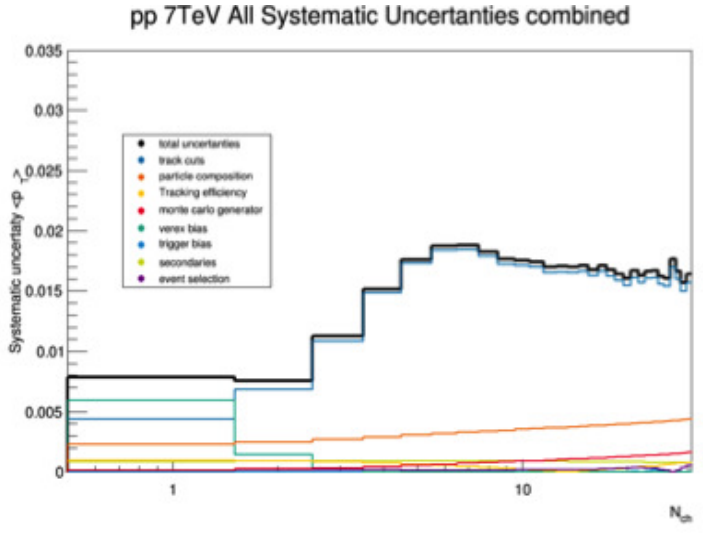




Figure 10 : systematics for vertex reconstruction, b) Analisis Note.

we see the effect in low Nch, but little higher.