

Annual Status Update:

$\Xi(1530)^0$ @ pp 13 TeV

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Overview

- **Moved to CERN(Main stay)**
 - from 2018-05, 7 months (on going)

- **Central Shifter in RC**
 - **DCS shift (5 blocks)**
 - 2018-06-05 ~ 10
 - 2018-06-23 ~ 28
 - 2018-07-03 ~ 08
 - 2018-07-11 ~ 16
 - 2018-12-02 ~ 03 **(Expert) ← Run2 final shift**
 - **Shift leader (2 blocks)**
 - 2018-10-17 ~ 22
 - 2018-10-31 ~ 11-05 **(Expert)**

- **Main topic:** ITS Upgrade project → ALICE Data Analysis(PWG-LF)

ID: 609753
Source: Bong-Hwi Lim
Created: 03/12/2018 10:51:10
Subsystems: Central DCS
Class: HUMAN
Type: EOS
Run: None

DCS EOS Morning Report

Operator Name: Bong-Hwi Lim
Trainee Name:
Status at the beginning of the shift:
Magnet : both off
LHC status: SHUTDOWN: NO BEAM
ALICE status: ALL DOWN
Locks owned: ALL in Central DCS
Free locks: None
Detector status:
ACO: READY
AD0/CPV/EMC/FMD/SDD/SSD/T00/V00: OFF
HMP/MCH/PMD: STBY_CO
MTR/TRD: MIXED
SPD/TOF/ZDC: BEAM_TU

News from previous shift:
04:43:10.602;...;trd_hv:Iseg/can/ra12cr3/ra12cr3ma05/ch03.Actual.ITripStat;trd_hv:_fwFatalAck.
05:08:12.909;...;t00_dcs:wrongConfiguration.value;t00_dcs:_fwErrorAck.
TRD -> contacted to on-call
T00 -> can be ignored(due to the magnet off)

Shift flow:
07:00 Shift start
08:04 (SLIMOS) ALICE ACCESS MODE changed to AUTOMATIC

10:00 DCS intervention start
10:45 DCS intervention done
10:50 DCS shifter released ! Good bye :)

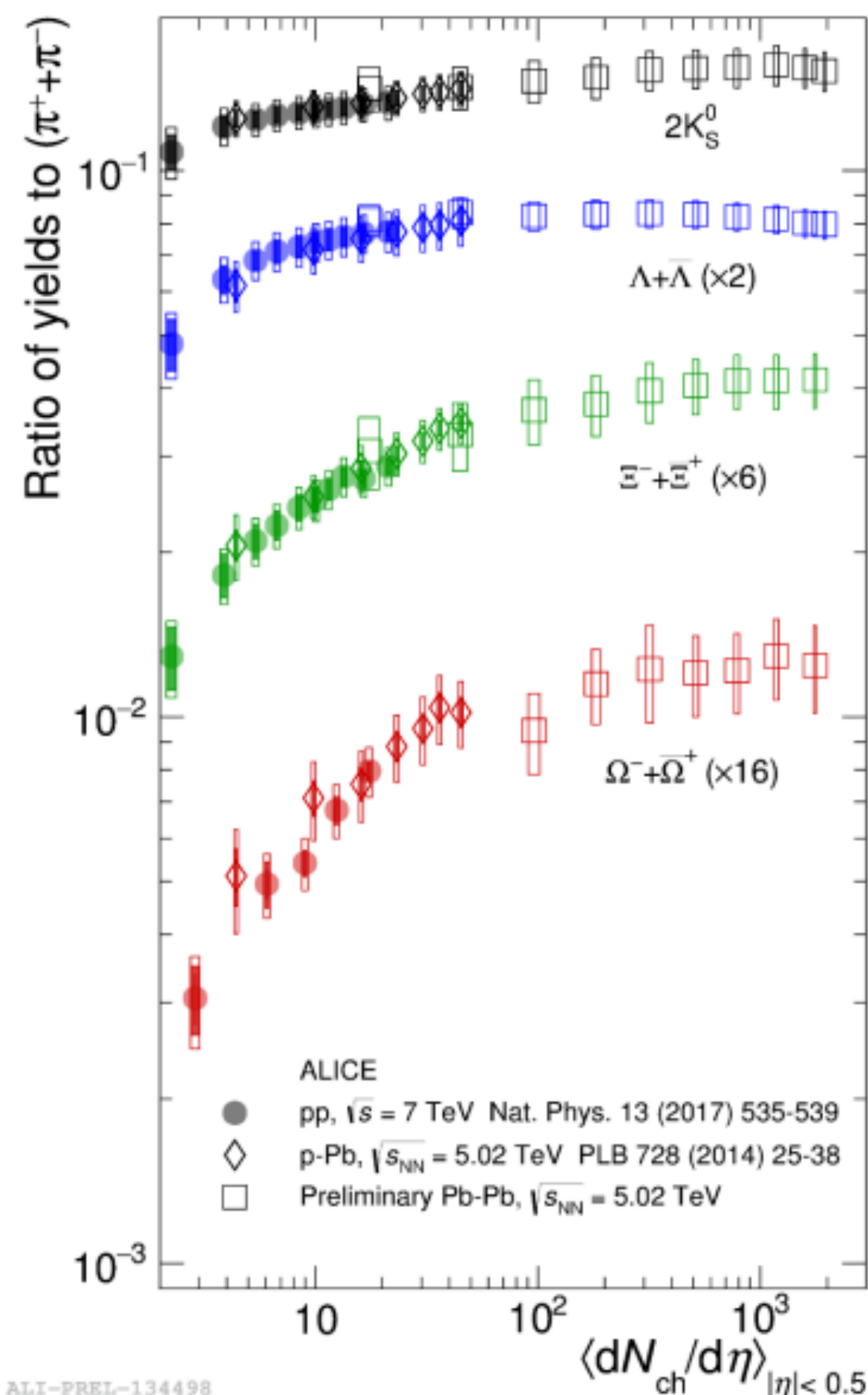
Alert Handlings:
none

:) See you next time!
***** END OF RUN2 *****

Multiplicity dependent Ξ^{*0} Analysis

- **High-multiplicity pp collision**

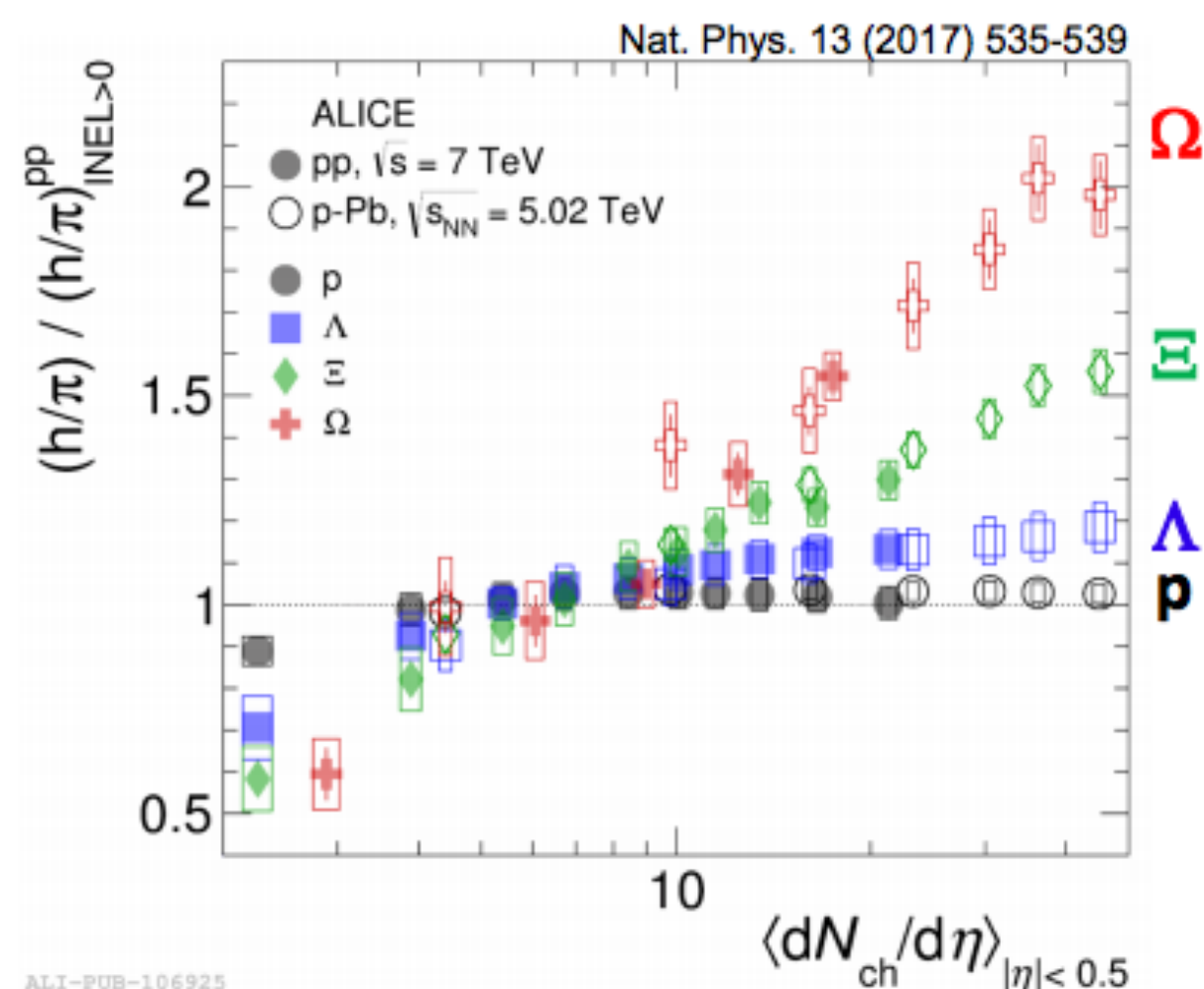
- QPG droplet?



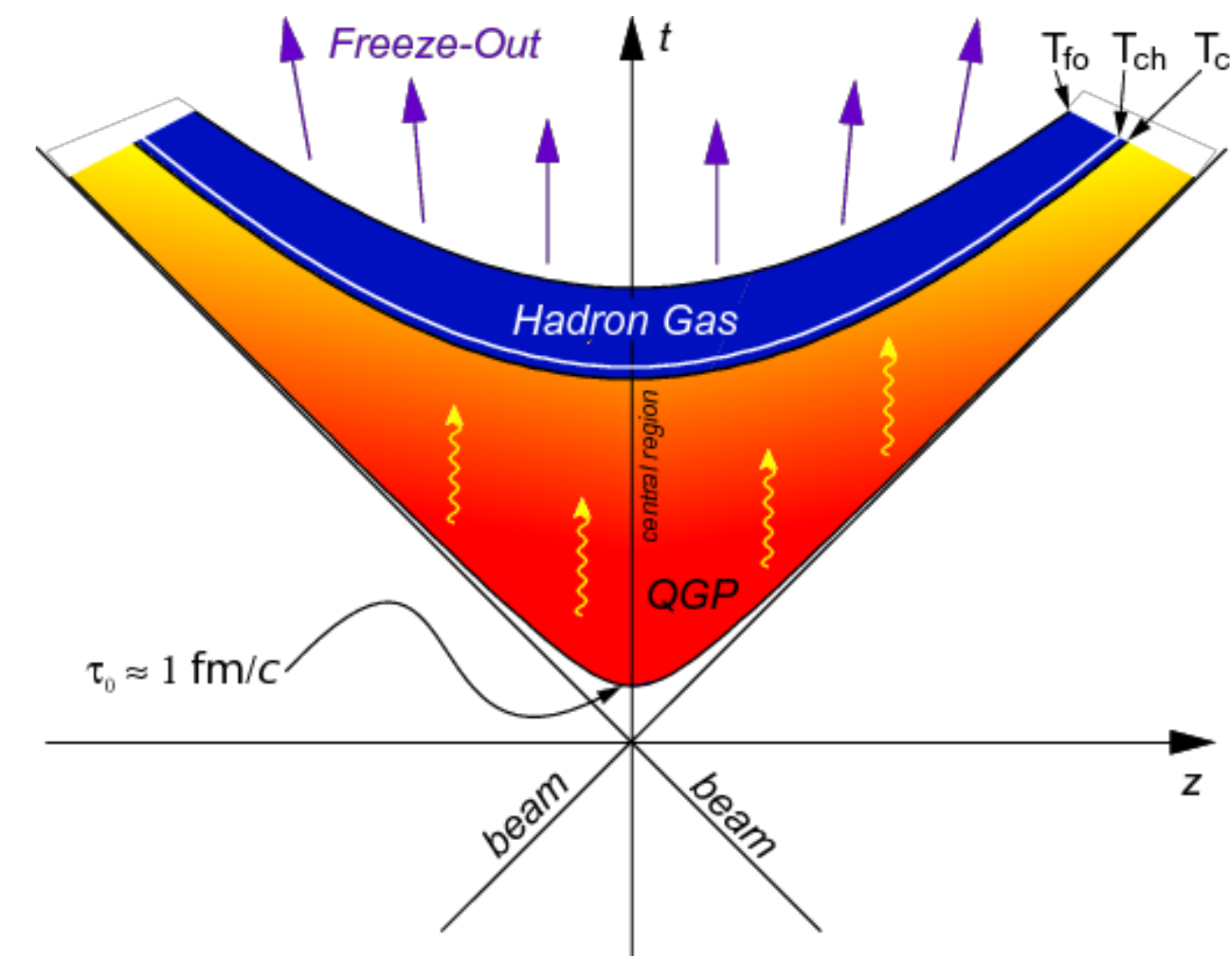
ALI-PREL-134498

- PDG Mass: $1531.80 \pm 0.32 \text{ MeV}/c^2$
- Quark contents: **USS**
- Decay mode: $\Xi^{*0} \rightarrow \Xi^- + \pi^+$
- **Hyperon (strange baryon)**
- **Resonance Particle**
 - Ξ^{*0} Life time: 21.7 fm/c
 - (Life time of Ξ^0 : 8.71 cm/c)

About $\Xi(1530)^0$



ALI-PUB-106925



<https://arxiv.org/abs/1705.01974v2>

- **Resonance particles**

- Short lifetime (fm/c)
 - $\rho[1.3] < K^*[4.2] < \Lambda^*[12.6] < \Xi^{*0}[21.7] < \phi[46.2]$
- Powerful tools to probe **hadronic phase after Chemical F.O.**
 - Regeneration, Re-scattering

Scheme-Procedure

- **Final Goal:** Get the number(N) of produced particle in specific condition.

$$\frac{1}{N_E^{INEL>0}} \frac{d^2 N}{dy dp_T} = \frac{\epsilon^{trigg. INEL>0}}{N_{E,PhysSel}} \frac{N_{raw}}{\Delta p_T \Delta y \Delta Multiplicity percentile} \frac{1}{\epsilon_{MC}} \frac{1}{(S.L.)}$$

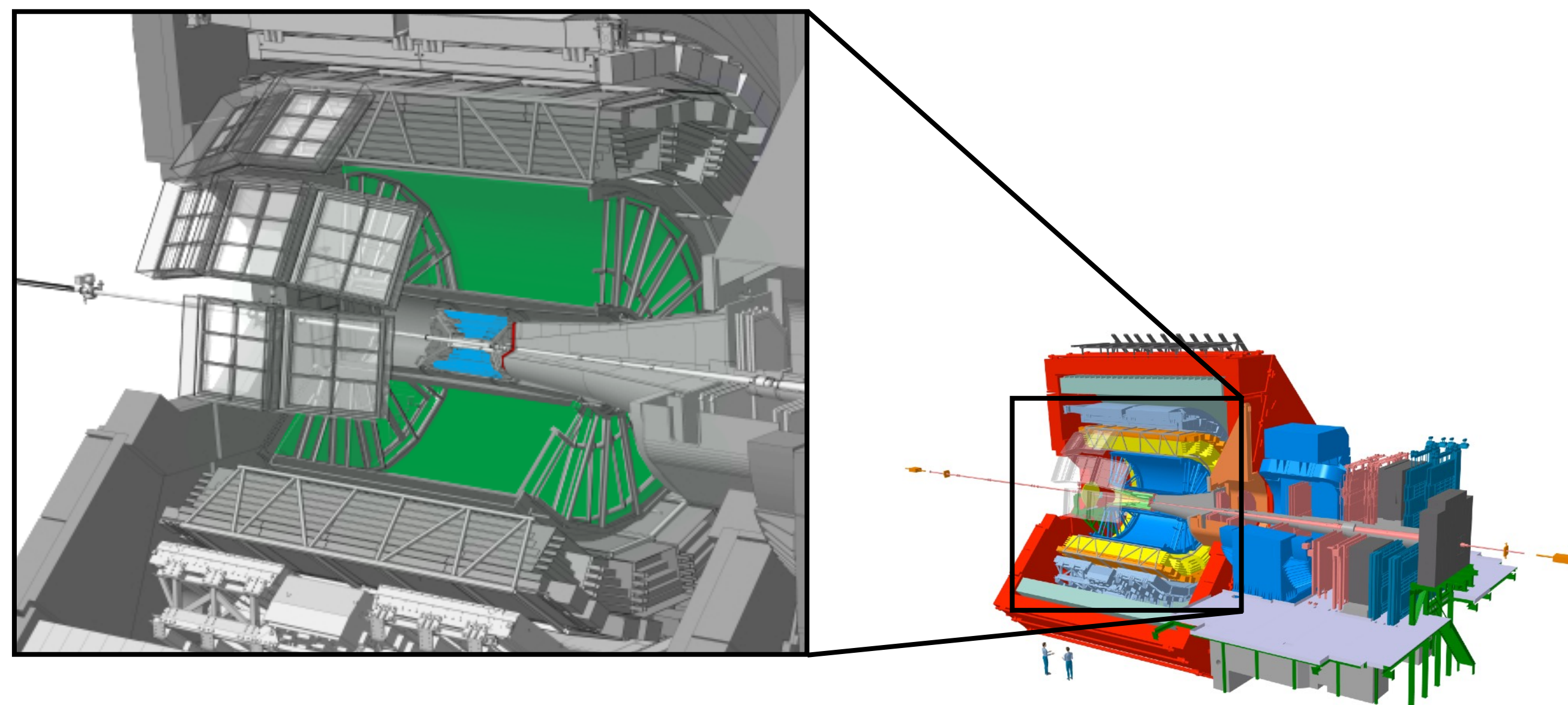
What we want to get Event Selection Reconstruction MC Correction

- **Analysis Flow:**



- **Used Detectors:**

- **ITS:** Trigger / Tracker / Vertexer
- **V0:** Trigger / Multiplicity Estimator
- **TPC:** Tracker / PID(dE/dX)





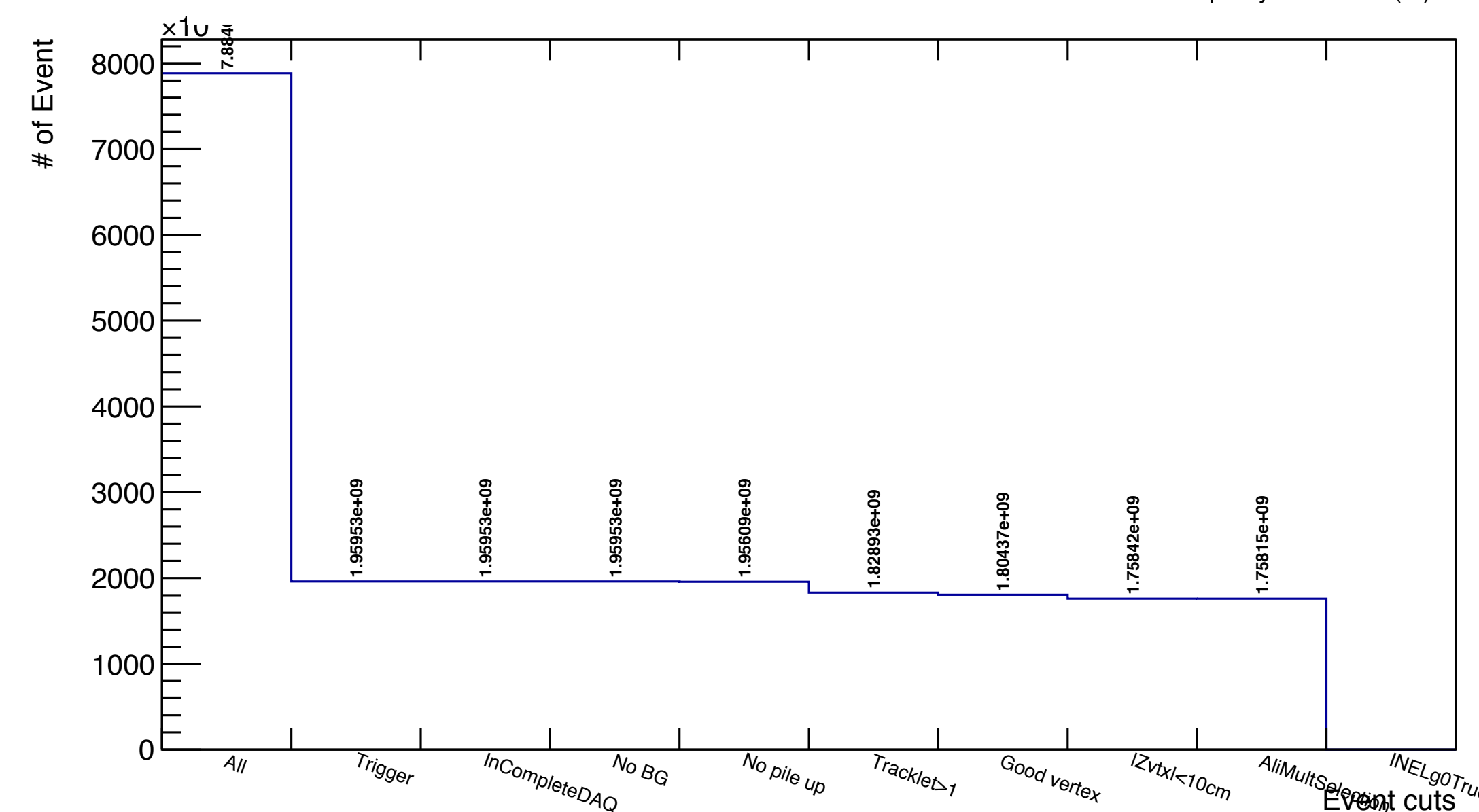
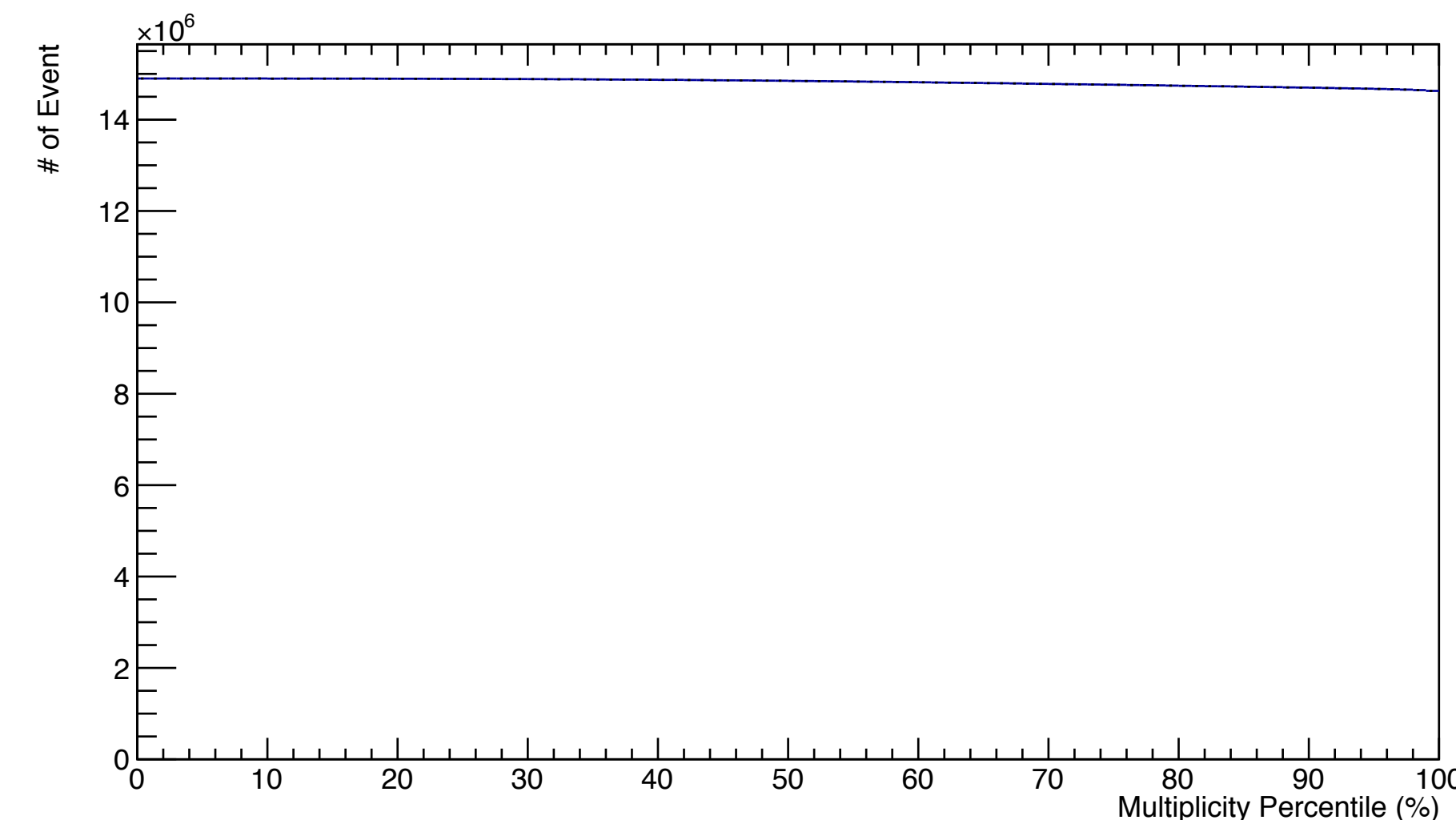
- **Data set:** All available pp 13 TeV collision data, **1.96B events**

- LHC15fi_16deghijklop_17cefgijklmor_18bdefghikmnop

- **Trigger:** kINT7, Minimum bias trigger (V0A && V0C)

- **Event cuts:**

- IsIncompleteDAQ
- IsSPDClusterVsTrackletBG
- IsNotPileupSPDInMultBins
- Good Vertex Selection:
 - $|zVertex| < 10$ cm
 - SPDVertex dispersion < 0.04 cm
 - zVertex resolution < 0.25 cm
 - z-position difference < 0.5 cm
- IsSelected in AliMultSelection



Event Selection → **Track Reconstruction** → MC Correction → Final Result

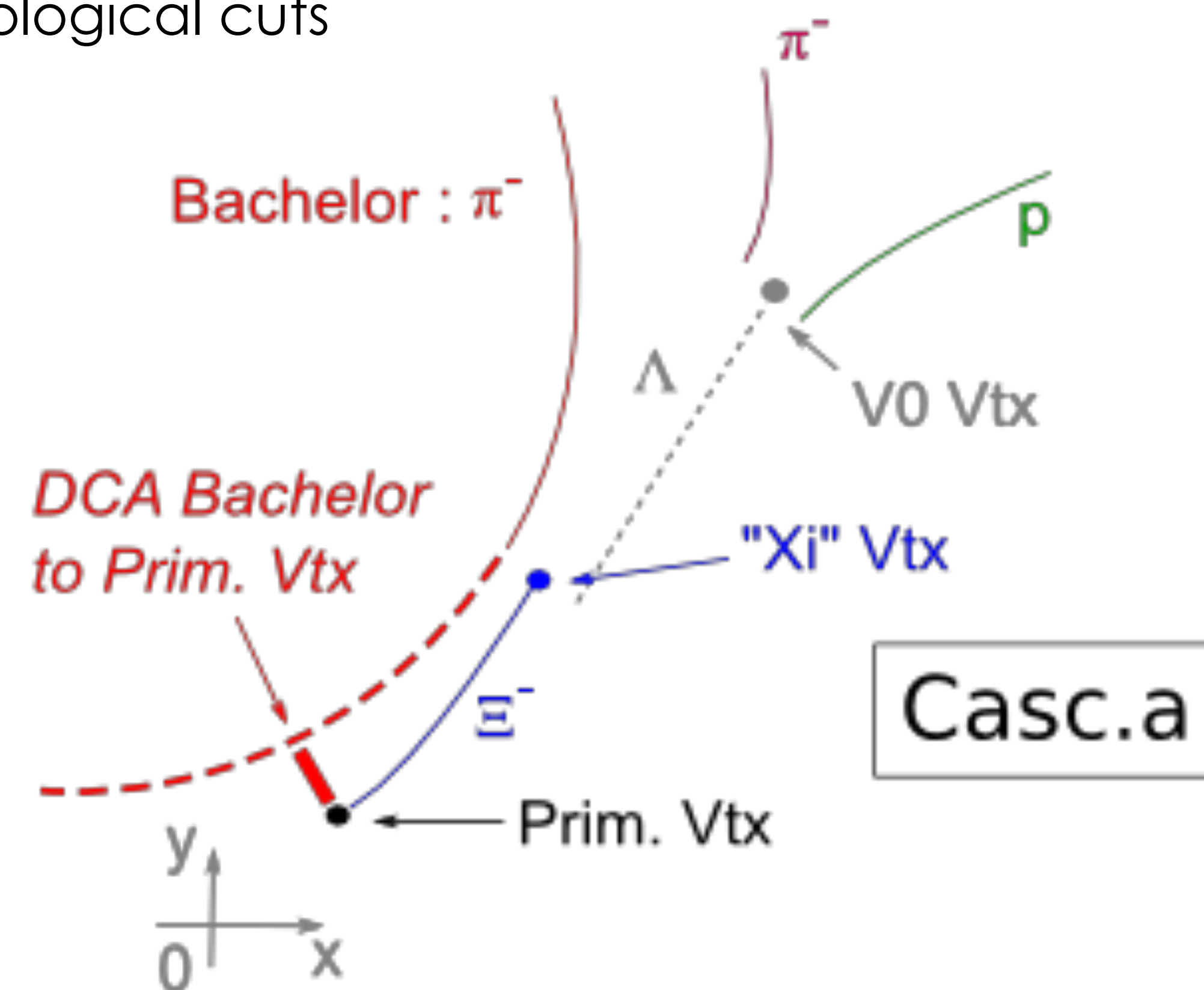
- **Decay channel:** $\Xi^{*0} \rightarrow \Xi^- + \pi^+$
- **Basic concept:** Select π , and Select Ξ and apply topological cuts

- Good π Selection (Track cut):

- Standard 2011 ITS-TPC Track cut ([link](#)) with Primary cut option
- $\eta < |0.8|$
- $p_T > 0.15$ GeV/c
- TPC PID(π) sigma < 3
- zVertex dispersion < 2.0 cm

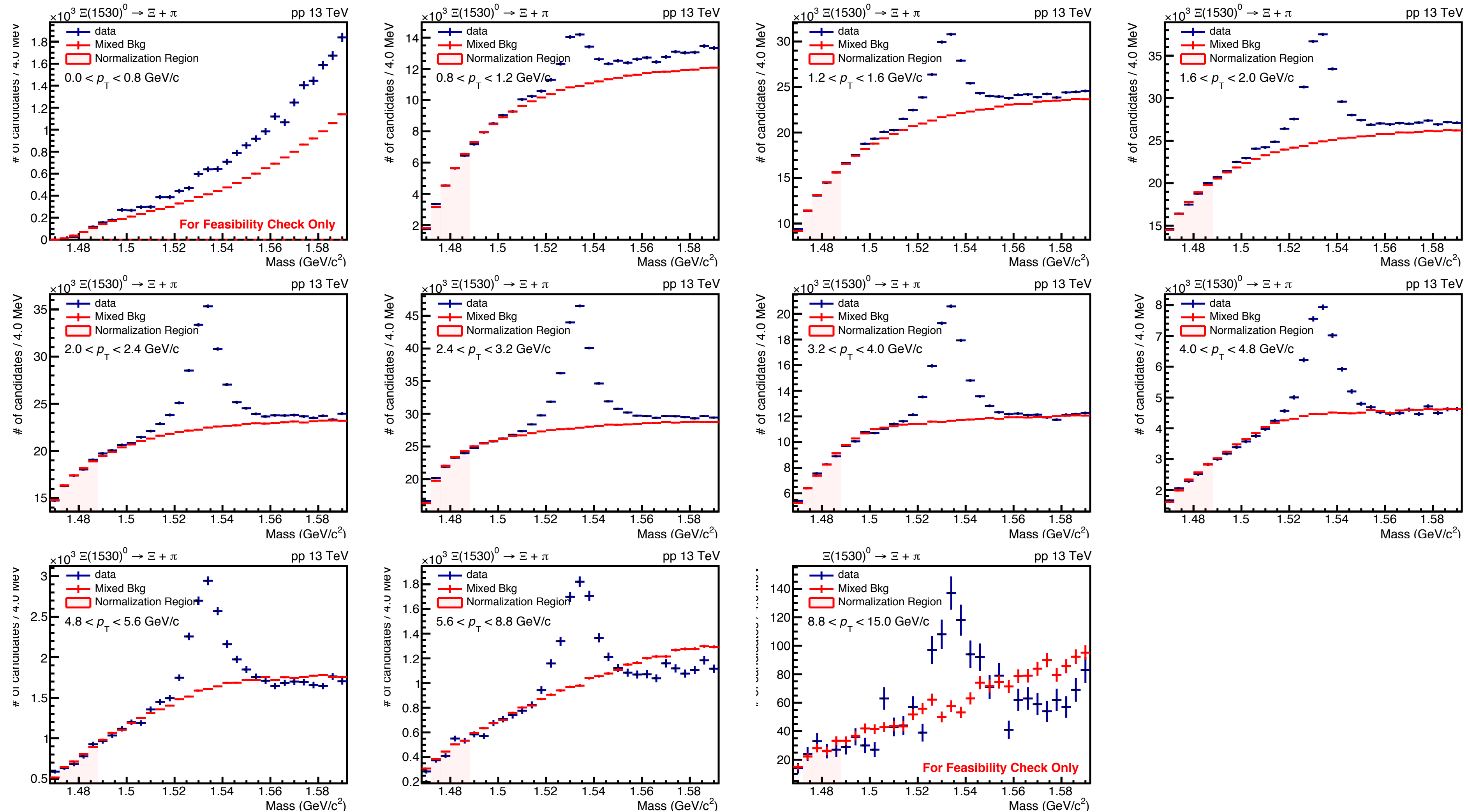
- Good Ξ Selection (Track cut):

- Reject AcceptKinkDaughters
- Number of Clusters in TPC > 50
- Require TPC Refit
- Chi2 Per Cluster TPC < 4
- $p_T > 0.15$ GeV/c
- TPC PID(π, ρ, Λ) sigma < 3



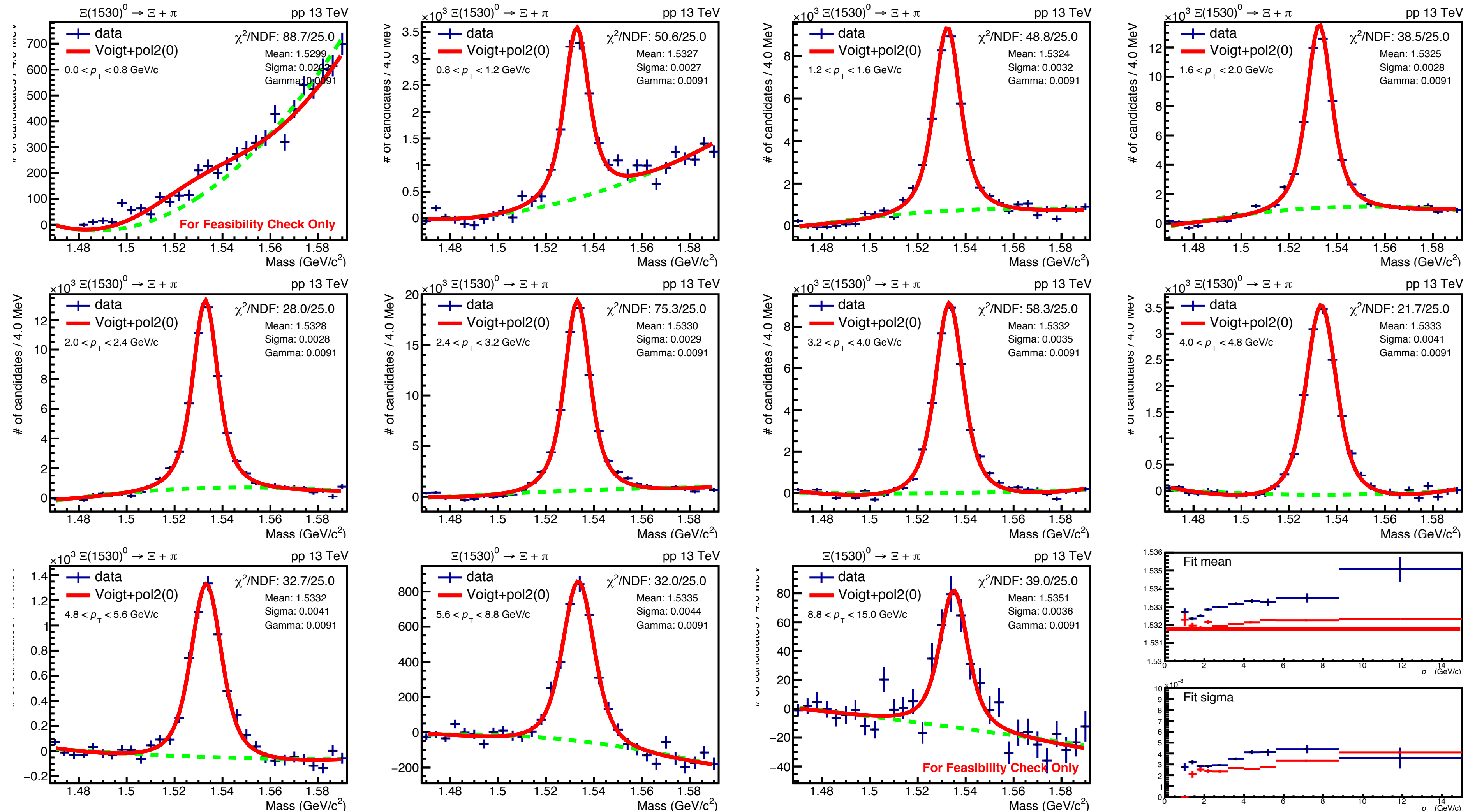


- Reconstructed Signal + Background (0-100% Minimum Bias)



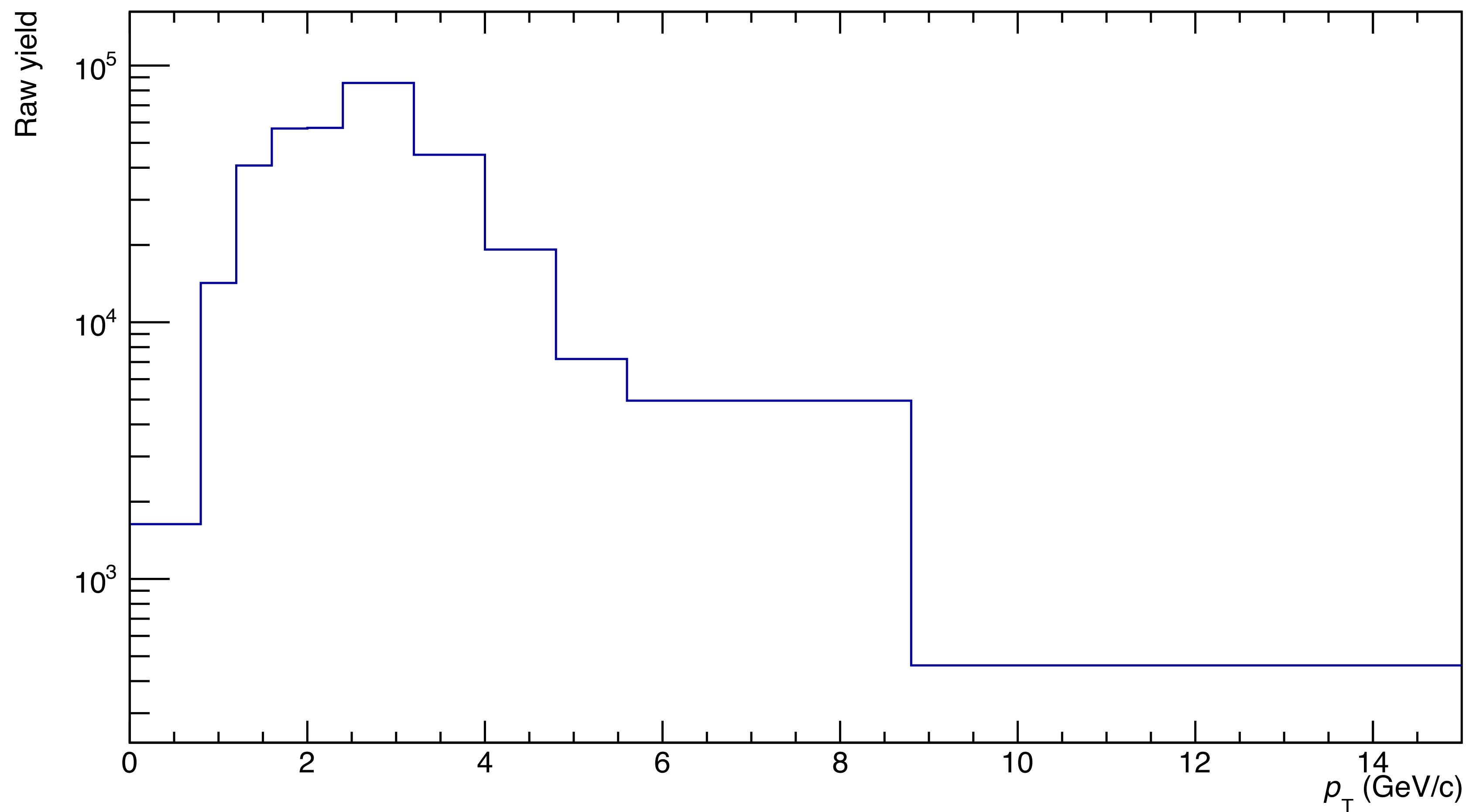


- Reconstructed Signal - Background, fit (0-100% Minimum Bias)



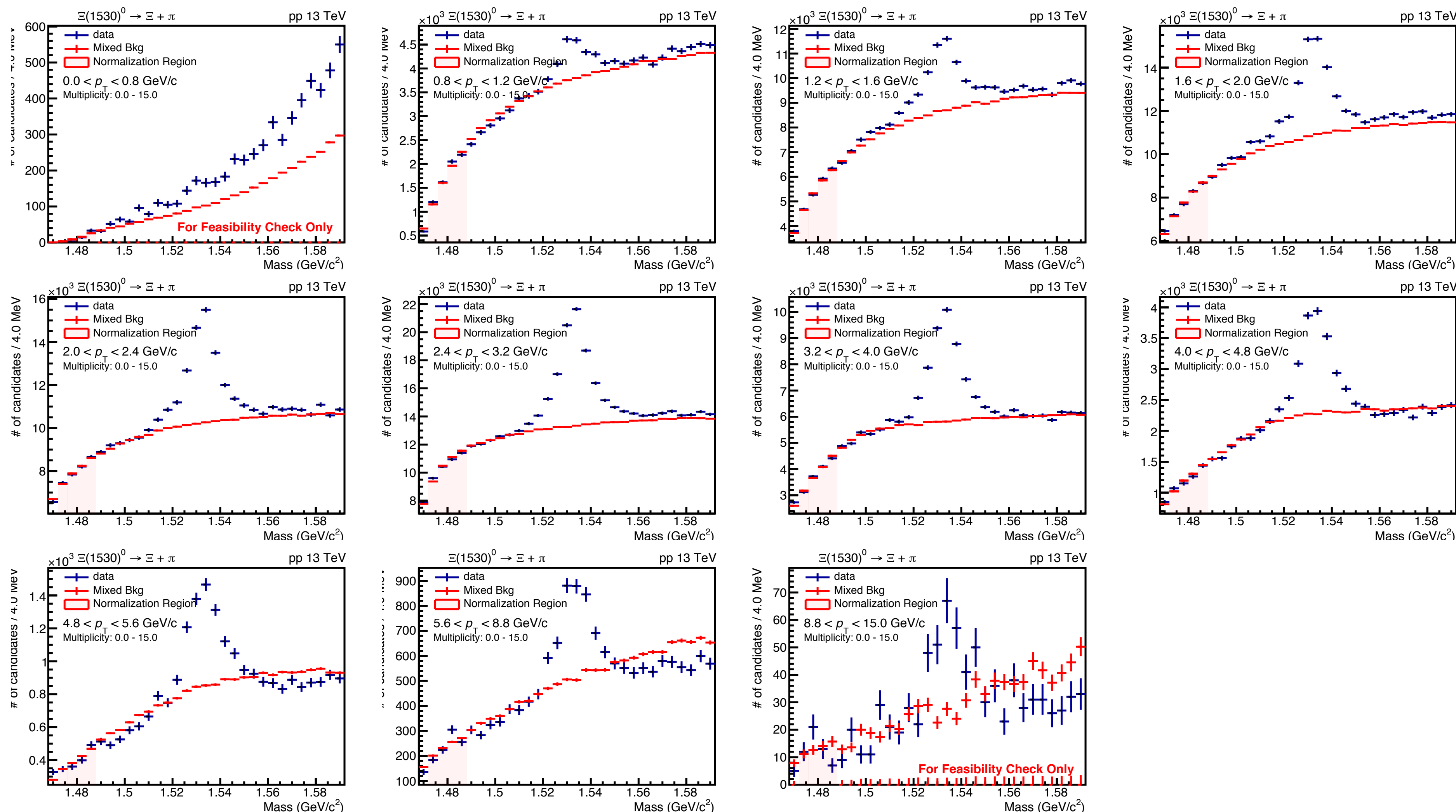
Event Selection → **Track Reconstruction** → MC Correction → Final Result

- Raw yield distribution



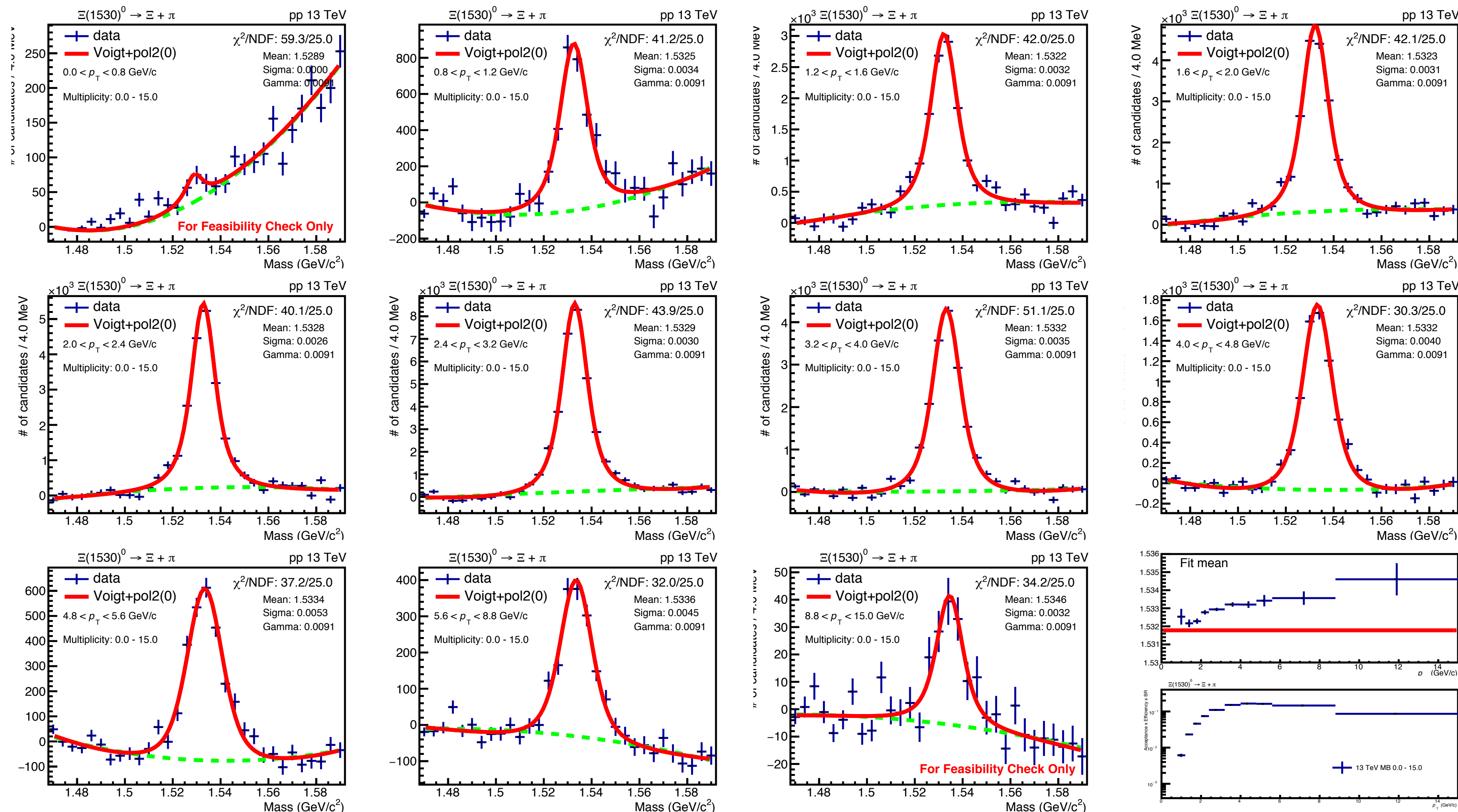
Event Selection → **Track Reconstruction** → MC Correction → Final Result

- Reconstructed Signal + Background (0-15%, 15-30%, 30-50%, 50-70%, 70-100%)



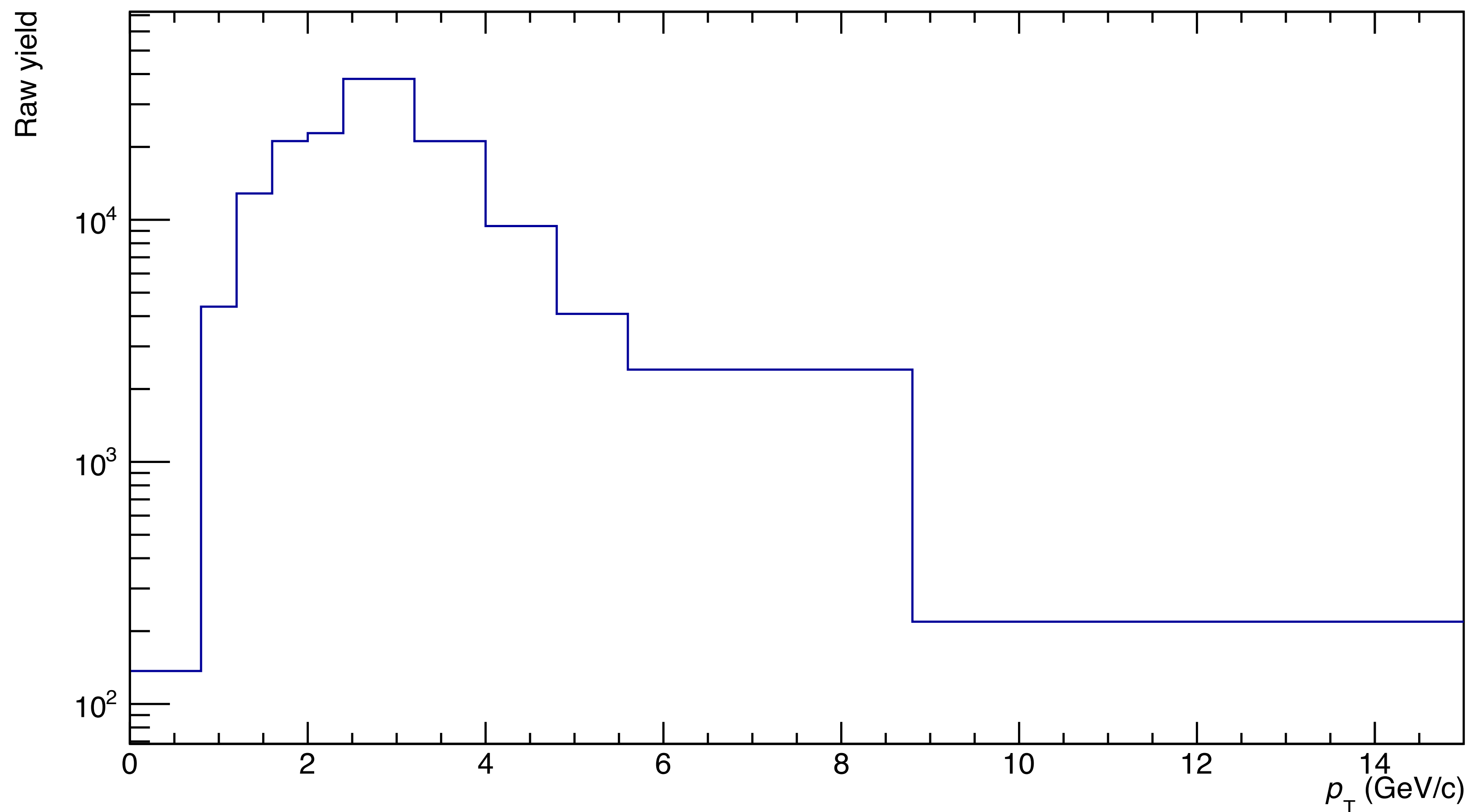
Event Selection → **Track Reconstruction** → MC Correction → Final Result

- Reconstructed Signal - Background, fit (0-15%, 15-30%, 30-50%, 50-70%, 70-100%)



Event Selection → **Track Reconstruction** → MC Correction → Final Result

- Raw yield distribution (**0-15%**, 15-30%, 30-50%, 50-70%, 70-100%)





• **Corrections:**

• **Trigger Efficiency**

• Reconstruction Efficiency

• Signal Loss

$$\frac{1}{N_E^{INEL>0}} \frac{d^2N}{dydp_T} = \frac{\epsilon^{trigg. INEL>0}}{N_{E,PhysSel}} \frac{N_{raw}}{\Delta p_T \Delta y \Delta Multiplicity percentile} \frac{1}{\epsilon_{MC}} \frac{1}{(S.L.)}$$

What we want to get

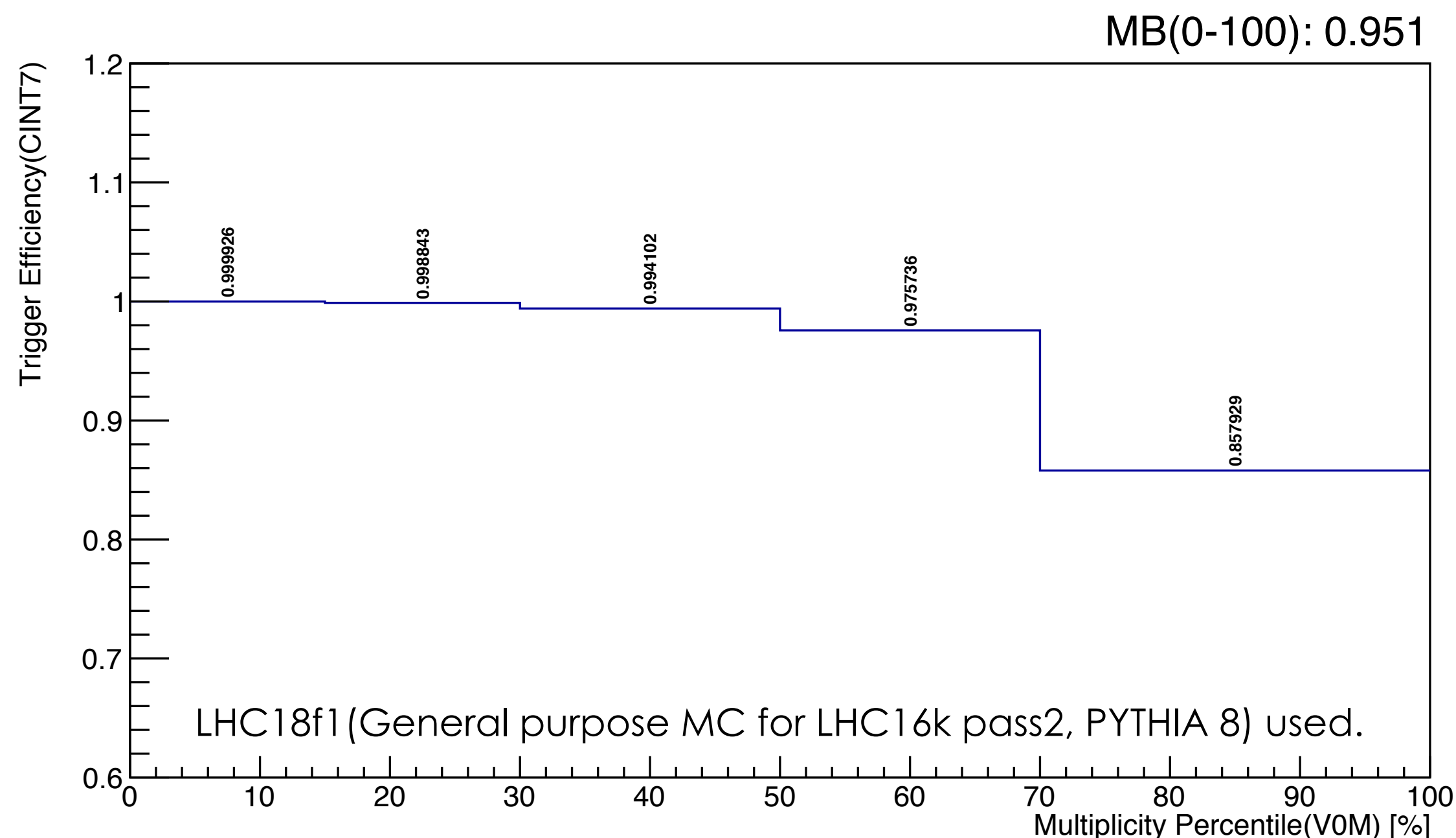
Event Selection

Reconstruction

MC Correction

• **Trigger Efficiency:** # of triggered events / # of MC True INEL>0 events

• 1.0 in Pb-Pb event, but pp case...





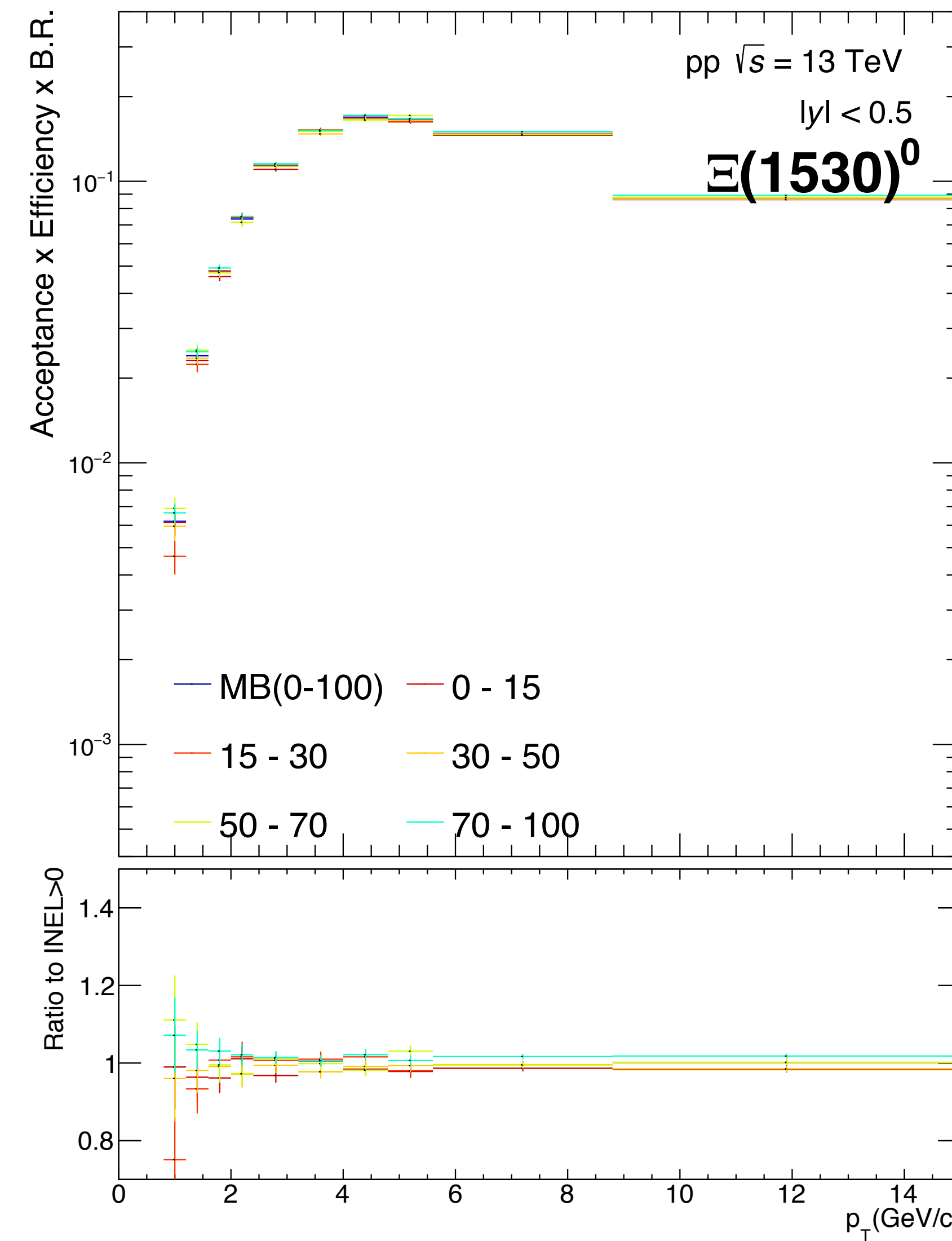
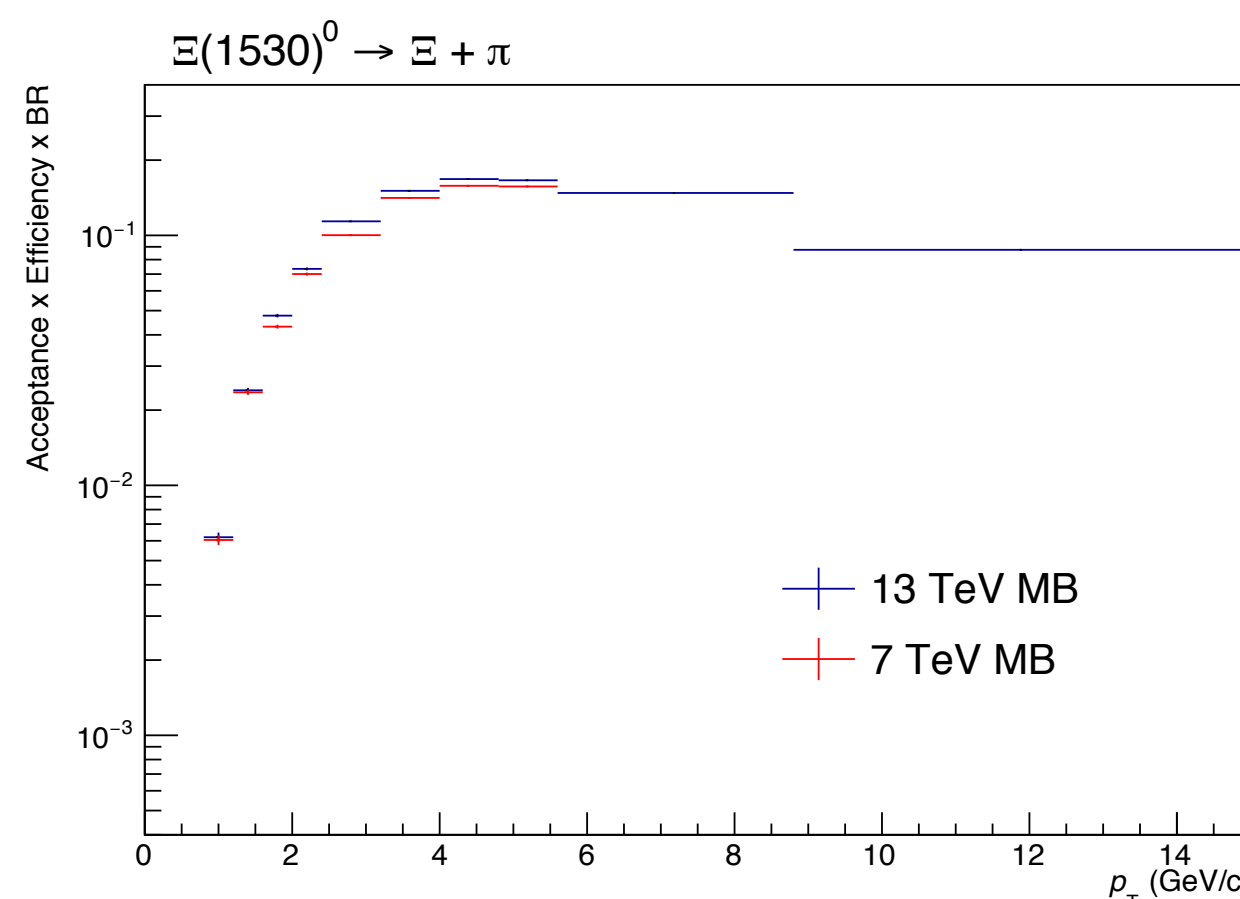
- **Corrections:**

- Trigger Efficiency
- **Reconstruction Efficiency**
- Signal Loss

- **Reconstruction Efficiency:**

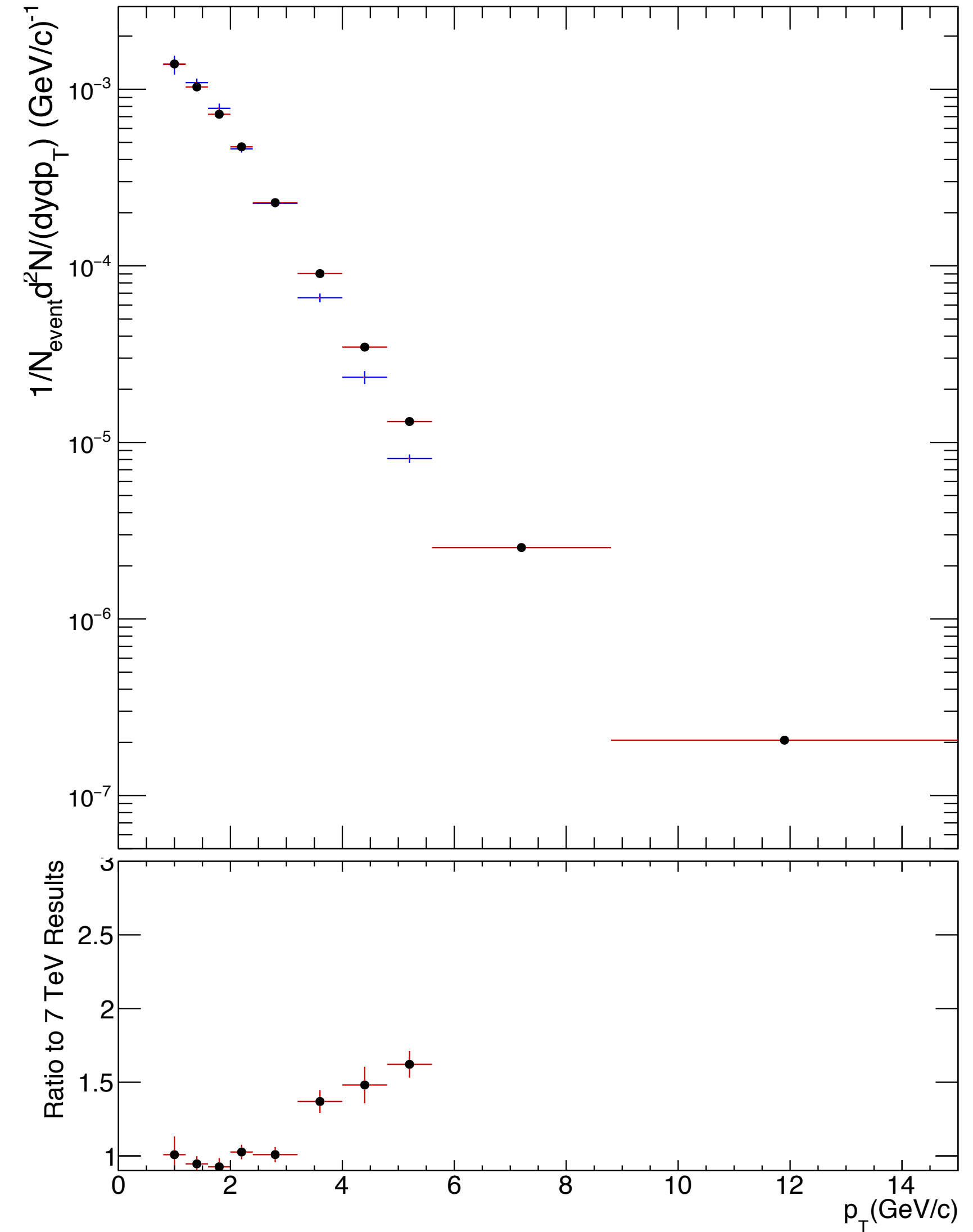
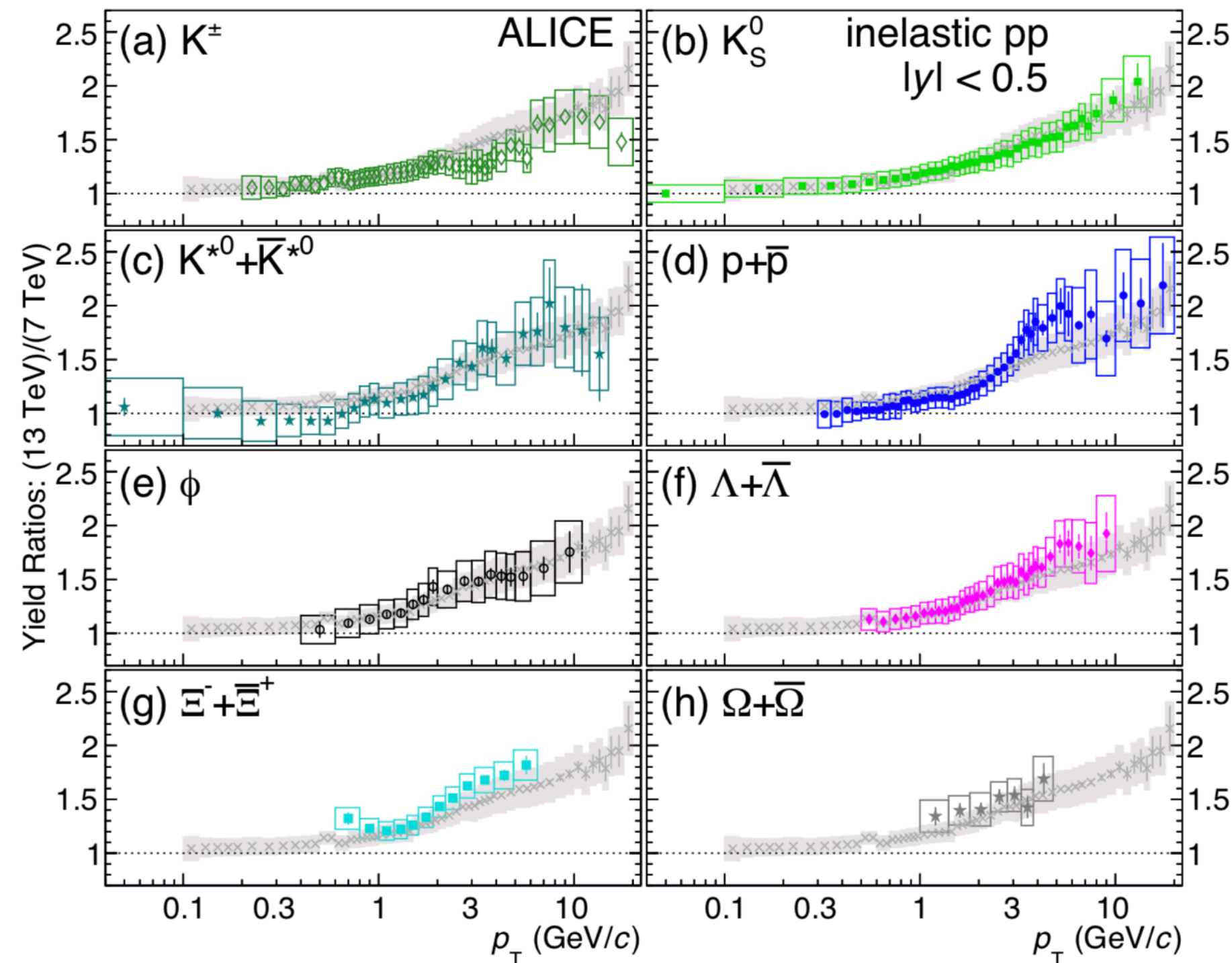
of Reconstructed particle / # of MC True particle after Event Selection.

- Acceptance and Branching Ratio are calculated together.
- All Reconstruction Efficiency through several multiplicity bins are look.
 - Test data → **More statistic needed! / planed!**





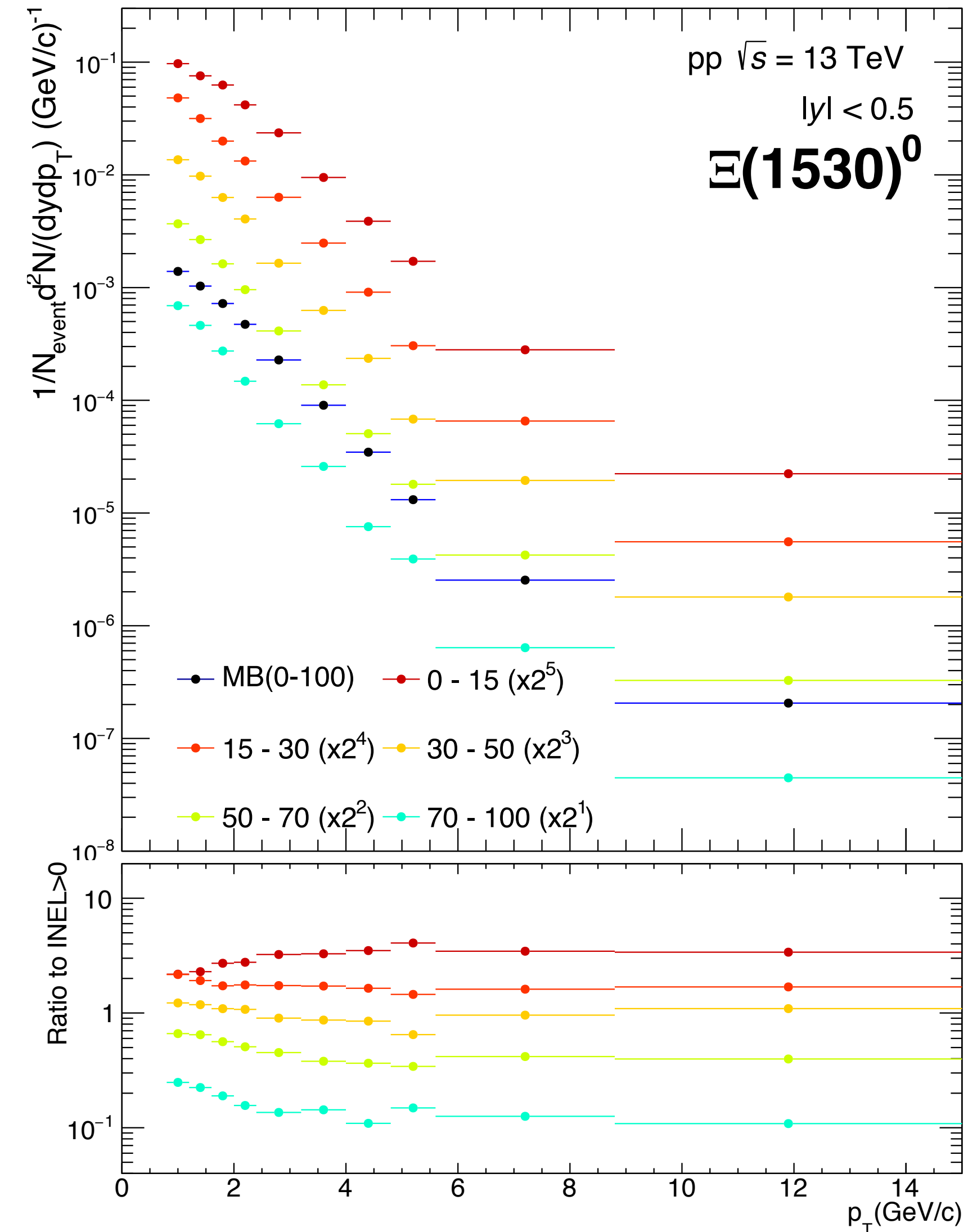
- **Corrected Spectra in MB(0-100%)**
 - Comparison with 7 TeV results ([Link](#))
 - Yields in 13 TeV have increasing trend, $\Xi(1530)^0$ also follow





Corrected Spectra

- With Multiplicity percentile bin: **0-15-30-50-70-100**
 - High Multiplicity results(**0-0.01-0.05-0.1**) will be added.
- (issue) Error bar is not well describing errors from the Efficiency.
- (Plan) Systematic Error will be added.



- **Mainly moved to CERN, starting ALICE DATA Analysis**
- **A Lot of Central Shifts done, including Expert shift during PbPb period.**
- **Study on the multiplicity dependent $\Xi(1530)^0$ in pp 13 TeV**
 - All procedures are explained: Event Selection, Track Reconstruction, MC Correction
 - MB/Multiplicity results are in final stage
 - **Results are compatible with 7 TeV Results. (Efficiency/Yields)**
 - Increasing trend through p_T observed, good agreement with other results.
- **Outlook**
 - High Multiplicity triggered data will be added soon.
 - Preparing Systematic Uncertainty Study

Thanks for your attention!!