FKPPL meeting

Ch-jet anlysis in pp Run 3

: cross-section normalization, *R*-dependent results

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Cross-section normalization (Run1)

Full jet pp@2.76 TeV (2013)

11.1 MB data set

Cross section normalization for the MB jet distribution requires scaling by the integrated luminosity of the MB data set.

$$\frac{d\sigma^{\mathrm{jet}}}{dp_{\mathrm{T}}} = \frac{dN^{\mathrm{jet}}_{\mathrm{raw}}}{dp_{\mathrm{T}}} \times \frac{1}{C_{\mathrm{MC}}} \times \frac{1}{Acc\,(p_{\mathrm{T}})} \times \frac{1}{L_{\mathrm{int}}} \quad (21)$$

The MB trigger cross section is measured to be $\sigma^{\mathrm{MB}} = 55.4$ mb with uncertainty of 1.9% (ref). And the integrated luminosity is:

$$L_{\mathrm{int}} = \frac{N^{10\ \mathrm{cm}}_{\mathrm{MB}}}{\sigma^{\mathrm{MB}}} = \frac{N^{\mathrm{vtx}+10\ \mathrm{cm}}_{\mathrm{MB}} \times \frac{N^{10\ \mathrm{cm}}_{\mathrm{MB}}}{N^{\mathrm{vtx}+10\ \mathrm{cm}}_{\mathrm{MB}}}}{\sigma^{\mathrm{MB}}} = \frac{N^{\mathrm{vtx}+10\ \mathrm{cm}}_{\mathrm{MB}} \times \frac{N_{\mathrm{MB}}}{N^{\mathrm{vtx}}_{\mathrm{MB}}}}{\sigma^{\mathrm{MB}}} \quad (22)$$

https://alice-notes.web.cern.ch/node/46

$$\frac{\mathrm{d}^2\sigma^{\mathrm{INEL}}_{\mathrm{jet}}}{\mathrm{d}p_{\mathrm{T}}\mathrm{d}\eta} = \frac{\sigma^{\mathrm{V0}}_{\mathrm{vis}}}{\mathrm{N}^{\mathrm{V0}}_{\mathrm{evt}}} \frac{\mathrm{d}^2\mathrm{N}^{\mathrm{V0,corr}}_{\mathrm{jet}}}{\mathrm{d}p_{\mathrm{T}}\mathrm{d}\eta} \times \frac{1}{\epsilon_{zvtx10}}$$

Ch-jet pp@2.76/7 TeV (2015)

To obtain corrected jet cross-sections, we have to unfold uncorrected jet crossection obtained using following equation

$$\left.\frac{d^2\sigma}{dp_{\mathrm{T}}d\eta}\right|^{raw}(p_{\mathrm{T}}) = \frac{\sigma}{N^{trig}_{evt}} \cdot \left.\frac{\Delta N^{jets}}{\Delta p_{\mathrm{T}}\Delta\eta}\right|^{raw}(p_{\mathrm{T}}) \quad (8)$$

Cross-sections are obtained from VdM scansi[2], and the value of σ_{MBOR} for 7 TeV proton collisions is 62 ± 2.2 mb and for 2.76 TeV collisions, this value is 55.4 ± 1.0 mb.

https://alice-notes.web.cern.ch/node/128

Ch-jet pp@7 TeV (2019)

9 Cross section normalization

We normalize the measured jet p_T spectra per event and multiply with the measured total inelastic cross section.

$$\frac{\mathrm{d}^2\sigma}{\mathrm{d}p_T\mathrm{d}\eta} = \frac{\sigma}{N^{evt}_{trig}} \cdot \frac{\Delta N^{jet,meas}}{\Delta p_T \Delta\eta}$$

For the normalization, we use the number of minimum bias events selected by the trigger after physics selection (AliVEvent::kMB), vertex quality cuts and zVertex cut. The number of events is divided by the efficiency of the vertex requirement, since all events with a jet in the TPC acceptance also should have a vertex, and correspondingly all events rejected by this cut have no jet. The efficiency is evaluated before the zVertex cut, assuming negligible zVertex dependence. The 'bin 0 correction' for this selection bias is 10%.

The inelastic pp cross section for $\sqrt{s} = 7$ TeV, measured in VdM scans [14], before corrections for trigger efficiency, is

$$\sigma_{MBOR} = 62.2 \pm 2.2\ mb\ (syst.)$$

https://alice-notes.web.cern.ch/node/621

Cross-section normalization (Run2)

Full jet pp@5.02TeV (2020)

To convert the measured yield into a cross section, the number of collected events need to be scaled by the luminosity.

$$\sigma^{Jet} = \frac{N^{Jet}_{Evt}}{\mathscr{L}} \tag{13}$$

In ALICE we do not measure the luminosity directly but rather measure a reference-process cross section (σ^{vis}) and the according average reference-process rate in a bunch crossing. More details are summarized in Ref. [15]. In our case, the reference-process is determined by the trigger rate in the V0 detector (where a coincidence of hits in the A and C side was required, called $\mathrm{V0_{AND}}$). The luminosity is thus:

$$\mathscr{L} = \frac{N^{V0}_{Evt}}{\sigma_{vis}} \tag{14}$$

and then

$$\sigma^{Jet} = \frac{N^{Jet}_{Evt}}{\mathscr{L}} = \frac{N^{Jet}_{Evt} \cdot \sigma_{vis}}{N^{V0}_{Evt}} = \frac{N^{Jet} \cdot \sigma_{vis}}{N_{Evt}}. \tag{15}$$

Since the $\mathrm{V0_{AND}}$ condition is the only one required for the MB trigger, σ_{vis} is also called the visible MB cross section and N^{V0}_{Evt} is the number of MB triggers (cleaned up by pile-up

https://alice-notes.web.cern.ch/node/852

Ch-jet pp@13TeV (2022)

2.7 Cross section normalization

We normalize the measured jet p_T spectra per event and multiply with the measured visible inelastic cross section.

$$\frac{\mathrm{d}^2\sigma^{\mathrm{ch\ jet}}}{\mathrm{d}p_\mathrm{T}\mathrm{d}\eta}(p_\mathrm{T}^{\mathrm{ch\ jet}}) = \frac{1}{\mathscr{L}_{\mathrm{int}}} \frac{\Delta N_{\mathrm{jets}}}{\Delta p_\mathrm{T} \Delta\eta}(p_\mathrm{T}^{\mathrm{ch\ jet}}), \tag{3}$$

For the normalization, we use the number of Minimum Bias events selected by the trigger after physics selection, vertex quality cuts and zVertex cut. The number of events is divided by the efficiency of the vertex requirement (bin0 correction), since all events with a jet in the TPC acceptance also should have a vertex, and correspondingly events rejected by this cut have no jet. The efficiency is evaluated before the z-Vertex cut, assuming negligible z-Vertex dependence. The inelastic pp cross section for $\sqrt{s} = 13$ TeV, measured in VdM scans [6], before corrections for vertex efficiency, is

$$\sigma_{V0} = 58.1 \pm 1.6\ mb\ (syst.) \tag{4}$$

At the time of writing this note, this value is not yet published, but can be considered final, or close to final.[6]

https://alice-notes.web.cern.ch/node/850

$$\frac{\mathrm{d}^2\sigma^{\mathrm{INEL}}_{\mathrm{jet}}}{\mathrm{dp_T d}\eta} = \frac{\sigma^{\mathrm{V0}}_{\mathrm{vis}}}{\mathrm{N}^{\mathrm{V0}}_{\mathrm{evt}}} \frac{\mathrm{d^2N^{V0,corr}_{jet}}}{\mathrm{d}p_\mathrm{T}\mathrm{d}\eta} \times \frac{1}{\epsilon_{zvtx10}}$$

Ch-jet pp&PbPb@5.02TeV (2024)

4 Cross-section normalization

We normalize the measured jet p_T spectra per event and multiply with the measured visible inelastic cross section.

$$\frac{\mathrm{d}\sigma^{jet}}{\mathrm{d}p_T} = \frac{C_{vtx}}{N_{evt}} \sigma_{V0} \cdot \mathrm{Unfolded}\left(\frac{\mathrm{d}N^{jet}}{\mathrm{d}p_T}\right) \tag{5}$$

For the normalization, we use the number of Minimum Bias events selected by the trigger after physics selection, vertex quality cuts and Z_{Vertex} cut. The number of events is divided by the efficiency of the vertex requirement C_{vtx} (bin0 correction), since all events with a jet in the TPC acceptance also should have a vertex, and correspondingly events rejected by this cut have no jet. The efficiency is evaluated before the Z_{Vertex} cut, assuming negligible Z_{Vertex} dependence. The inelastic pp cross section for $\sqrt{s} =$ 5.02 TeV, measured in VdM scans [1], before corrections for vertex efficiency, is $\sigma_{V0} = 51.2 \pm 1.2$ mb.

https://alice-notes.web.cern.ch/node/1218

Ch-jet pPb@5.02 TeV (2024)

8.1 Jet spectra

8.1.1 p–Pb

The inclusive p–Pb jet cross-section is reported differentially in p_T and η as:

$$\frac{d^2\sigma}{dp_T d\eta} = \frac{\varepsilon_{VZ}}{N_{\mathrm{evt}}} \sigma_{v0} \frac{d^2N}{dp_T d\eta} \tag{9}$$

Where N_{evt} is the number of MB events passing the event selection, ε_{VZ} is the vertex reconstruction efficiency which accounts for the number of events that fired the MB trigger, but failed to reconstruct a

https://alice-notes.web.cern.ch/node/1211

Iso-γ jet pp@13 Tev (2025)

5 Cross section

So far, all the quantities involved in the isolated photon differential cross-section calculation have been obtained and discussed. In this section they are gathered to finally compute this observable following the equation given hereunder, based on Eq. (6) per trigger:

$$\frac{\mathrm{d}^2\sigma_\gamma^{\mathrm{iso}}}{\mathrm{d}\ p_\mathrm{T}\ \mathrm{d}\ \eta} = \sigma_{\mathrm{MB}}^{\mathrm{average}} \times \frac{1}{N_{\mathrm{evt}} \times RF} \frac{\mathrm{d}^2 N^{\mathrm{iso}}}{\mathrm{d}\ p_\mathrm{T}\ \mathrm{d}\ \eta} \times \frac{1}{\varepsilon_{\mathrm{trig}}} \times \frac{P}{\varepsilon_\gamma^{\mathrm{iso}} \times \kappa^{\mathrm{iso}}} \tag{21}$$

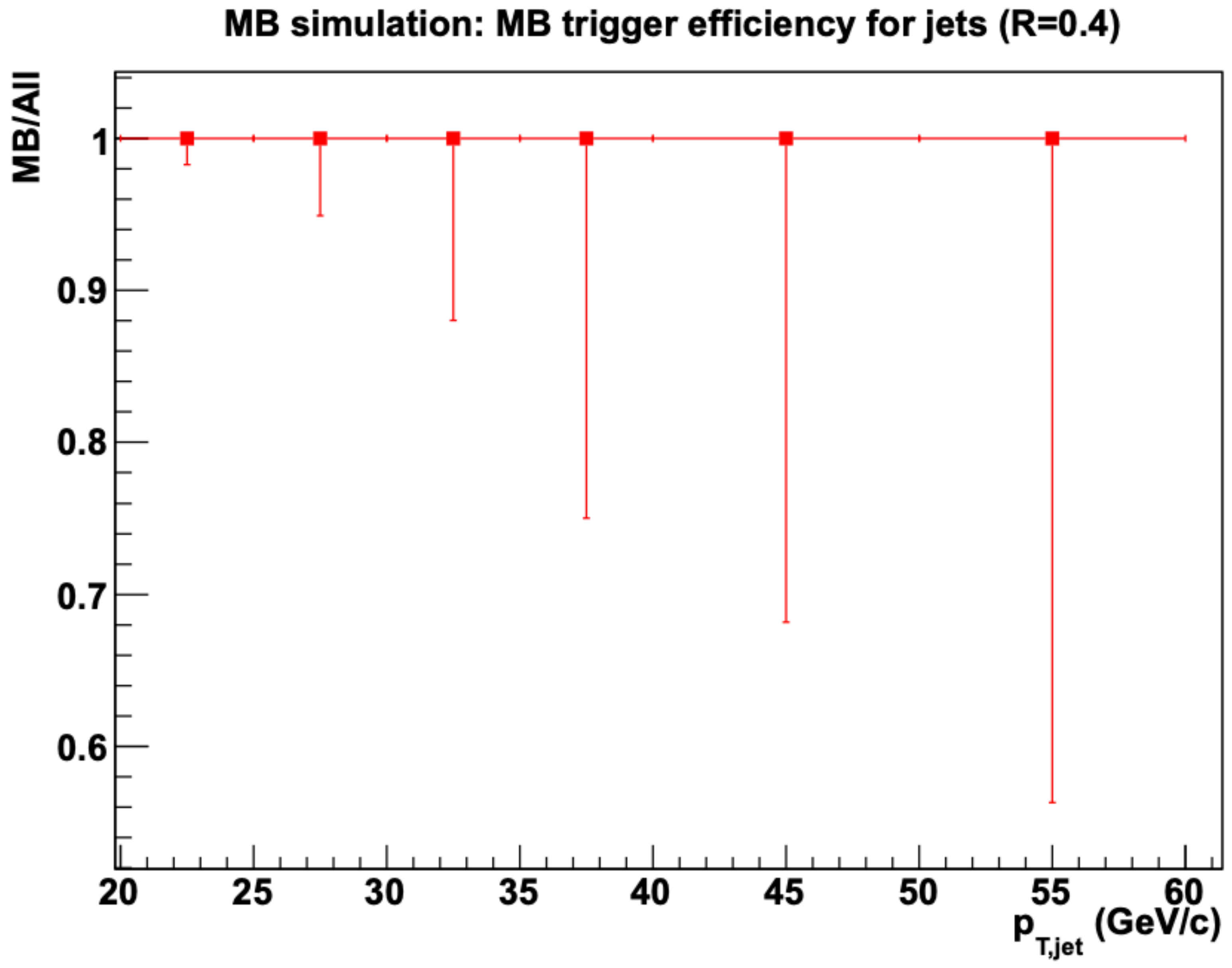
https://alice-notes.web.cern.ch/node/849

Cross-section normalization (Run1/2)

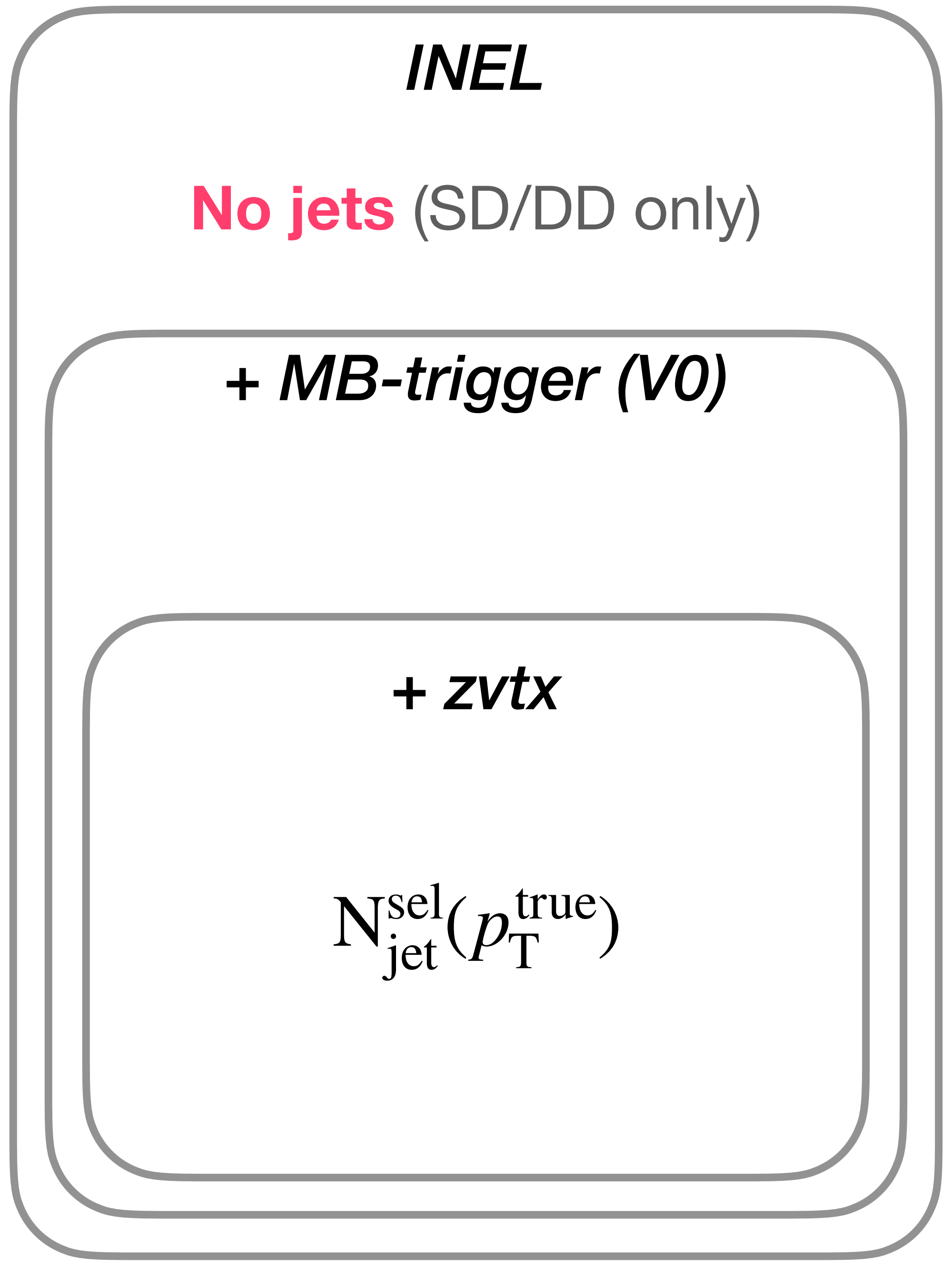
- In Run 1/2 jet analyses, we assume that:

  1. Events that do not fire the MB trigger contain no jets.

$$\frac{\mathrm{d}^2\sigma^{\mathrm{INEL}}_{\mathrm{jet}}}{\mathrm{d}p_{\mathrm{T}}\mathrm{d}\eta} = \frac{1}{L_{\mathrm{int}}} \frac{\mathrm{d}^2 \boxed{\mathrm{N}^{\mathrm{INEL}}_{\mathrm{jet}}}}{\mathrm{d}p_{\mathrm{T}}\mathrm{d}\eta} \approx \frac{1}{L_{\mathrm{int}}} \frac{\mathrm{d}^2 \boxed{\mathrm{N}^{\mathrm{MB,corr}}_{\mathrm{jet}}}}{\mathrm{d}p_{\mathrm{T}}\mathrm{d}\eta} \times \frac{1}{\epsilon_{zvtx10}} = \frac{\sigma^{\mathrm{V0}}_{\mathrm{vis}}}{\mathrm{N}^{\mathrm{V0}}_{\mathrm{evt}}} \frac{\mathrm{d}^2 \boxed{\mathrm{N}^{\mathrm{V0,corr}}_{\mathrm{jet}}}}{\mathrm{d}p_{\mathrm{T}}\mathrm{d}\eta} \times \frac{1}{\epsilon_{zvtx10}}$$



Particle-level jets with and without MB trigger.
(ch-jet@2.76, https://alice-notes.web.cern.ch/node/46)



Particle-level (MC)

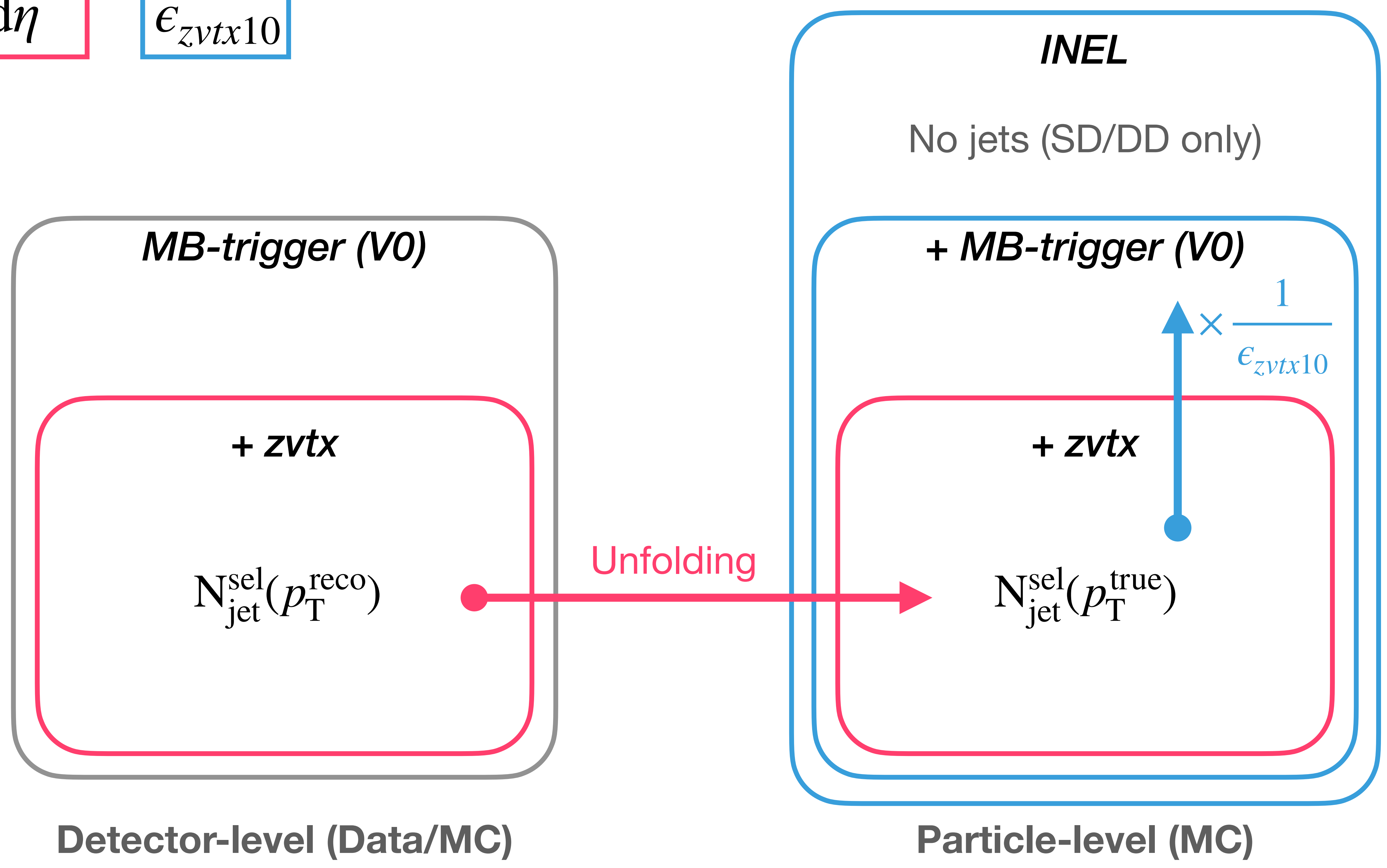
Cross-section normalization (Run1/2)

- In Run 1/2 jet analyses, we assume that:

  1. *Events that do not fire the MB trigger contain **no jets**.*

$$\frac{d^2\sigma_{\rm jet}^{\rm INEL}}{dp_{\rm T}d\eta} = \frac{1}{L_{\rm int}}\frac{d^2N_{\rm jet}^{\rm INEL}}{dp_{\rm T}d\eta} \approx \frac{1}{L_{\rm int}}\frac{d^2N_{\rm jet}^{\rm MB,corr}}{dp_{\rm T}d\eta} \times \frac{1}{\epsilon_{zvtx10}} = \frac{\sigma_{\rm vis}^{\rm V0}}{N_{\rm evt}^{\rm V0}}\boxed{\frac{d^2N_{\rm jet}^{\rm V0,corr}}{dp_{\rm T}d\eta}} \times \boxed{\frac{1}{\epsilon_{zvtx10}}}$$

  2. Z-vtx efficiency is the only correction after unfolding.



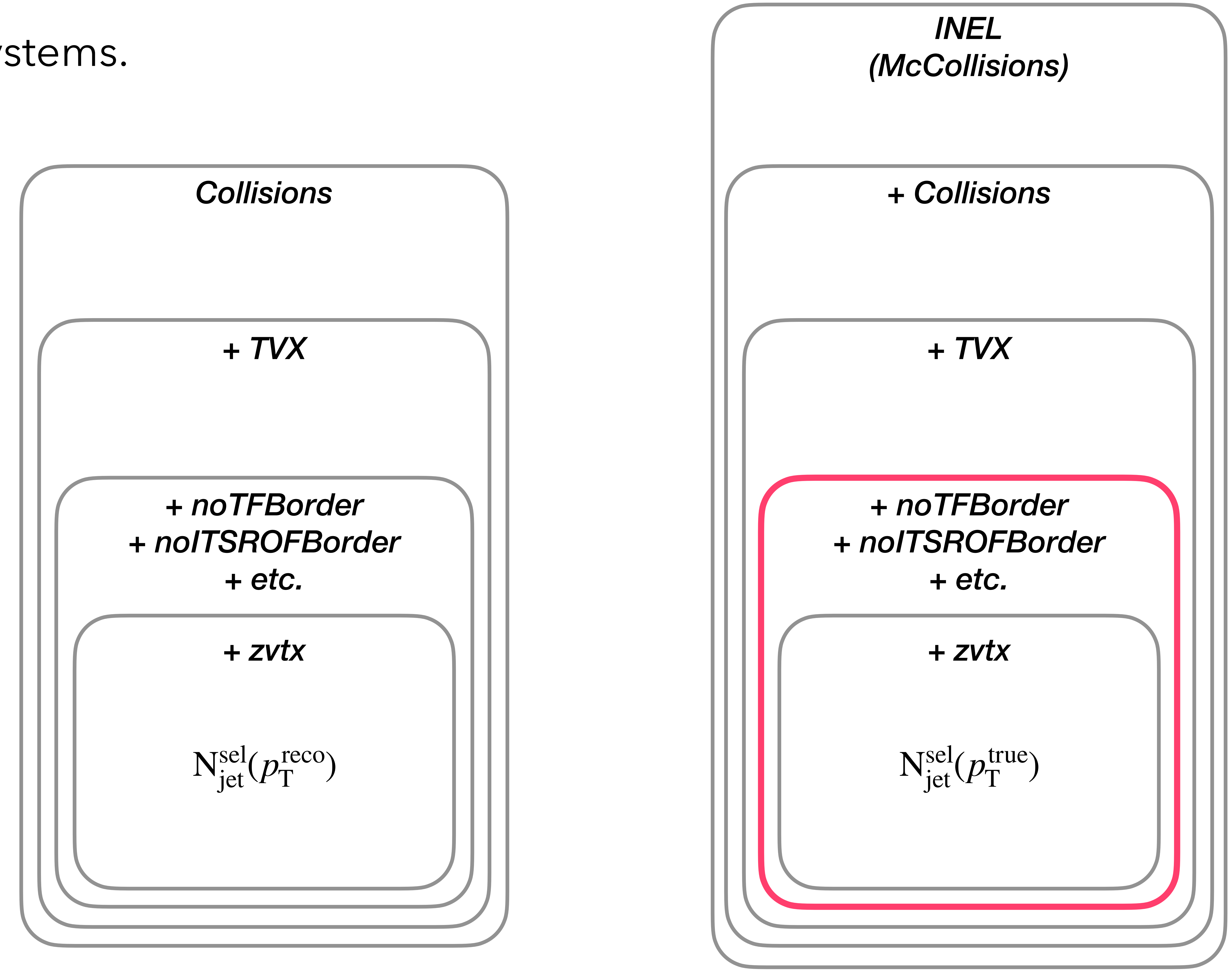
Cross-section normalization (Run3)

- In **Run 3** jet analyses:
  - ALICE has different trigger and event-selection systems.
    - Collisions: vertex > 0
    - TVX: FT0A/C codincidence
    - no Time Frame Border cut
    - no ITS Readout Frame Border cut

$$\frac{d^2\sigma_{\mathrm{jet}}^{\mathrm{INEL}}}{dp_{\mathrm{T}}d\eta} = \frac{\sigma_{\mathrm{vis}}^{\mathrm{V0}}}{N_{\mathrm{evt}}^{\mathrm{V0}}}\frac{d^2N_{\mathrm{jet}}^{\mathrm{V0}}}{dp_{\mathrm{T}}d\eta} \times \frac{1}{\epsilon_{zvtx10}}$$

$$\neq \frac{\sigma_{\mathrm{vis}}^{\mathrm{TVX}}}{N_{\mathrm{evt}}^{\mathrm{TVX}}}\frac{d^2N_{\mathrm{jet}}^{\mathrm{sel}}}{dp_{\mathrm{T}}d\eta} \times \frac{1}{\epsilon_{zvtx10}}$$

- Previous equation no longer valid.
- More corrections needed.



Detector-level (Data/MC) Particle-level (MC)

Cross-section normalization (Run3)

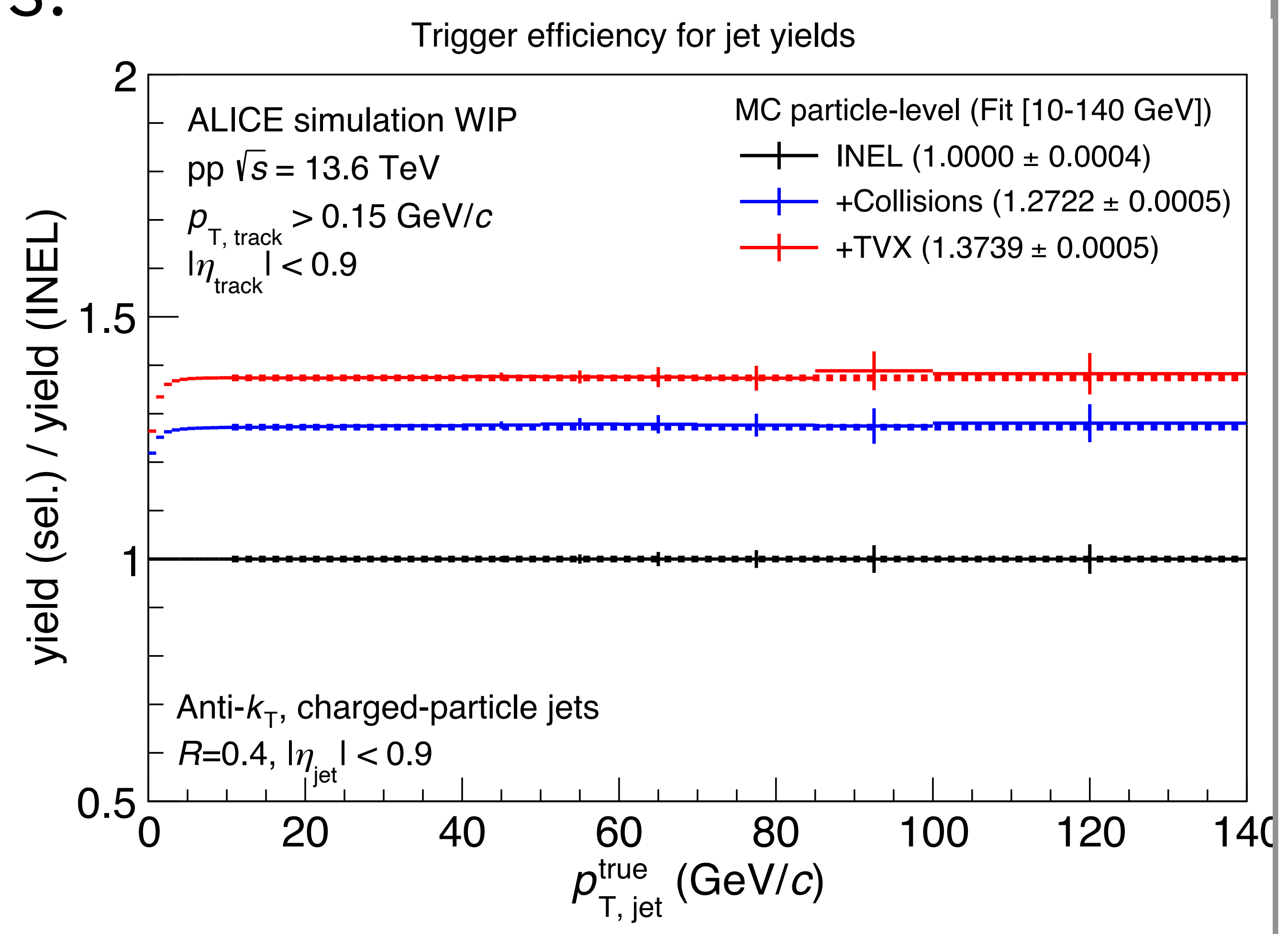
- In **Run 3** jet analyses:
  - ALICE has different trigger and event-selection systems.

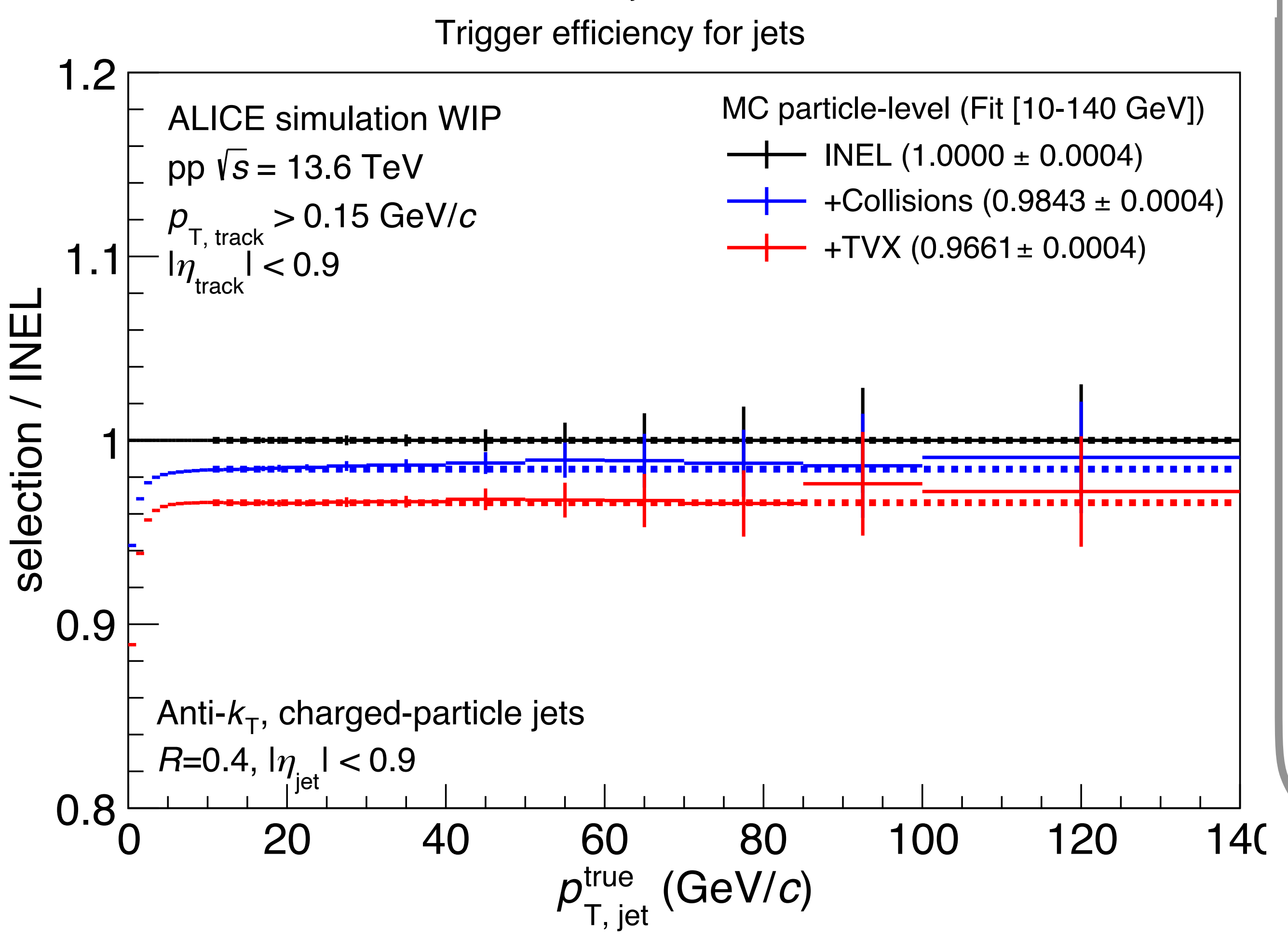
1. Events that do not fire the MB trigger ***also*** *contain jets.*

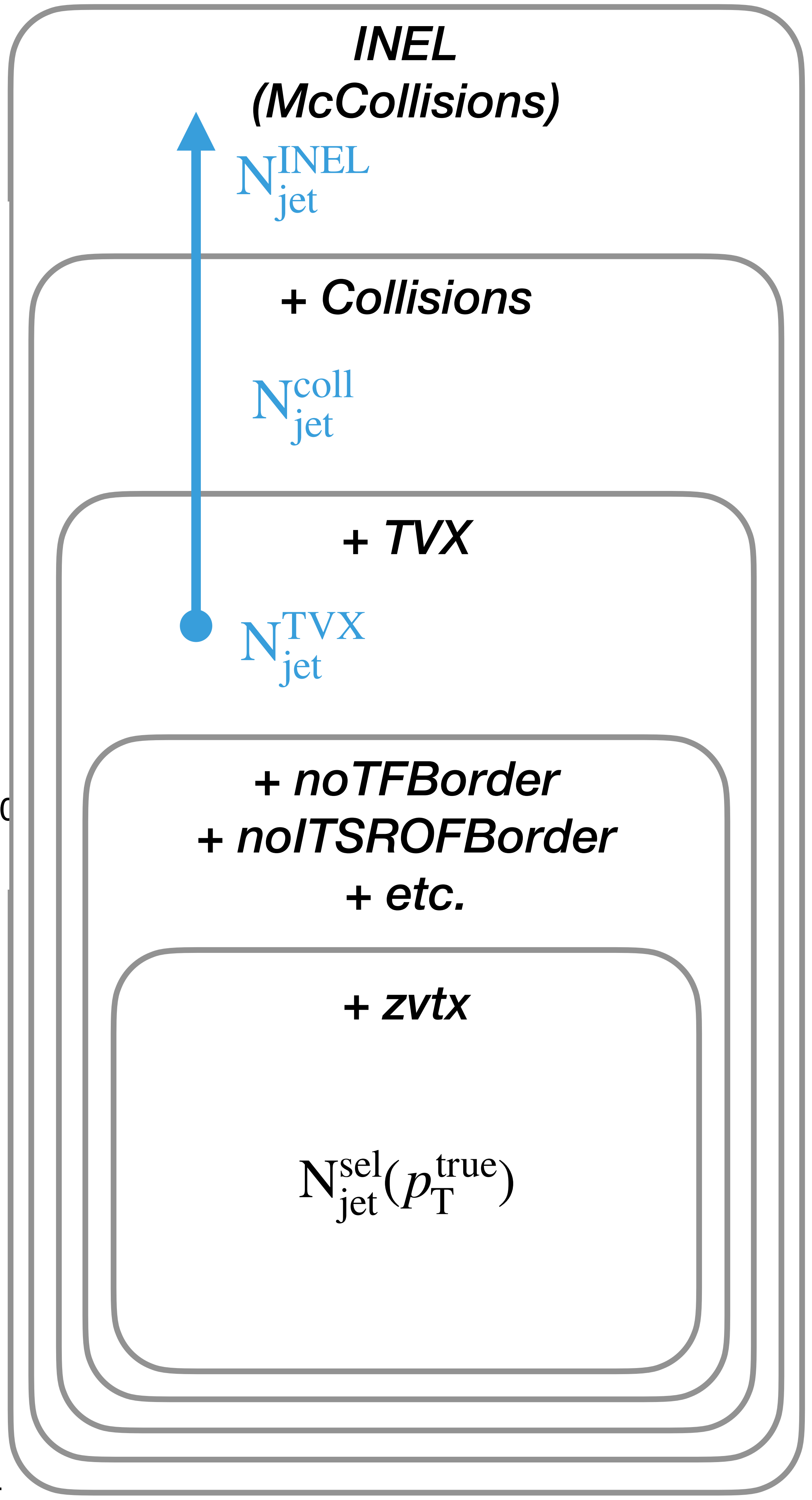
$$N_{jet}^{INEL} \neq N_{jet}^{coll} \neq N_{jet}^{TVX}$$

- **Invariant yields (N_{jet}/N_{evt}) are not consistent**.
  This is unlikely caused by zvtx effects,
  so we need correction factors for the **jet counts**.

$$\times \frac{1}{\epsilon_{TVX}} \times \frac{1}{\epsilon_{coll}} = \frac{N_{jet}^{INEL}}{N_{jet}^{TVX}}$$







Particle-level (MC)

Cross-section normalization (Run3)

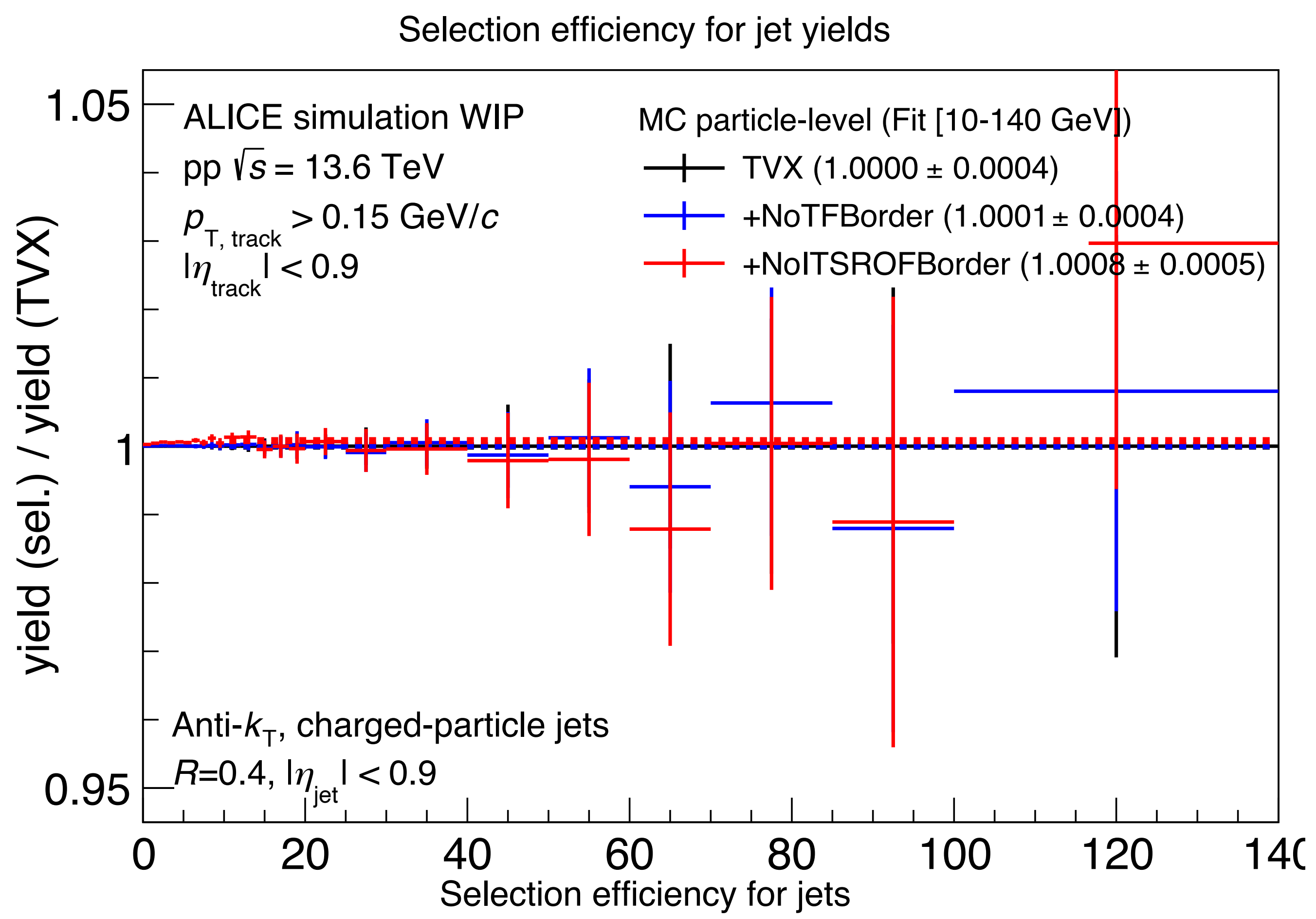
- In **Run 3** jet analyses:
  - ALICE has different trigger and event-selection systems.

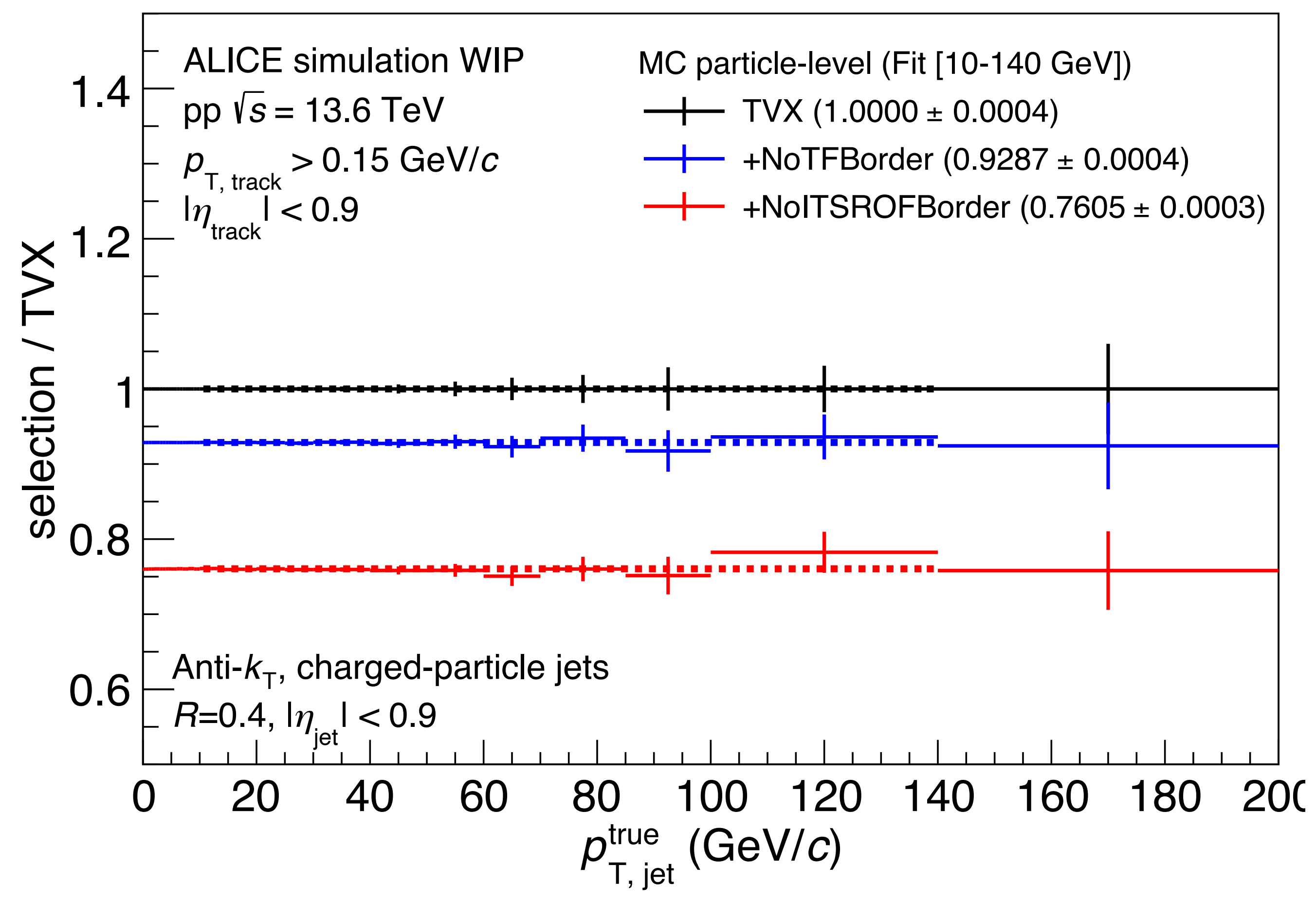
1. *Events that do not fire the MB trigger **also** contain jets*

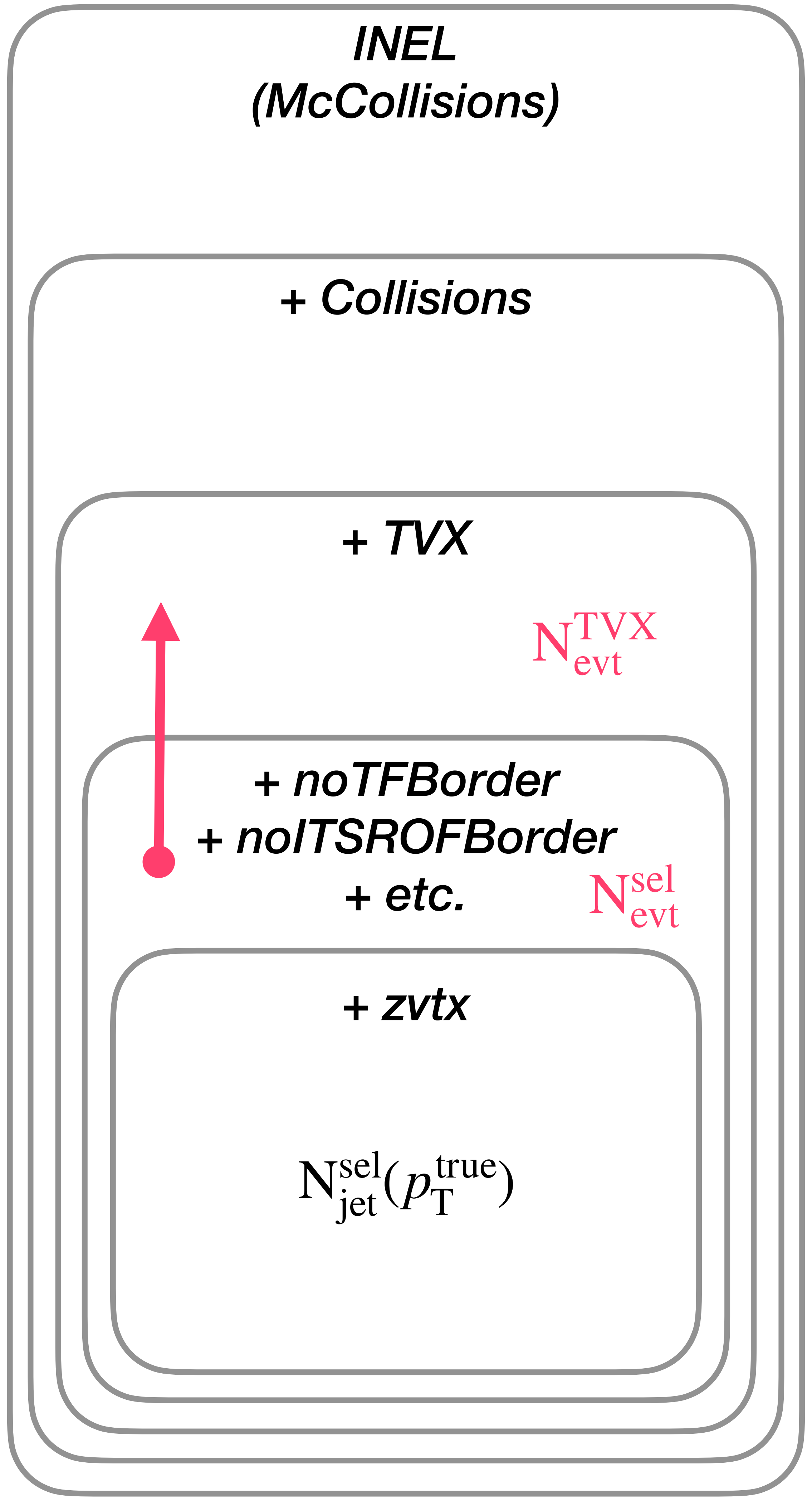
$$N_{\rm jet}^{\rm INEL} \neq N_{\rm jet}^{\rm coll} \neq N_{\rm jet}^{\rm TVX}$$

2. Additional correction factor needed for these selection effects (TFBorder, ITSROBorder, etc.).
   - Invariant yields ($N_{\rm jet}/N_{\rm evt}$) are consistent.

$$\times \frac{1}{\epsilon_{\rm sel}} = \frac{N_{\rm evt}^{\rm TVX}}{N_{\rm evt}^{\rm sel}} \approx 1.32 \text{ (for sel8)}$$







Particle-level (MC)

Cross-section normalization (Run3)

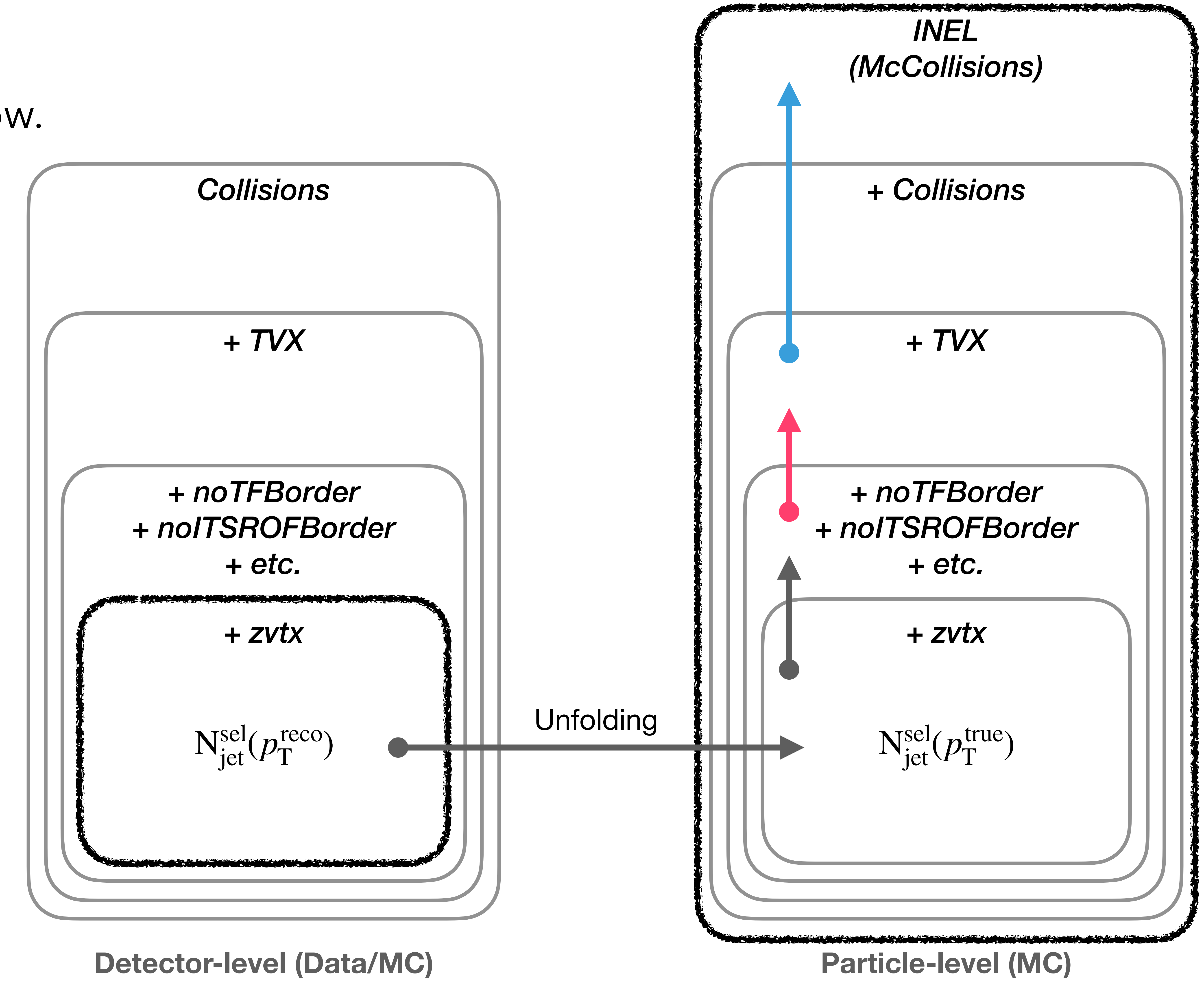
- In Run **3** jet analyses:
  - We need different cross-section equation as below.

$$\frac{d^2\sigma^{\mathrm{INEL}}_{\mathrm{jet}}}{dp_{\mathrm{T}}d\eta} \approx \frac{1}{L_{\mathrm{int}}}\frac{d^2\mathrm{N}^{\mathrm{sel}}_{\mathrm{jet}}}{dp_{\mathrm{T}}d\eta} \times \frac{1}{\epsilon_{\mathrm{zvtx10}}} \times \frac{1}{\epsilon_{\mathrm{additional}}}$$

$$= \frac{\sigma^{\mathrm{TVX}}_{\mathrm{vis}}}{\mathrm{N}^{\mathrm{TVX}}_{\mathrm{evt}}}\frac{d^2\mathrm{N}^{\mathrm{sel}}_{\mathrm{jet}}}{dp_{\mathrm{T}}d\eta} \times \frac{1}{\epsilon_{\mathrm{zvtx10}}} \times \frac{1}{\epsilon_{\mathrm{sel}}} \times \frac{1}{\epsilon_{\mathrm{trigger}}}$$

$$\epsilon_{\mathrm{sel}} = \frac{\mathrm{N}^{\mathrm{sel}}_{\mathrm{evt}}}{\mathrm{N}^{\mathrm{TVX}}_{\mathrm{evt}}}$$

$$\epsilon_{\mathrm{trigger}} = \epsilon_{\mathrm{TVX}} \times \epsilon_{\mathrm{coll}} = \frac{\mathrm{N}^{\mathrm{TVX}}_{\mathrm{jet}}}{\mathrm{N}^{\mathrm{INEL}}_{\mathrm{jet}}}$$



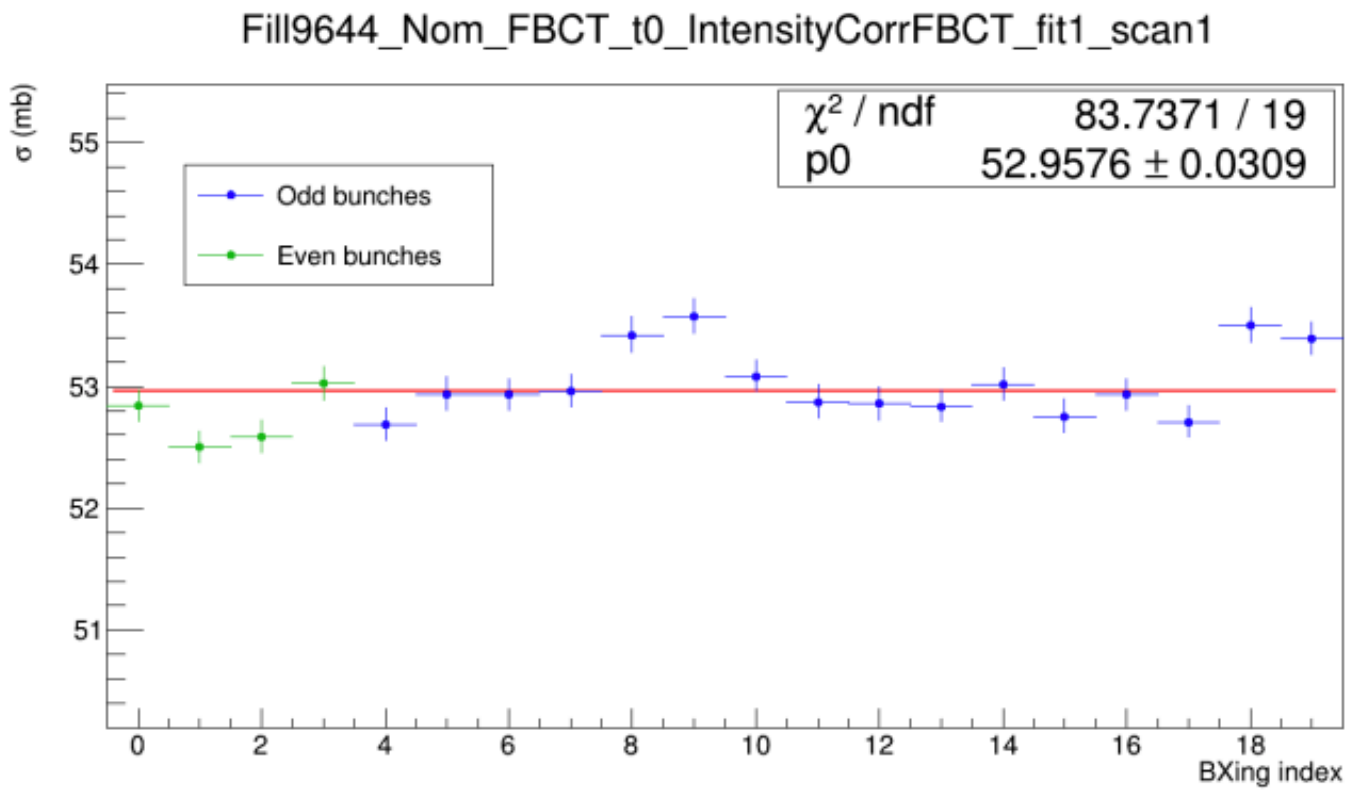
Cross-section normalization (Run3)

- Ch-jet in Run 3 pp:

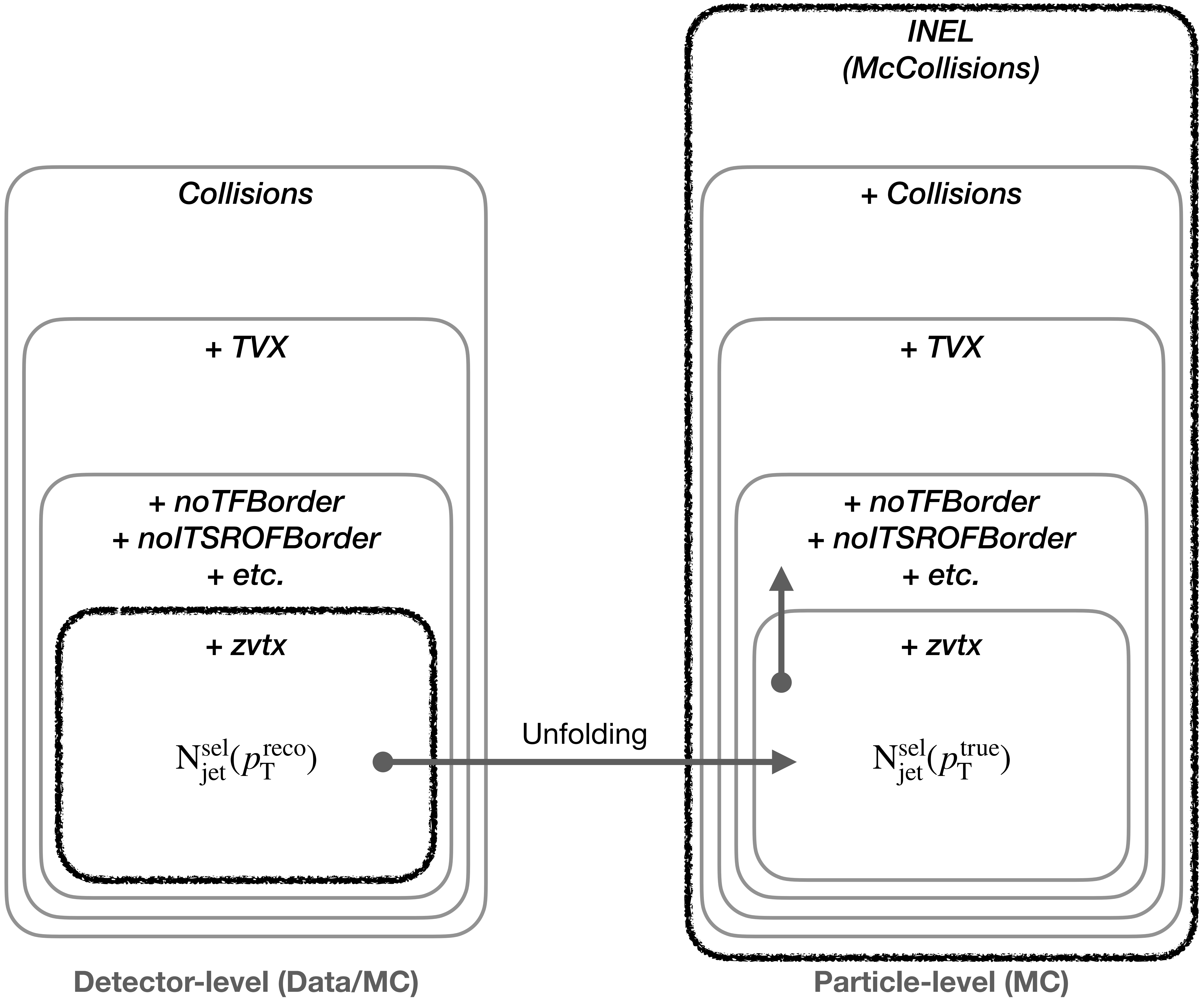
$$\frac{d^2\sigma^{\mathrm{INEL}}_{\mathrm{jet}}}{dp_{\mathrm{T}}d\eta} = \frac{1}{L_{\mathrm{int}}}\frac{d^2N^{\mathrm{INEL}}_{\mathrm{jet}}}{dp_{\mathrm{T}}d\eta}$$

$$= \frac{\sigma^{\mathrm{TVX}}_{\mathrm{vis}}}{N^{\mathrm{TVX}}_{\mathrm{evt}}}\frac{d^2N^{\mathrm{sel8+zvtx}}_{\mathrm{jet}}}{dp_{\mathrm{T}}d\eta} \times \frac{1}{\epsilon_{\mathrm{zvtx10}}} \times \frac{1}{\epsilon_{\mathrm{sel}}} \times \frac{1}{\epsilon_{\mathrm{trigger}}}$$

$$\epsilon^{\mathrm{TVX}}_{\mathrm{vis}} = 53 \text{ or } 59.4 \text{ mb}$$



[Lucina, "2022 vdM scans" (June, 2025)]



Cross-section normalization (Run3)

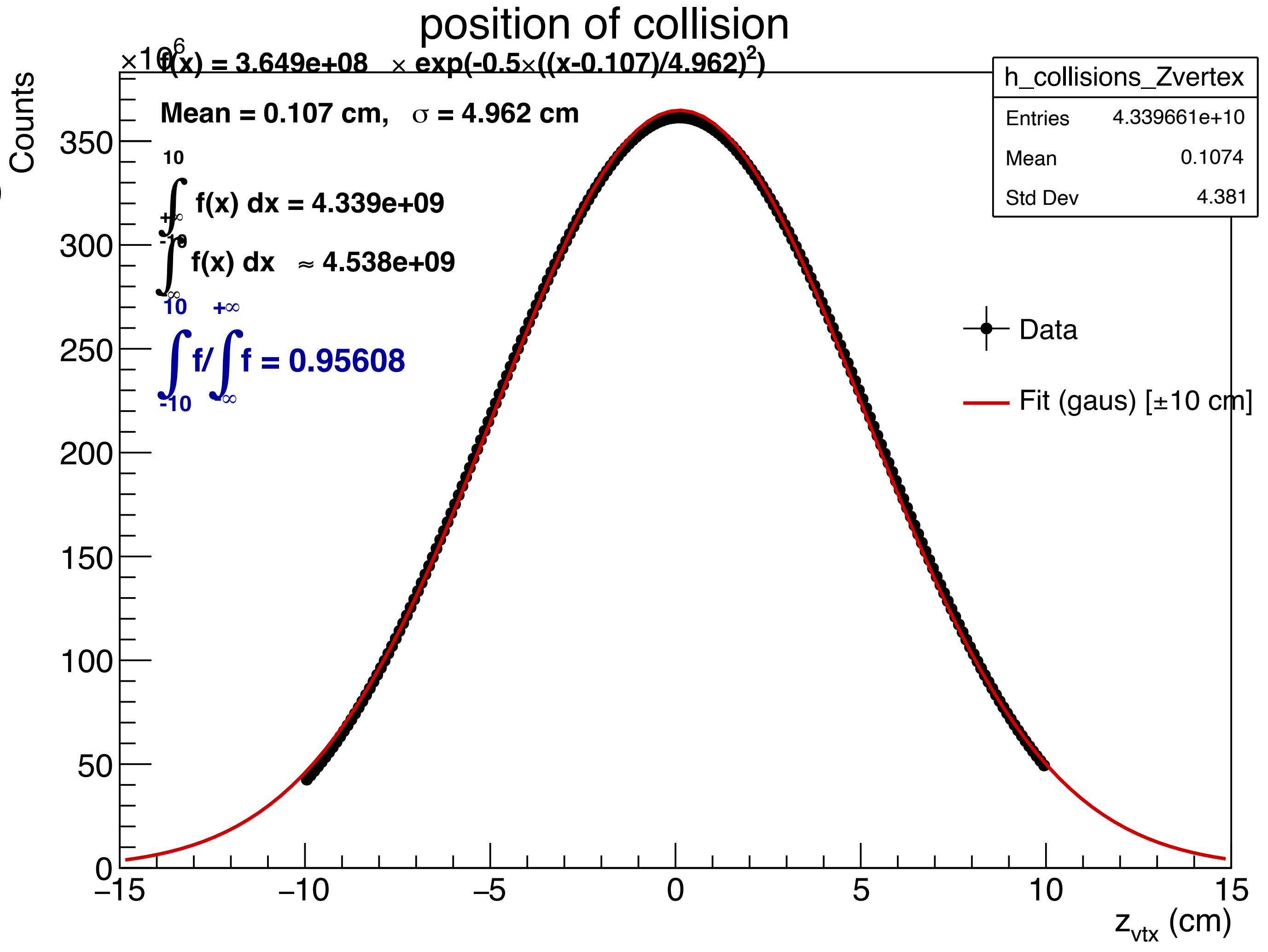
- Ch-jet in Run 3 pp:

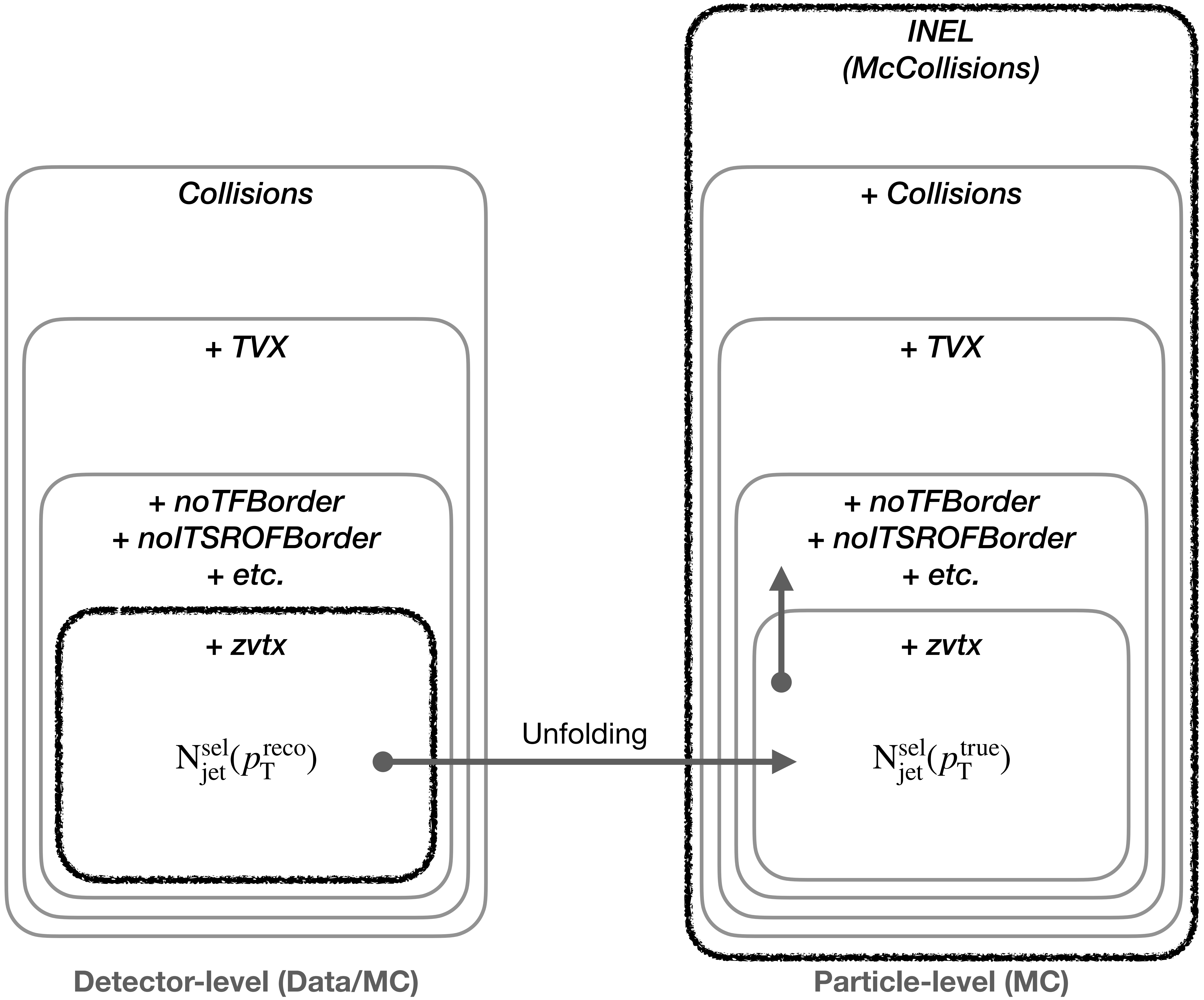
$$\frac{d^2\sigma^{\mathrm{INEL}}_{\mathrm{jet}}}{dp_{\mathrm{T}}d\eta} = \frac{1}{L_{\mathrm{int}}}\frac{d^2N^{\mathrm{INEL}}_{\mathrm{jet}}}{dp_{\mathrm{T}}d\eta}$$

$$= \frac{\sigma^{\mathrm{TVX}}_{\mathrm{vis}}}{N^{\mathrm{TVX}}_{\mathrm{evt}}}\frac{d^2N^{\mathrm{sel8+zvtx}}_{\mathrm{jet}}}{dp_{\mathrm{T}}d\eta} \times \frac{1}{\epsilon_{\mathrm{zvtx10}}} \times \frac{1}{\epsilon_{\mathrm{sel}}} \times \frac{1}{\epsilon_{\mathrm{trigger}}}$$

$$\epsilon^{\mathrm{TVX}}_{\mathrm{vis}} = 53 \text{ or } 59.4 \text{ mb}$$

$$\epsilon_{\mathrm{zvtx10}} = 0.956$$





Cross-section normalization (Run3)

- Ch-jet in Run 3 pp:

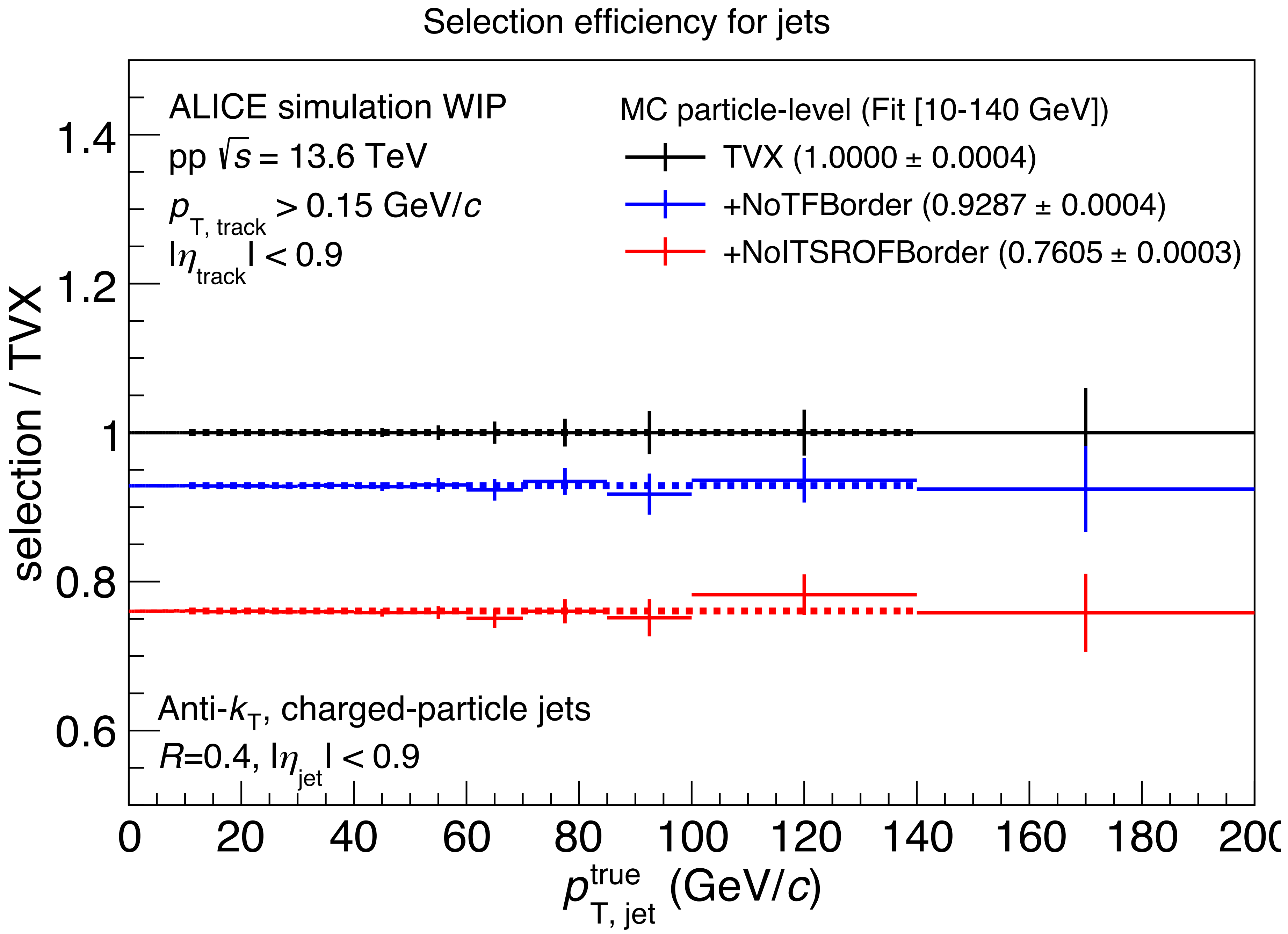
$$\frac{d^2\sigma_{\mathrm{jet}}^{\mathrm{INEL}}}{dp_{\mathrm{T}}d\eta} = \frac{1}{L_{\mathrm{int}}}\frac{d^2\mathrm{N}_{\mathrm{jet}}^{\mathrm{INEL}}}{dp_{\mathrm{T}}d\eta}$$

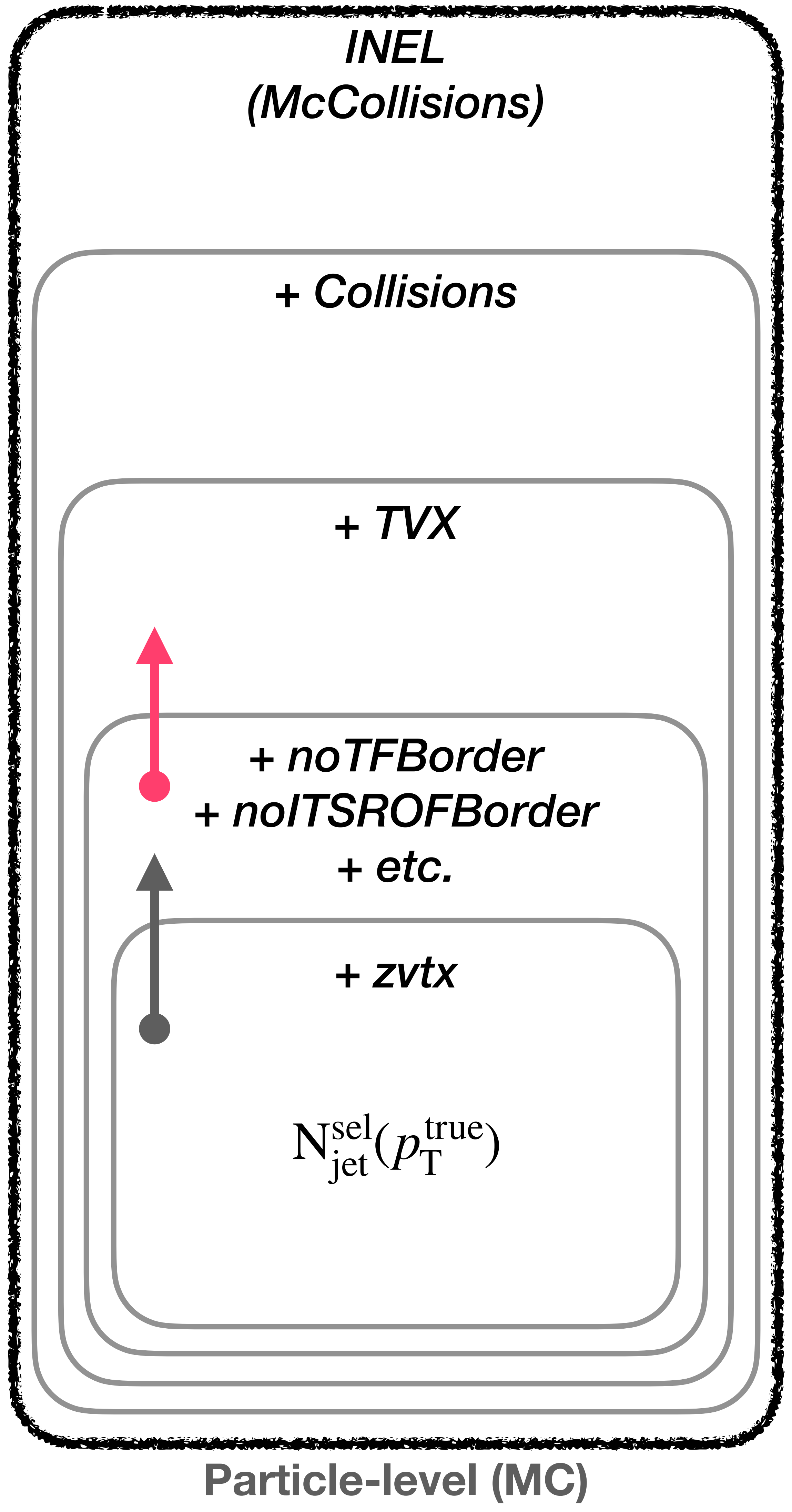
$$= \frac{\sigma_{\mathrm{vis}}^{\mathrm{TVX}}}{\mathrm{N}_{\mathrm{evt}}^{\mathrm{TVX}}}\frac{d^2\mathrm{N}_{\mathrm{jet}}^{\mathrm{sel8+zvtx}}}{dp_{\mathrm{T}}d\eta} \times \frac{1}{\epsilon_{\mathrm{zvtx10}}} \times \frac{1}{\epsilon_{\mathrm{sel}}} \times \frac{1}{\epsilon_{\mathrm{trigger}}}$$

$$\epsilon_{\mathrm{vis}}^{\mathrm{TVX}} = 53 \text{ or } 59.4 \text{ mb}$$

$$\epsilon_{\mathrm{zvtx10}} = 0.956$$

$$\epsilon_{\mathrm{sel}} = \frac{\mathrm{N}_{\mathrm{evt}}^{\mathrm{sel}}}{\mathrm{N}_{\mathrm{evt}}^{\mathrm{TVX}}} = 0.756$$





Cross-section normalization (Run3)

- Ch-jet in Run 3 pp:

$$\frac{d^2\sigma_{jet}^{INEL}}{dp_T d\eta} = \frac{1}{L_{int}} \frac{d^2N_{jet}^{INEL}}{dp_T d\eta}$$

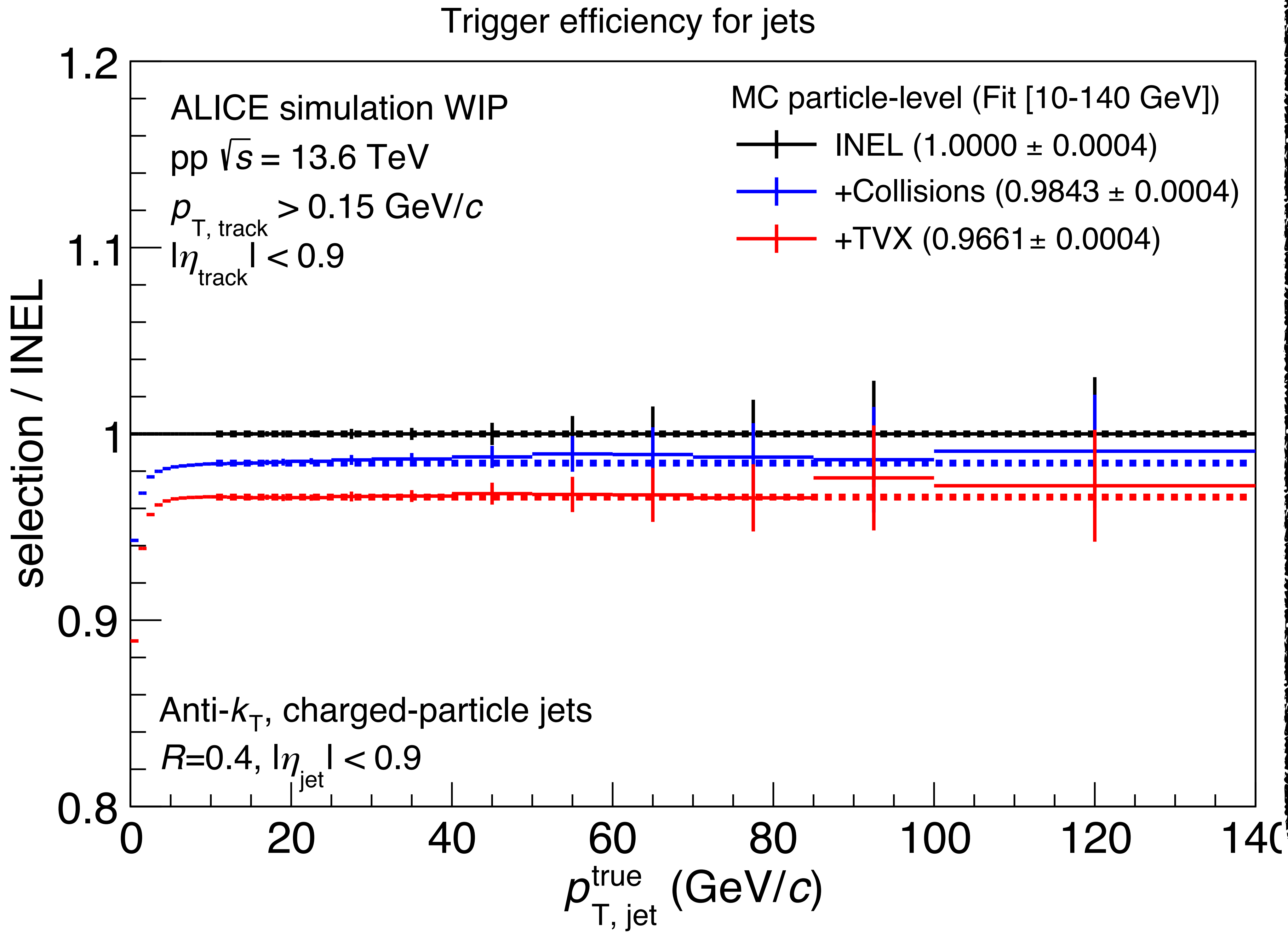
$$= \frac{\sigma_{vis}^{TVX}}{N_{evt}^{TVX}} \frac{d^2N_{jet}^{sel8+zvtx}}{dp_T d\eta} \times \frac{1}{\epsilon_{zvtx10}} \times \frac{1}{\epsilon_{sel}} \times \frac{1}{\epsilon_{trigger}}$$

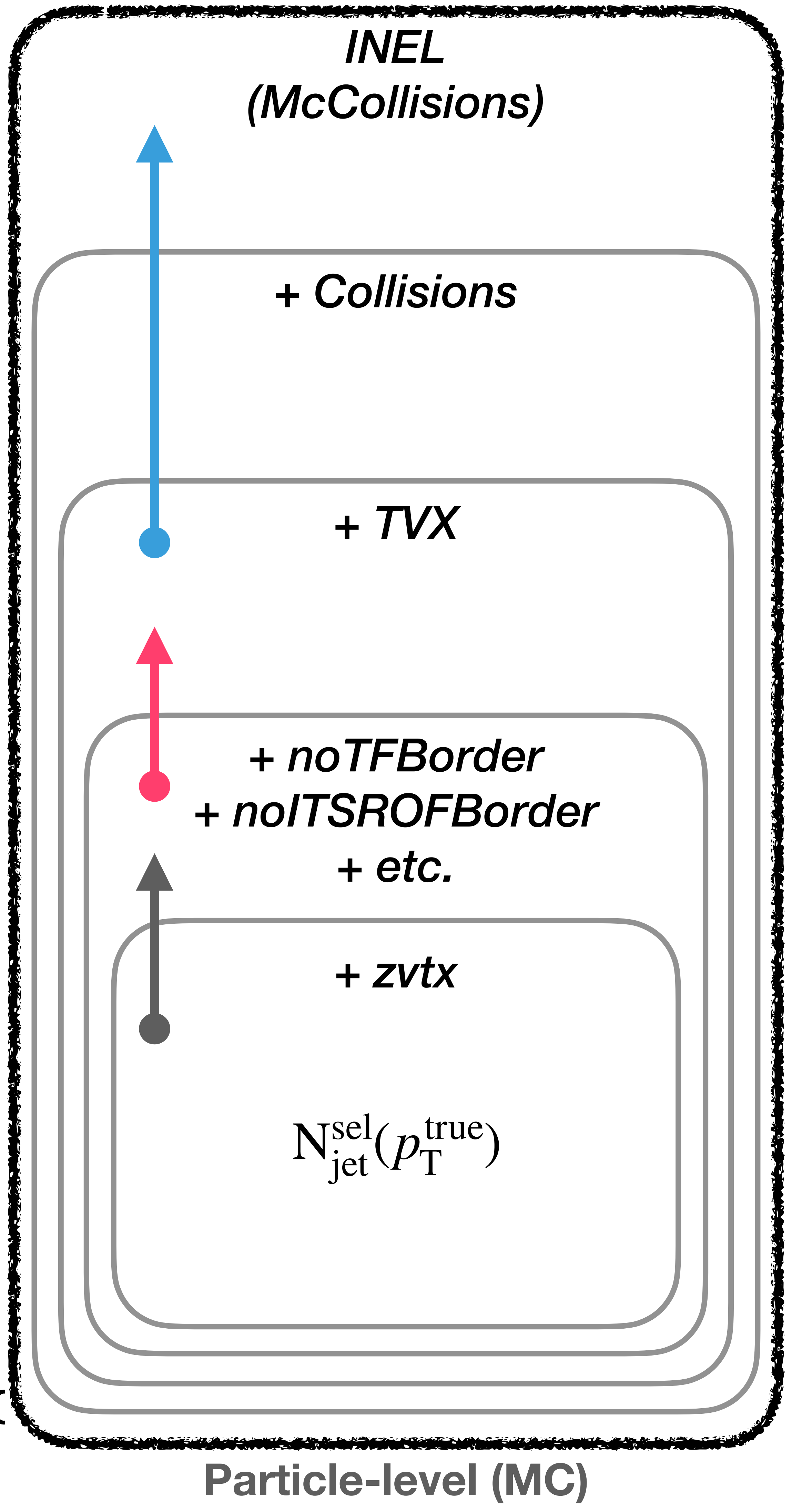
$$\epsilon_{vis}^{TVX} = 53 \text{ or } 59.4 \text{ mb}$$

$$\epsilon_{zvtx10} = 0.956$$

$$\epsilon_{sel} = \frac{N_{evt}^{sel}}{N_{evt}^{TVX}} = 0.756$$

$$\epsilon_{TVX} \times \epsilon_{coll} = \frac{N_{jet}^{TVX}}{N_{jet}^{INEL}} = 0.966$$





Cross-section normalization (Run3)

- Ch-jet in Run 3 pp:

$$\frac{d^2\sigma_{\rm jet}^{\rm INEL}}{dp_{\rm T}d\eta} = \frac{1}{L_{\rm int}}\frac{d^2 N_{\rm jet}^{\rm INEL}}{dp_{\rm T}d\eta}$$

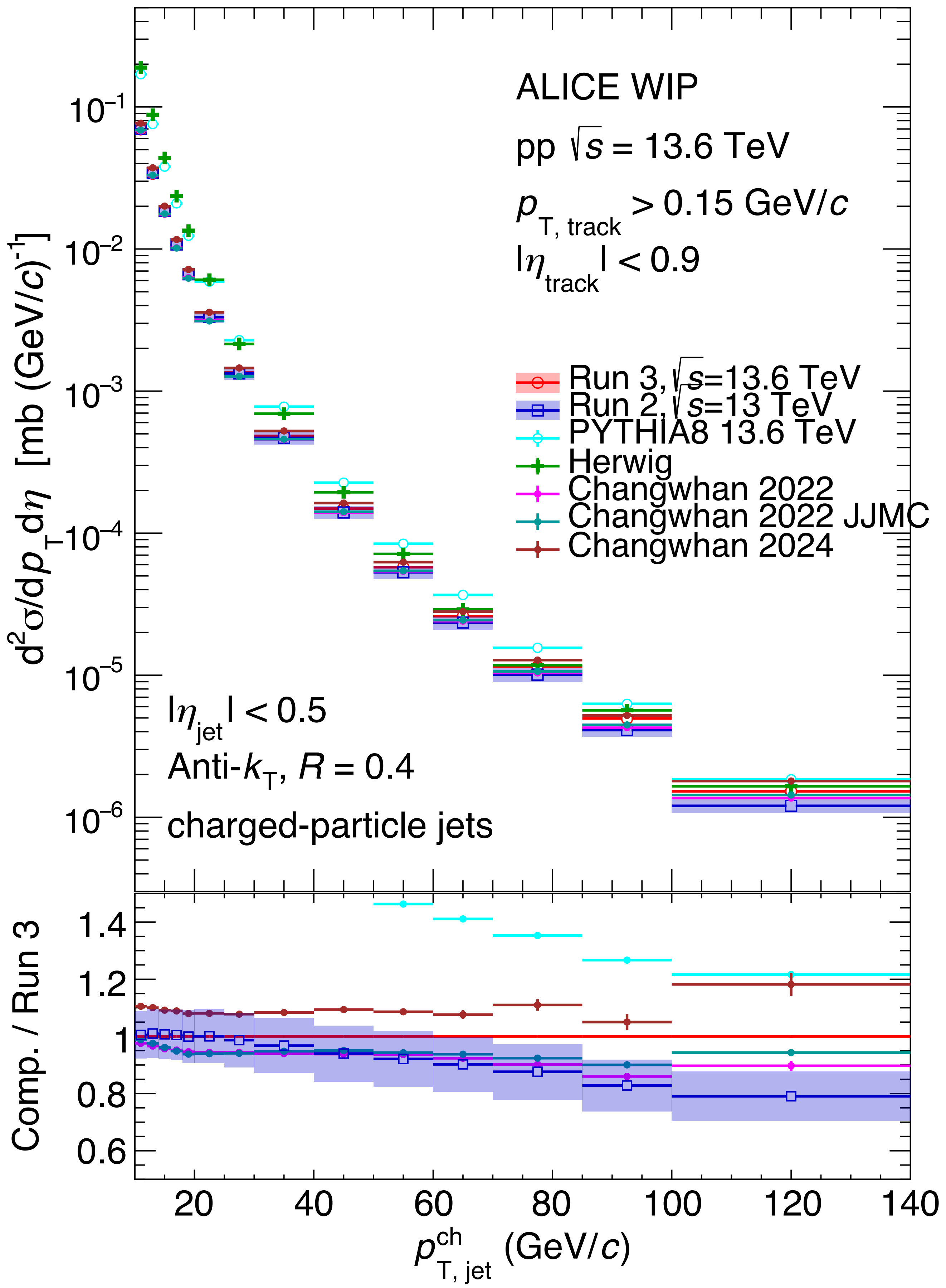
$$= \frac{\sigma_{\rm vis}^{\rm TVX}}{N_{\rm evt}^{\rm TVX}}\frac{d^2 N_{\rm jet}^{\rm sel8+zvtx}}{dp_{\rm T}d\eta} \times \frac{1}{\epsilon_{\rm zvtx10}} \times \frac{1}{\epsilon_{\rm sel}} \times \frac{1}{\epsilon_{\rm trigger}}$$

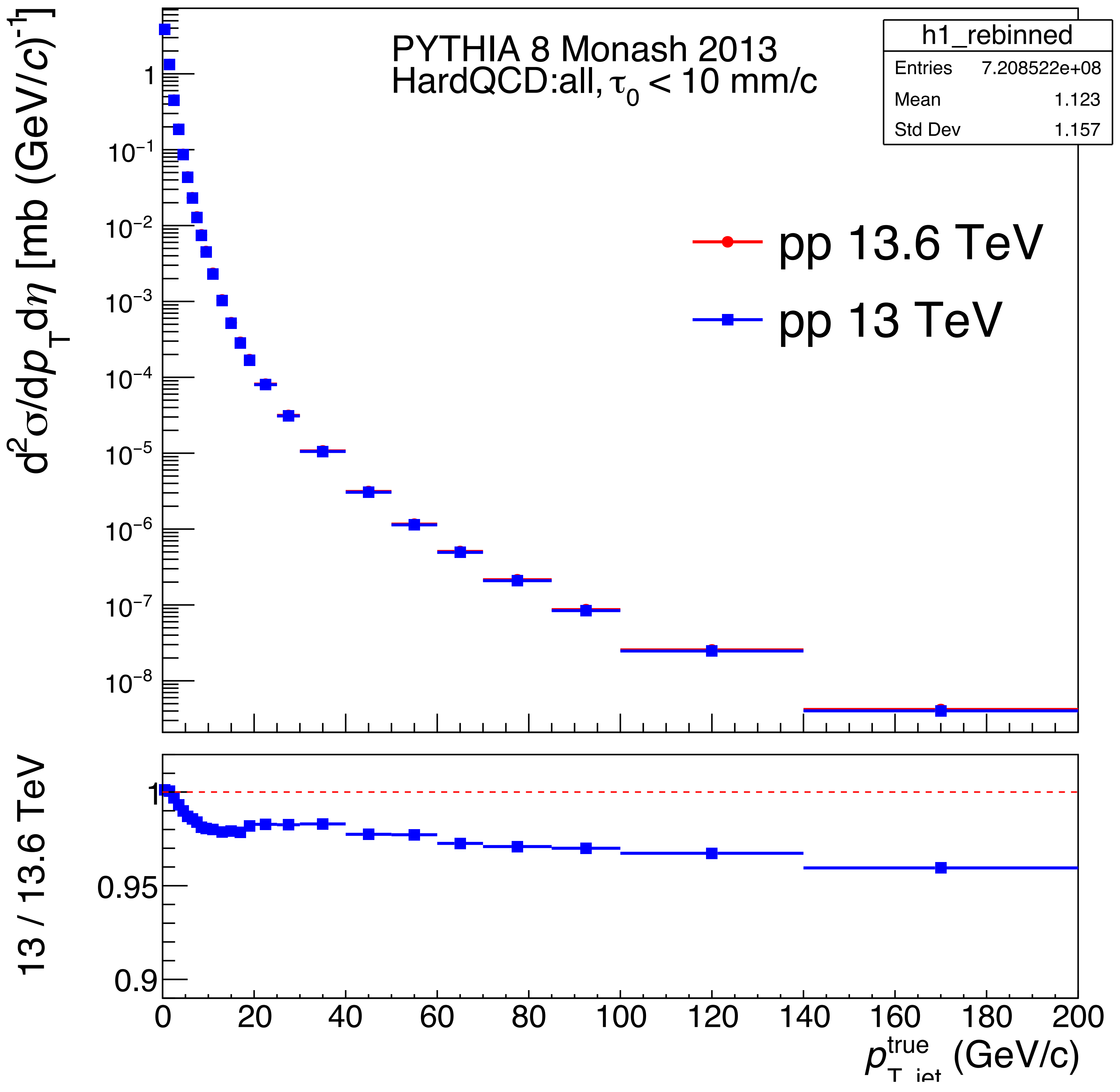
$$\epsilon_{\rm vis}^{\rm TVX} = 53 \text{ or } 59.4 \text{ mb}$$

$$\epsilon_{\rm zvtx10} = 0.956$$

$$\epsilon_{\rm sel} = \frac{N_{\rm evt}^{\rm sel}}{N_{\rm evt}^{\rm TVX}} = 0.756$$

$$\epsilon_{\rm TVX} \times \epsilon_{\rm coll} = \frac{N_{\rm jet}^{\rm TVX}}{N_{\rm jet}^{\rm INEL}} = 0.966$$





PYTHIA standalone (JJ MC)

Cross-section normalization (Run3)

- Ch-jet in Run 3 pp:

$$\frac{d^2\sigma_{\rm jet}^{\rm INEL}}{dp_{\rm T}d\eta} = \frac{1}{L_{\rm int}}\frac{d^2{\rm N}_{\rm jet}^{\rm INEL}}{dp_{\rm T}d\eta}$$

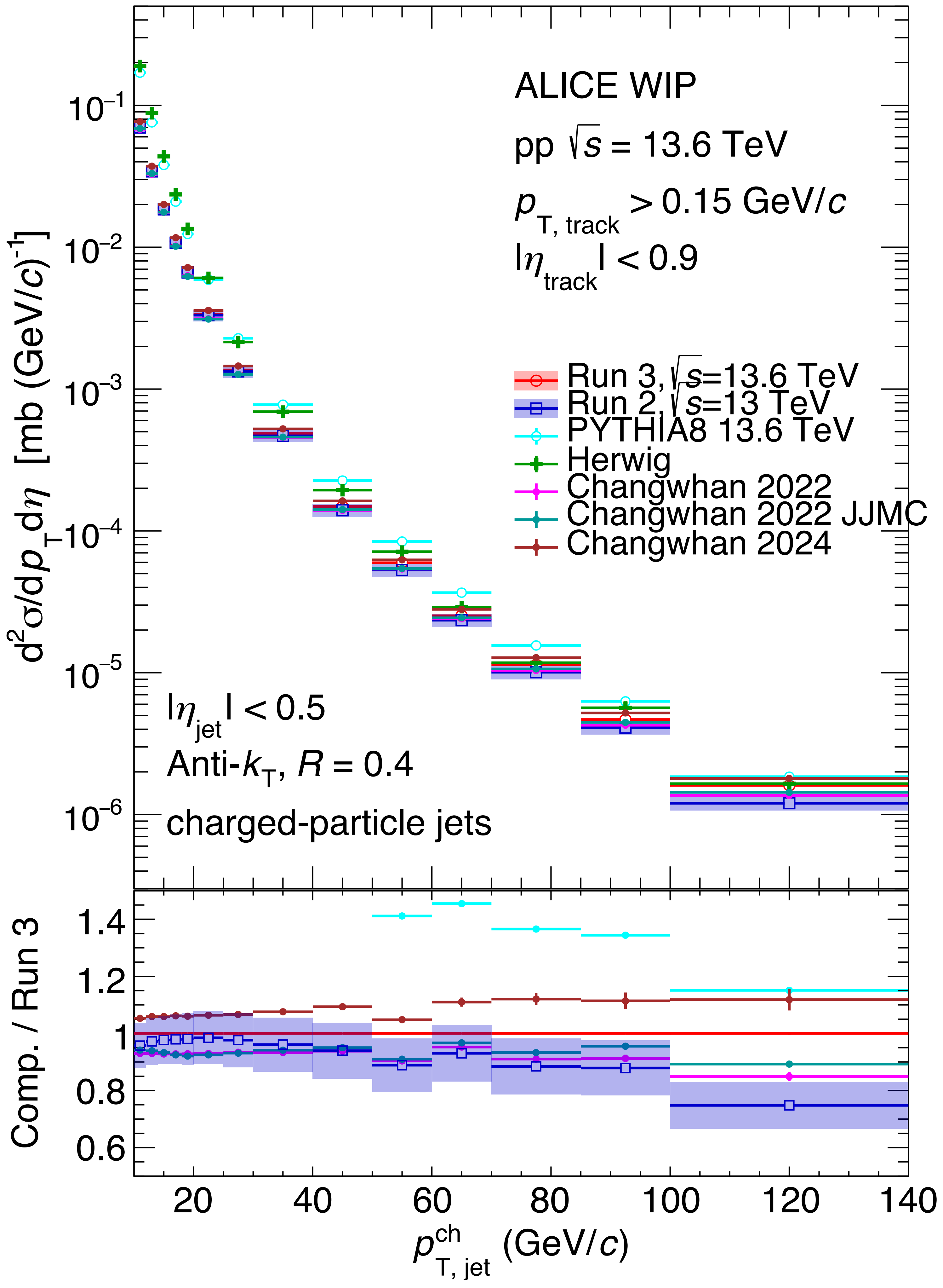
$$= \frac{\sigma_{\rm vis}^{\rm TVX}}{{\rm N}_{\rm evt}^{\rm TVX}}\frac{d^2{\rm N}_{\rm jet}^{\rm sel8+zvtx}}{dp_{\rm T}d\eta} \times \frac{1}{\epsilon_{\rm zvtx10}} \times \frac{1}{\epsilon_{\rm sel}} \times \frac{1}{\epsilon_{\rm trigger}}$$

$$\epsilon_{\rm vis}^{\rm TVX} = 53 \text{ or } 59.4 \text{ mb}$$

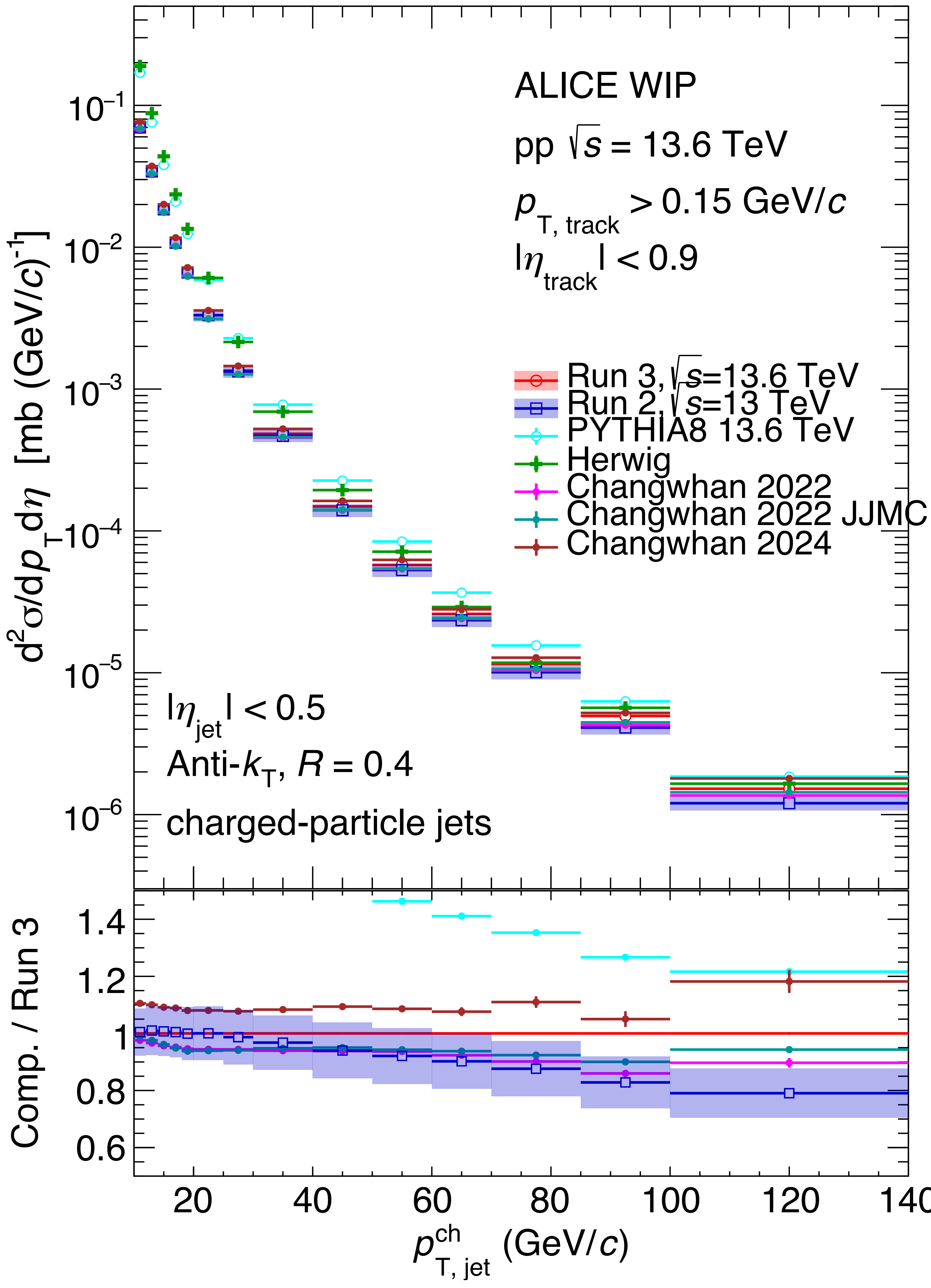
$$\epsilon_{\rm zvtx10} = 0.956$$

$$\epsilon_{\rm sel} = \frac{{\rm N}_{\rm evt}^{\rm sel}}{{\rm N}_{\rm evt}^{\rm TVX}} = 0.756$$

$$\epsilon_{\rm TVX} \times \epsilon_{\rm coll} = \frac{{\rm N}_{\rm jet}^{\rm TVX}}{{\rm N}_{\rm jet}^{\rm INEL}} = 0.966$$

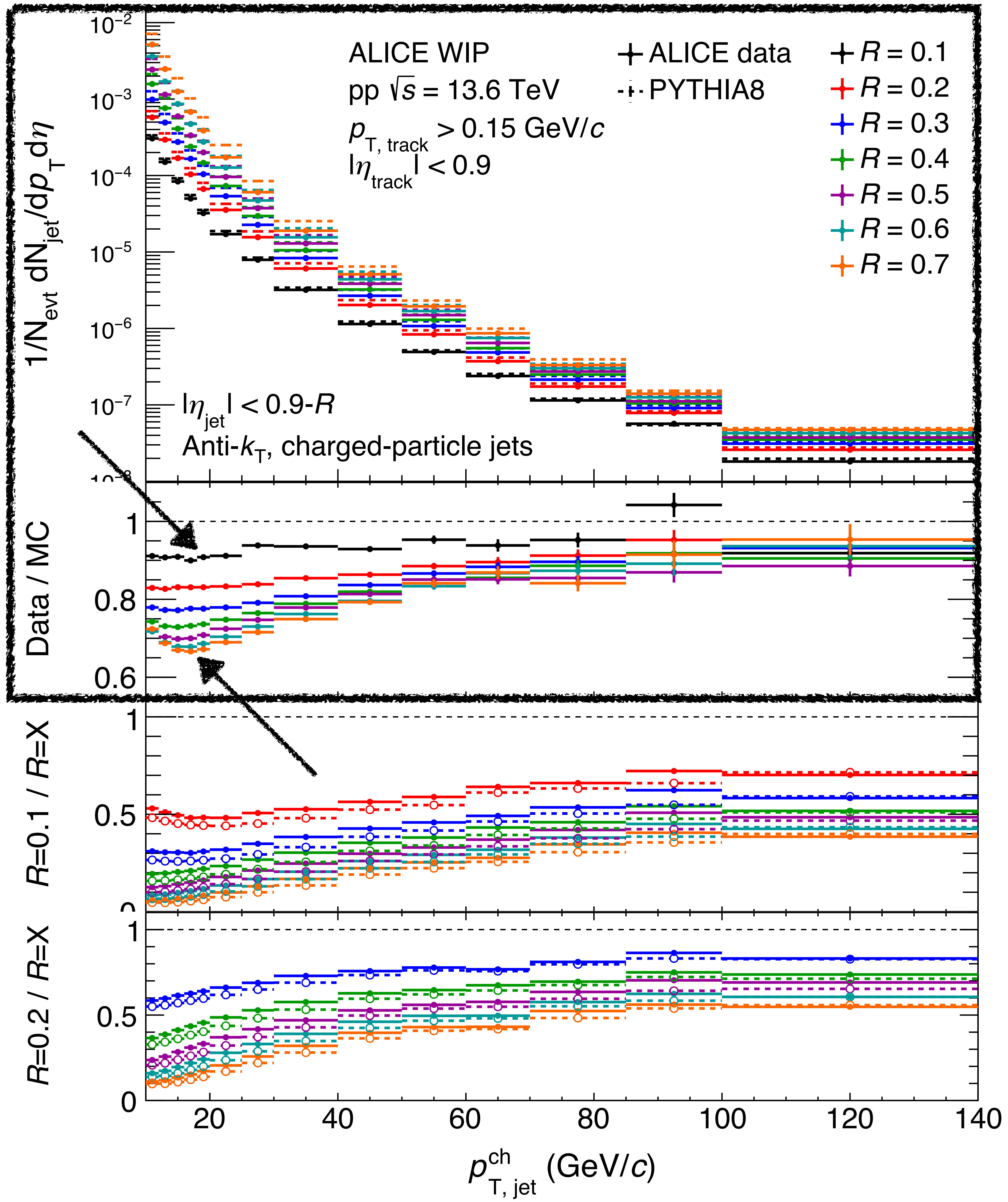


unfolded by MB MC (LHC24f3c)



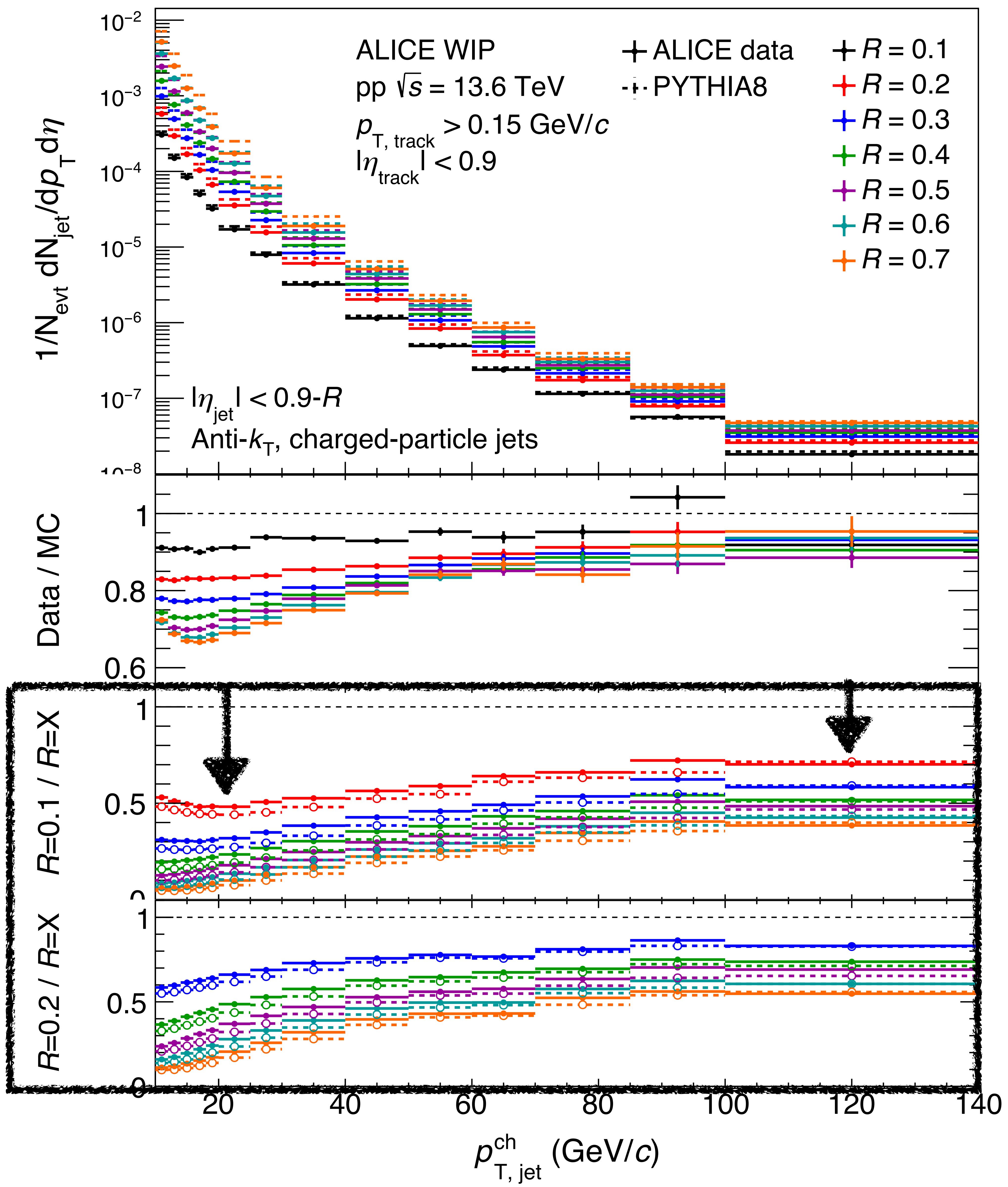
unfolded by JJ MC (LHC25a2b)

Results: invariant yields with various R



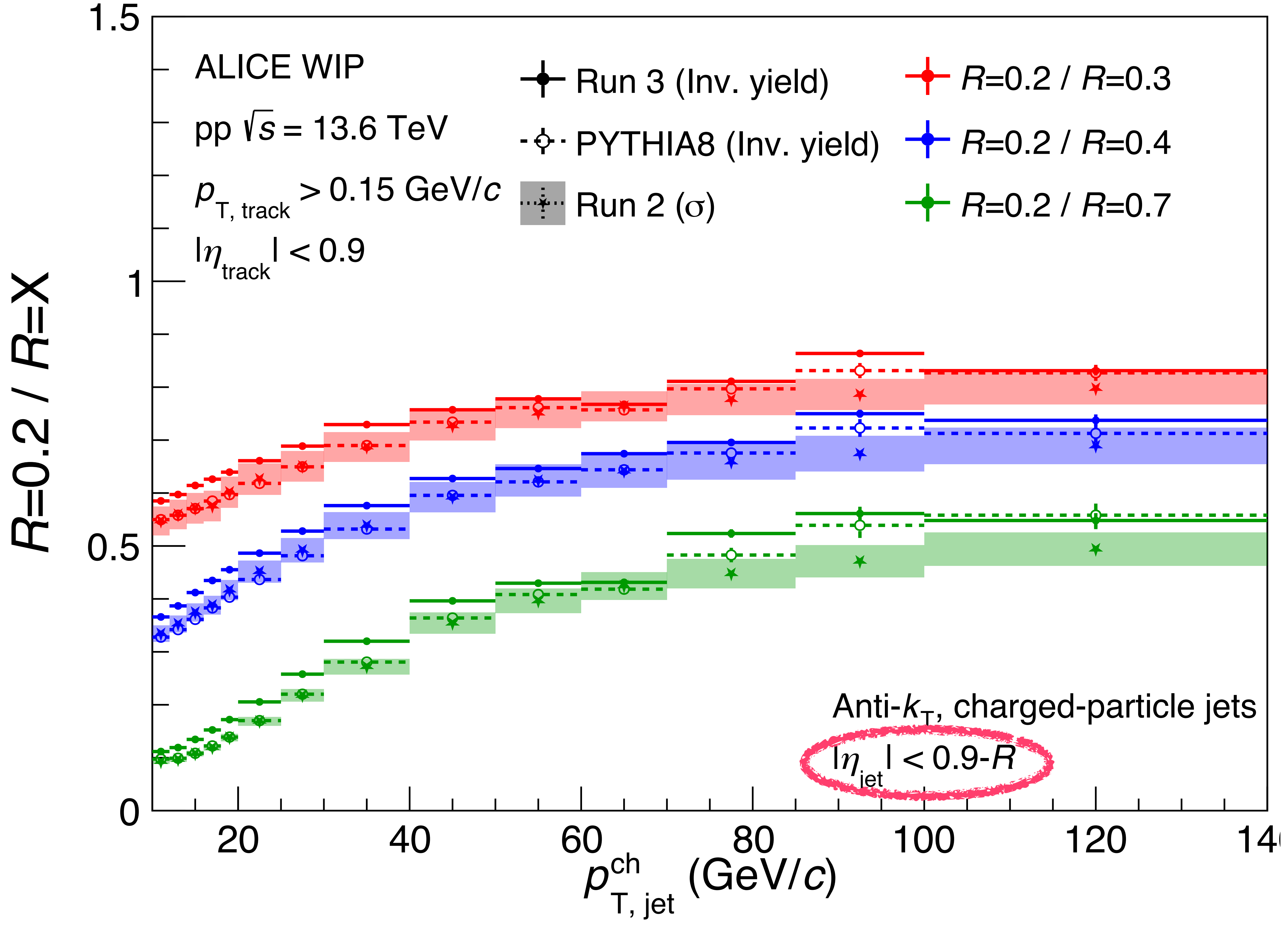
- **R-dependent fully-corrected invariant (1st).**
  - Clear R-ordering observed across all jet radii.
- **Data—MC comparison (2nd).**
  - Consistency depends on how much NP (non-perturbative) components each R captures.
    - Best agreement at **R=0.1**:
      Minimal soft-particle radiation -> smallest NP sensitivity.
    - Largest discrepancy at **R=0.7**:
      includes more soft radiation and wider jet area -> stronger NP effects.

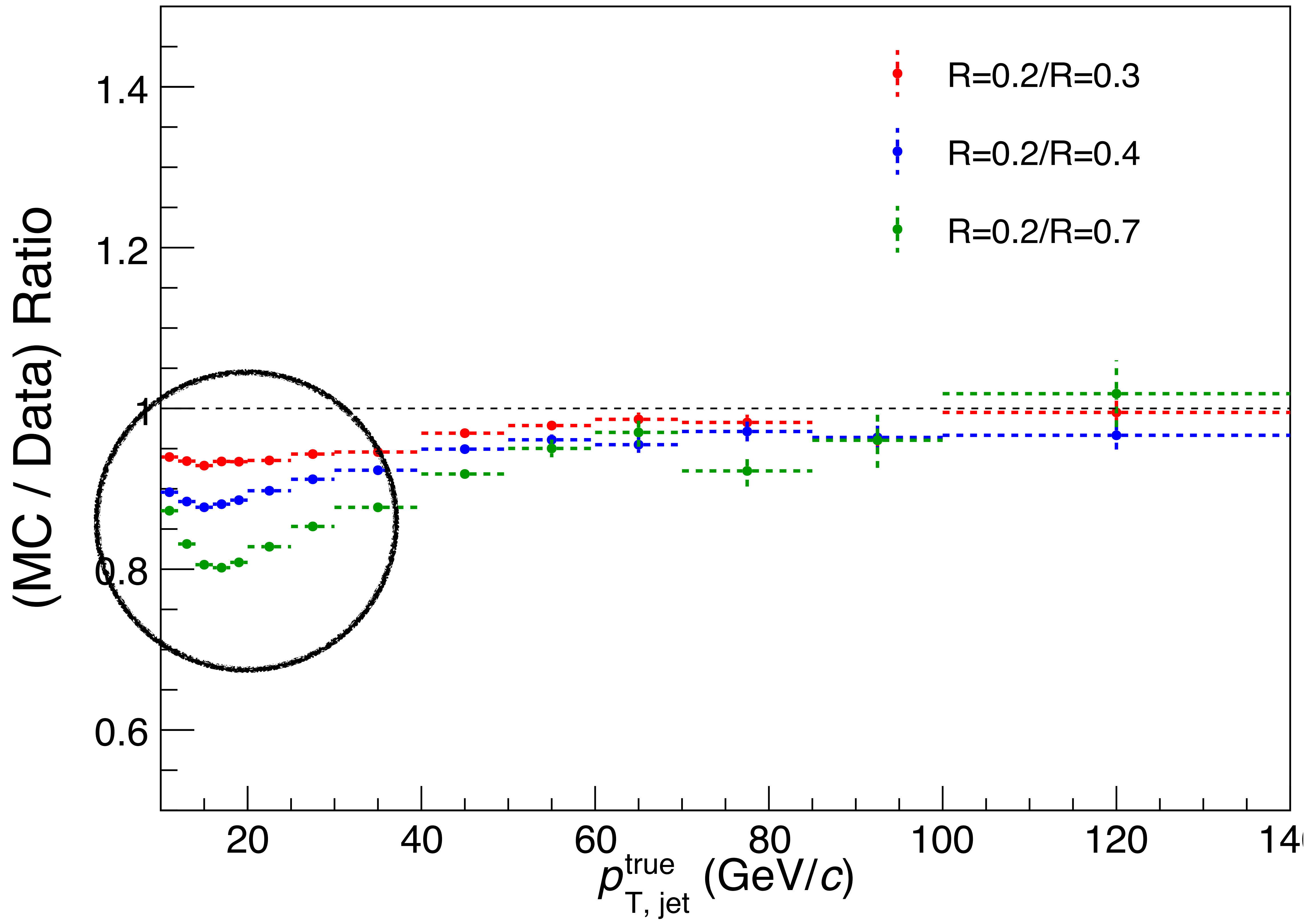
Results: invariant yields with various R



- **R-ratio results of invariant yield (3rd, 4th).**
  - Ratios show better consistencies with MC than absolute yields.
- **High-pT behavior:**
  - Differences shrink as jets become dominantly hard-scattered.
- **Further interpretation required:**
  - Model variations (hadronization, UE/NP, etc.) needed to disentangle underlying mechanisms.

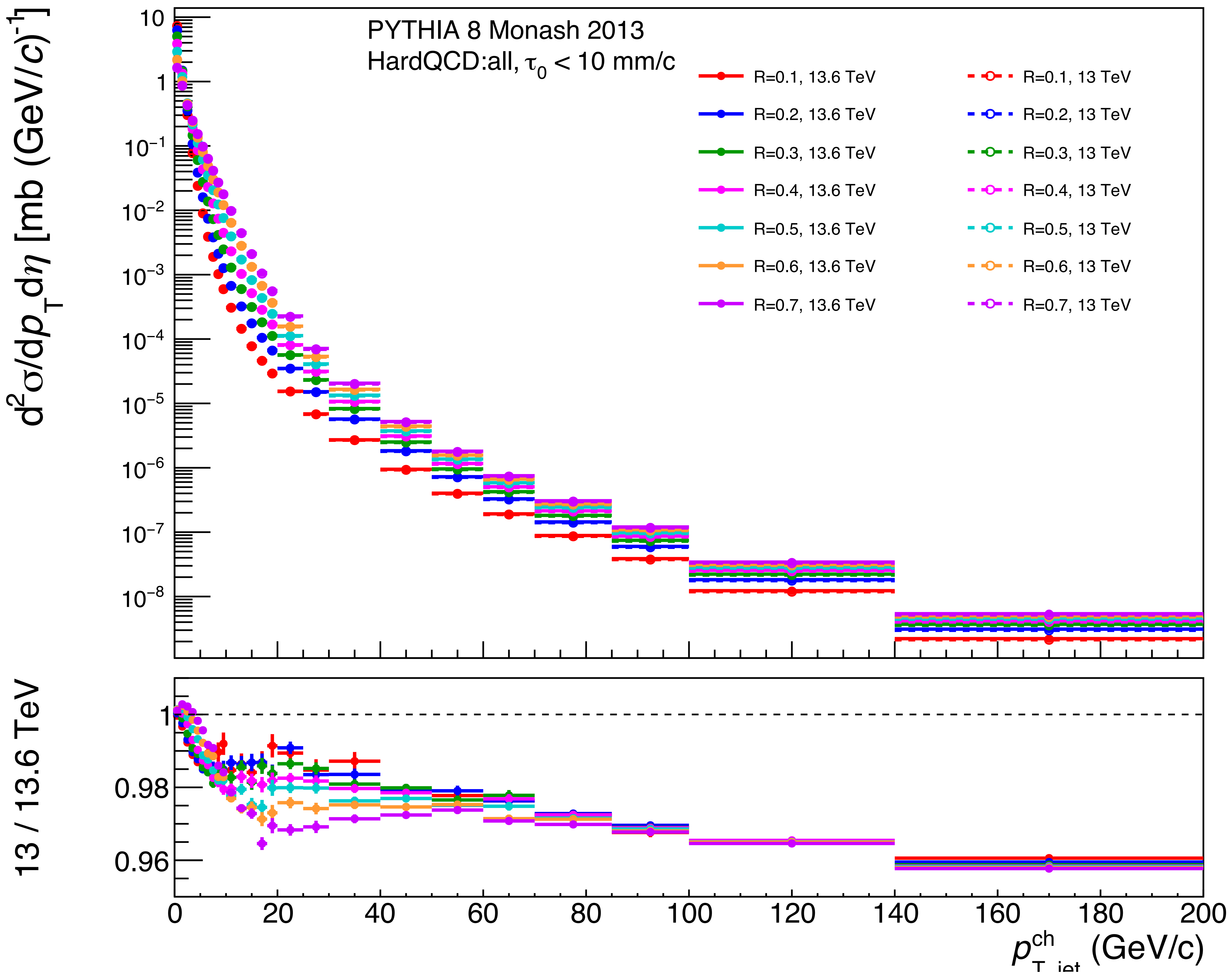
Results: invariant yields with various R

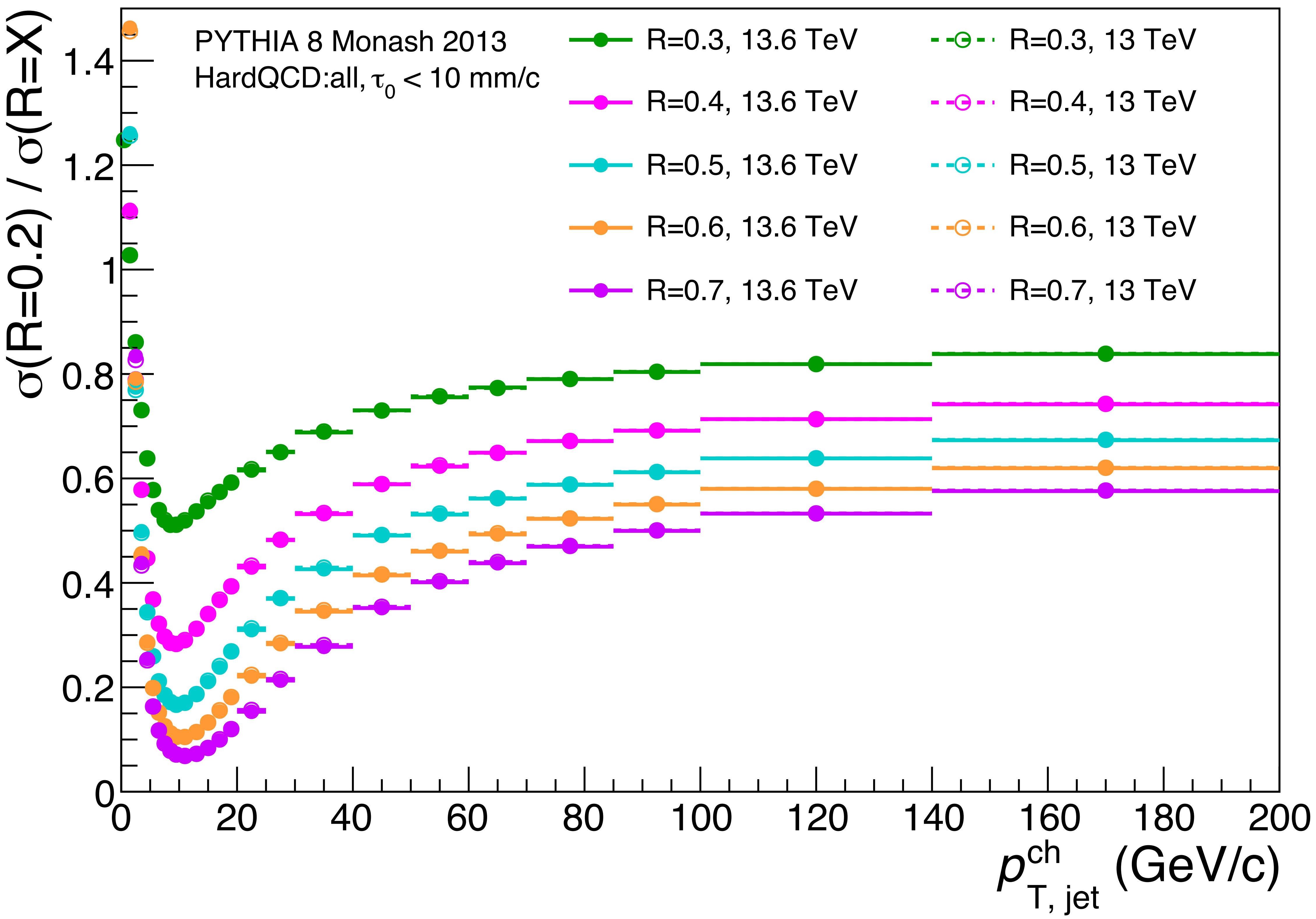




- R-ratios (0.2/0.3, 0.2/0.4) are generally align with Run 2 (13 TeV) and PYTHIA8.
- Low-$p_{T,jet}$ and large R (0.7) dicrepancies, mostly driven by NP effects, would enhance model-discriminating power.

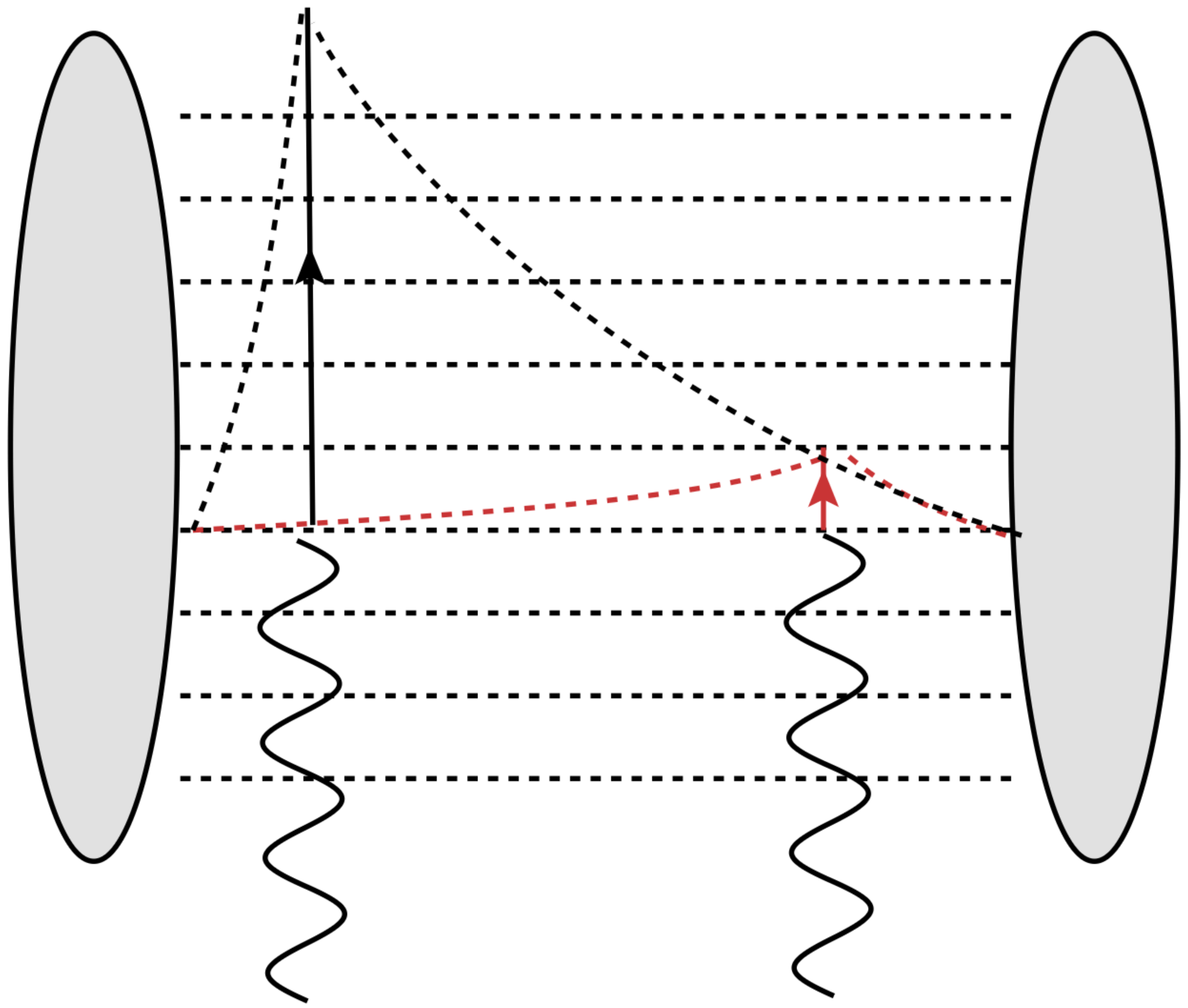
Model studies: PYTHIA8

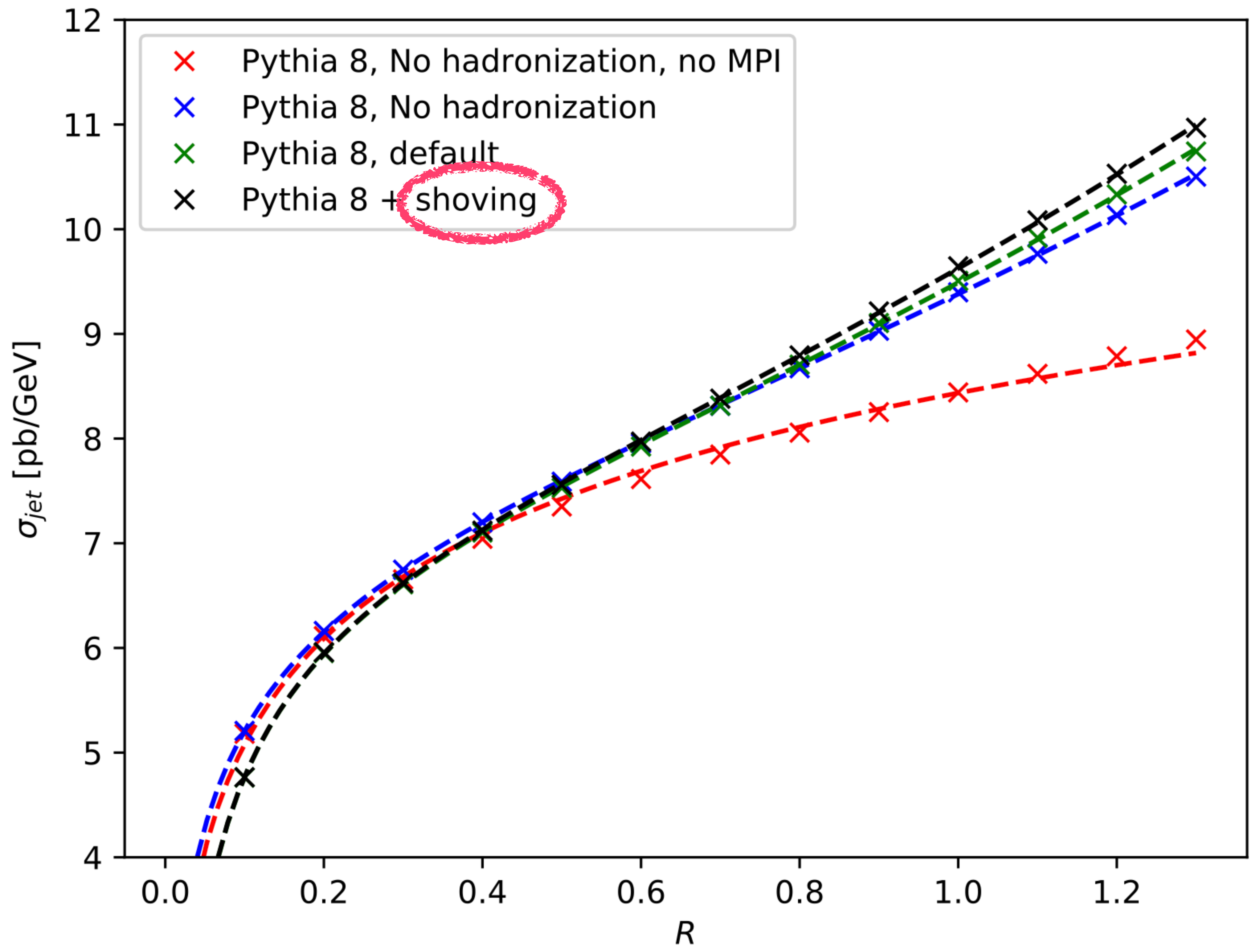




- PYTHIA8 (LO, Lund string) used as a standalone generator to provide a framework-independent baseline.
  - Discrepancies between Run 3 might not come from their beam energy fraction.
- Additional pQCD model variations (hadronization, UE, MPI) are being explored to assess model sensitivity.

Model studies: PYTHIA8 + others





- For example, shoving model explain small system collectivity with FSR via repulsive string interactions
- Expected to be discriminating in large *R*.

Outlook

- A paper proposal targeting HP 2026 (June) is planned.
- A dedicated talk on jet fragmentation observables (jT) is foreseen, in collaboration with Jaehyeok.

Resources	Estimation	5 < pT < 6	85 < pT <
Tracking	Jet reconstruction after	**5.2** (4.2)%	**11.6** (8.2)%
Unfolding	Prior dependence	**3.0%**	**21.6%**
	Method dependence	**0.1%**	**0.8%**
	Iteration dependence	**0.4%**	**0.9%**
	Jet pT bin dependence	Negligible (”)	
	MC closure	**5%**	
	Subtotal	**6.5** (0.2) %	**27.5** (4.5)%
Track pT	~~w/o track tuner~~ ~+50%	**0.5%**	**~8** ~~24.9%~~
Secondarie	TSallis fit: $p_{\mathrm{T,jet}} \pm 1\ \%$	**5** (1.7 ~ 2.6)%	
Normalizat	Luminosity, other	**10** (1.6)%	
Total	Quadrature sum	**13.9** (7.2)%	**29.1**

*(Run 2)

Week	Monday	Conferences	Conferences / CERN	ALICE	Paper campaign	Public note campaign
1	29/12					
2	05/01				IRC approval, EB rev start	
3	12/01					
4	19/01			Mini-week	Collab round 1 start	
5	26/01		Dune Collab. School	SQM approval		
6	02/02		Winter School	ALICE 3 days	Collab round 1 end	EB/ARC review
7	09/02		CMS week			EB/ARC review
8	16/02		ATLAS week	Mini-week		EB/ARC review
9	23/02		LHCb week	Muon week	Collab round 2 start	Collaboration round
10	02/03	LHCC 2-5 Mar		SQM follow-up	Collab round 2 end	Collaboration round
11	09/03			SQM follow-up		
12	16/03		HEPCAP/DPG	SQM rehearsals	arXiv submission	CDS submission
13	23/03	SQM26	Council week	SQM26	SQM26	SQM26
14	30/03		KITP week	Mini-week		
15	06/04	DIS2026			IRC approval, EB rev start	
16	13/04		CPOD at CERN			
17	20/04				Collab round 1 start	
18	27/04	RRB 27-29 Apr		HP (+LHCP) approval*		
19	04/05		HECAP	ALICE 3 week / Boards/ CB	Collab round 1 end	EB/ARC review
20	11/05		Council week	LHCP rehearsals / S&C days (Wed-Fr)		EB/ARC review
21	18/05	LHCP26	CHEP 23-29 May			EB/ARC review
22	25/05		CHEP 23-29 May		Collab round 2 start	Collaboration round
23	01/06	LHCC 1-4 Jun		HP follow-up	Collab round 2 end	Collaboration round
24	08/06		CMS week			
25	15/06		ATLAS week	HP rehearsals	arXiv submission	CDS submission
26	22/06	HP26	Council week	HP26	HP26	HP26