Ξ-hadron correlations with ALICE and PYTHIA

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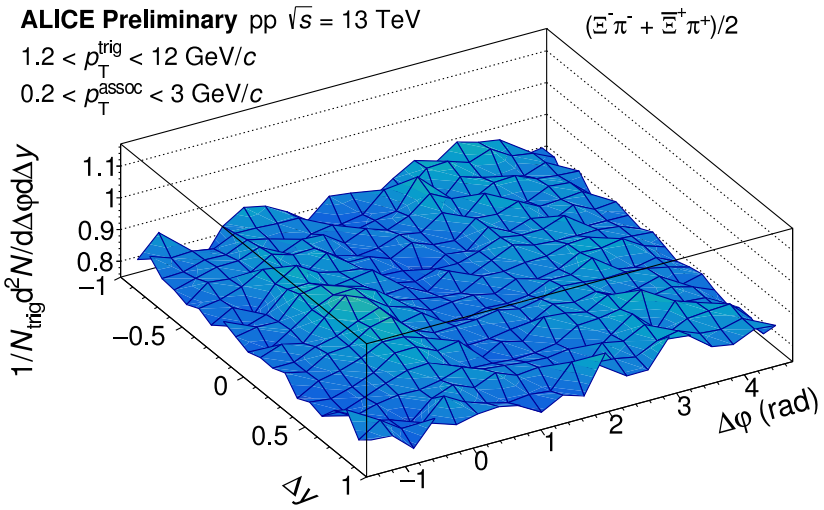
- Follow-up on presentation given on 12 February: indico.lucas.lu.se/event/1422
- New results today: resolved $\Xi - \Lambda$ correlations in PYTHIA, simulations of $\Xi - \Xi$ correlations
- Configuration files available at the Indico page

Motivation

- Angular correlations are studied to determine where hadrons are produced in the event
- Different mechanisms have different signatures: near-side jet peak, away-side ridge, near-side ridge, etc.
- In this analysis, the Ξ baryon is used as a trigger to study strangeness production
- $\Xi - \mathrm{K}$ correlations are used to probe strangeness, with $\Xi - \pi$ correlations as a reference to disentangle jet-like effects and the underlying event
- Strange quarks and hadrons produced late in the event $\Longrightarrow$ strong near-side peak in $\Xi - \mathrm{K}$ correlations
- Strange quarks produced early in the event and hadrons later $\Longrightarrow$ weaker correlations
- Ongoing work to extend to $\Xi - \mathrm{p}$, $\Xi - \Lambda$, and $\Xi - \Xi$ correlations to understand strange baryon production - hiearchy with increased strangeness content?

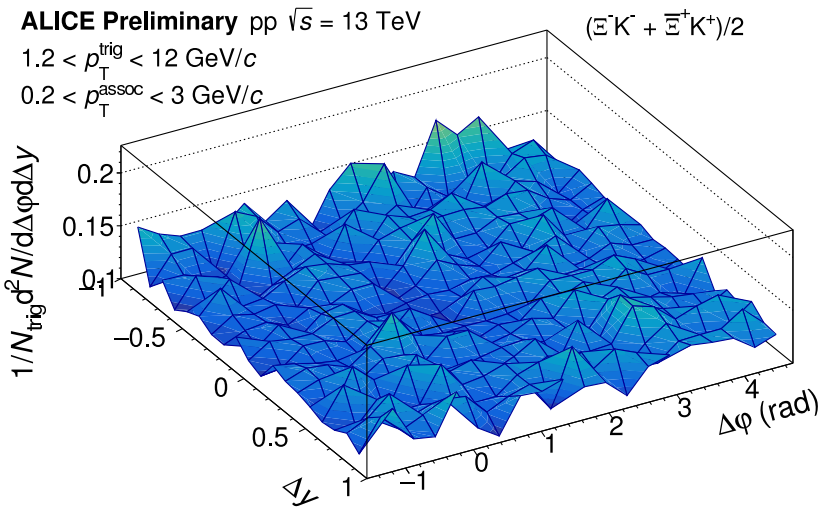
Recap: $\Xi - \pi$ and $\Xi - \mathrm{K}$ correlation results

Same sign pions:



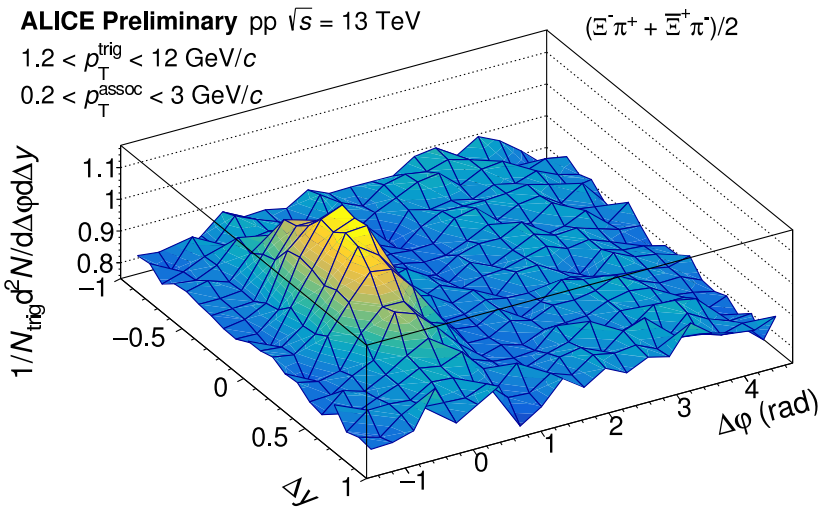
ALI-PREL-333364

Same-sign kaons:



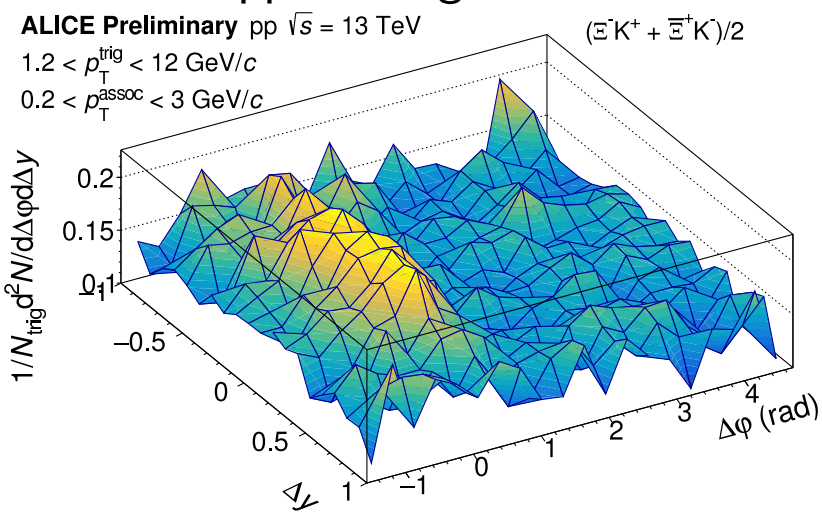
ALI-PREL-327485

Opposite-sign pions:



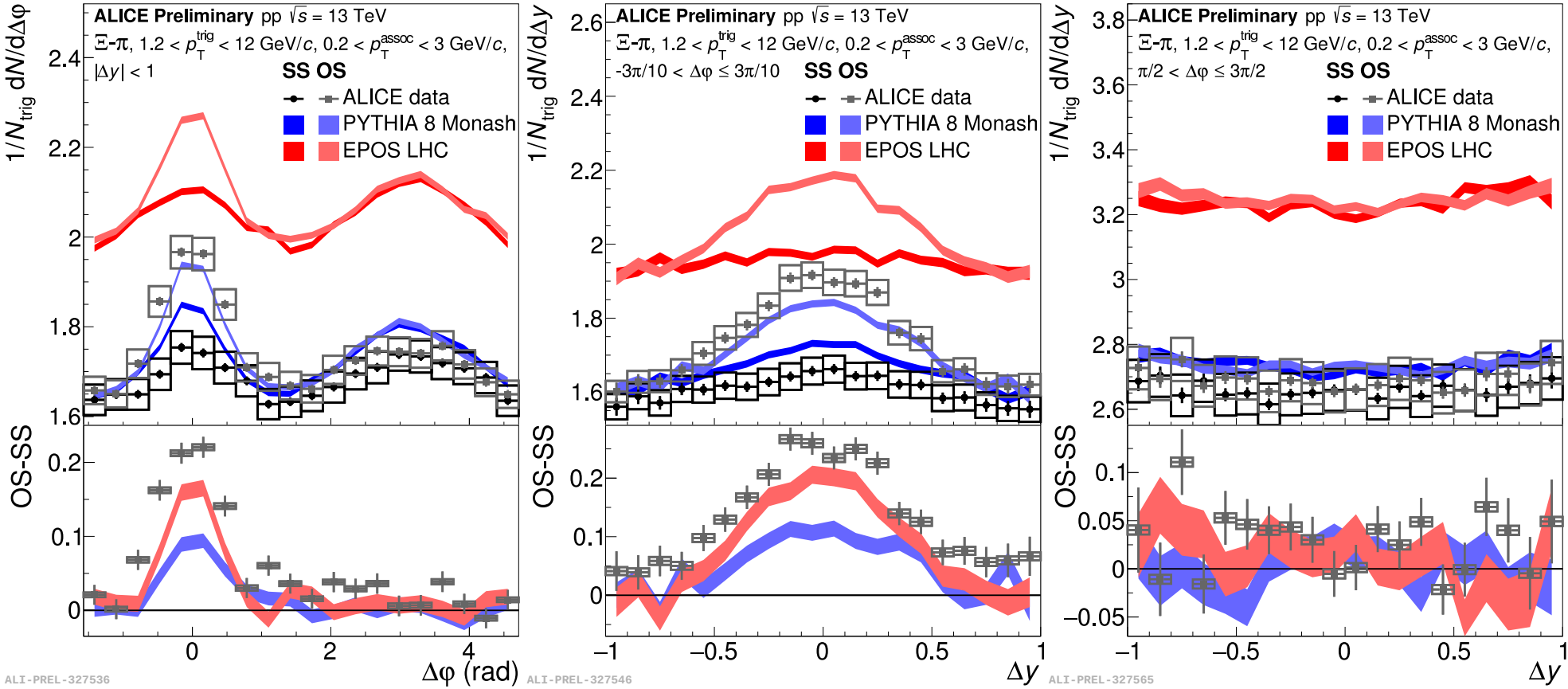
ALI-PREL-327490

Opposite-sign kaons:



ALI-PREL-327500

Recap: $\Xi - \pi$ correlations, projections

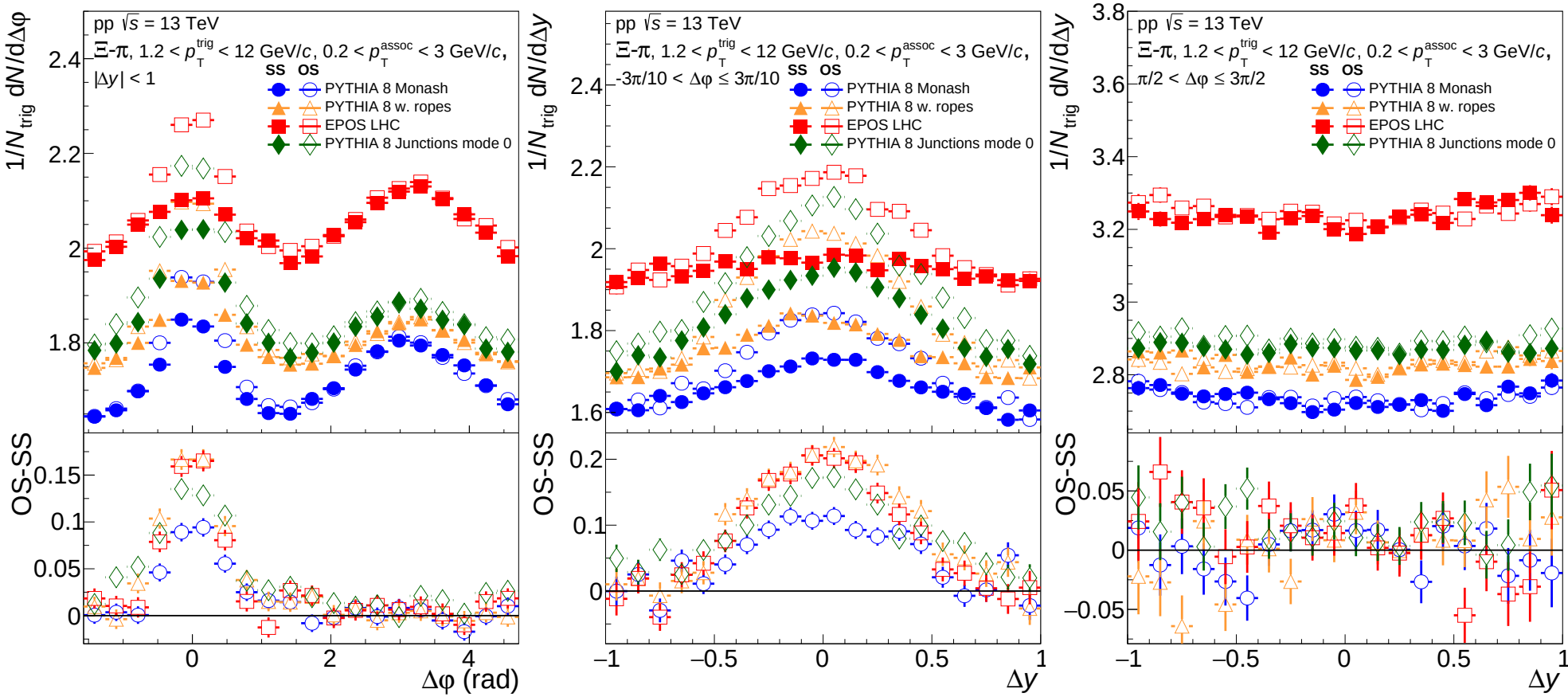


Results quite well described by both PYTHIA and EPOS, but:

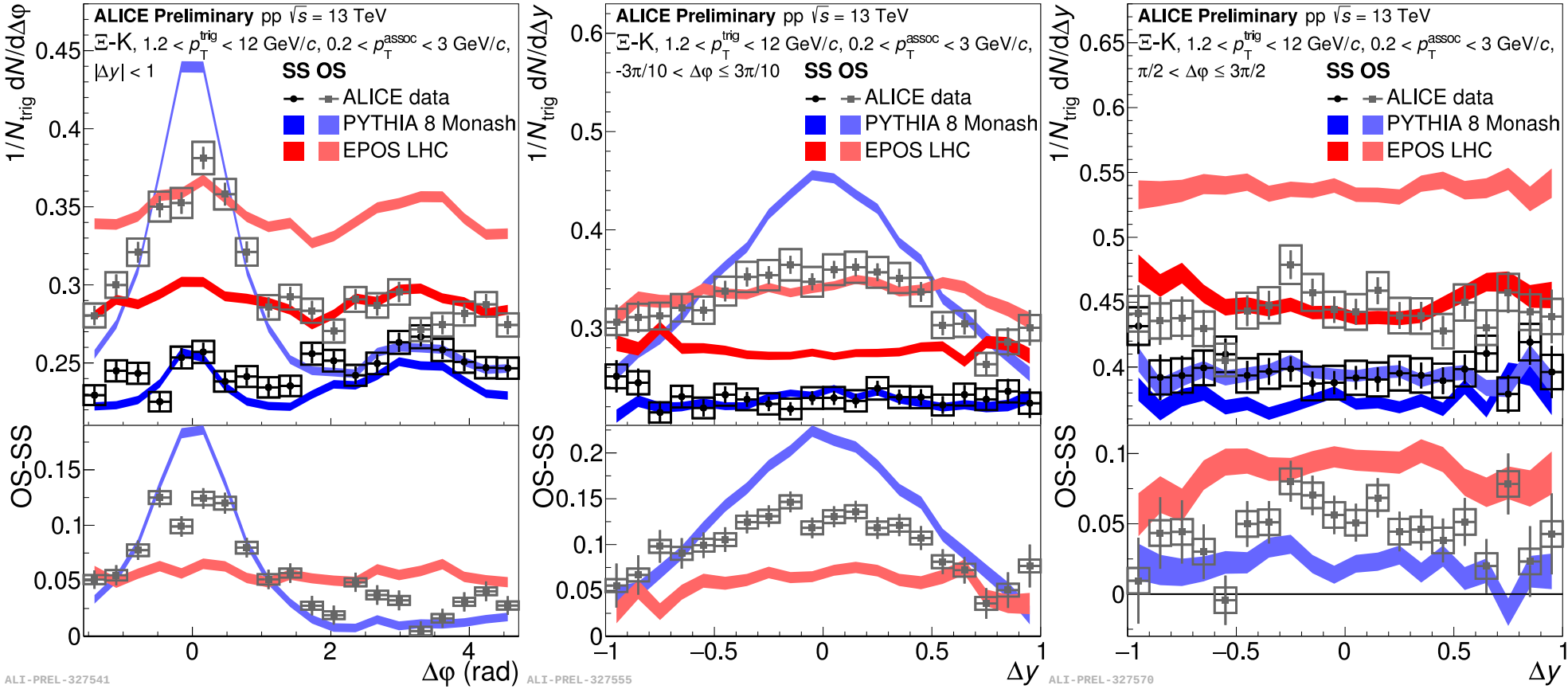
- PYTHIA does better quantitatively
- OS-SS difference better described by EPOS

Recap, simulation results: $\Xi - \pi$ correlations

Here also including rope and junction extensions

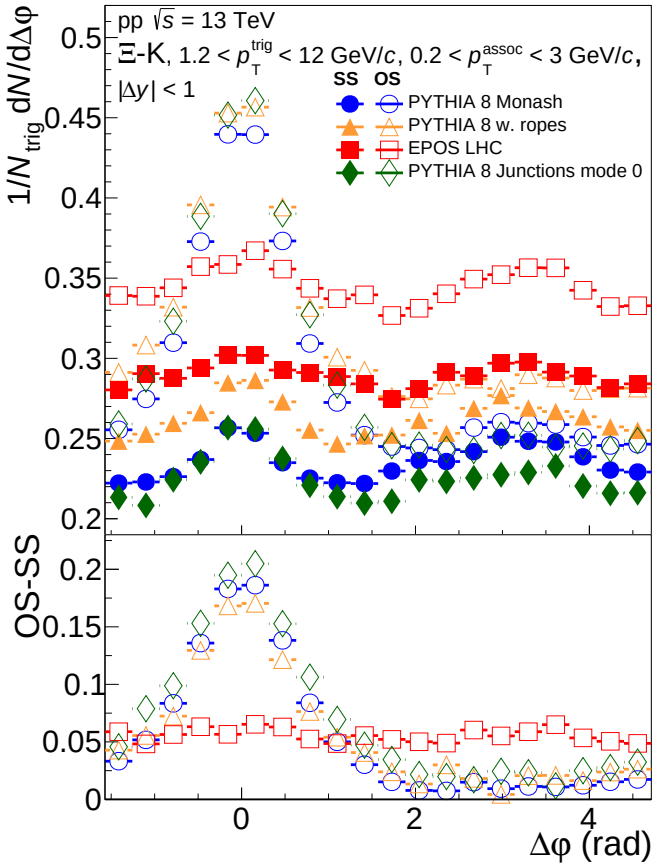


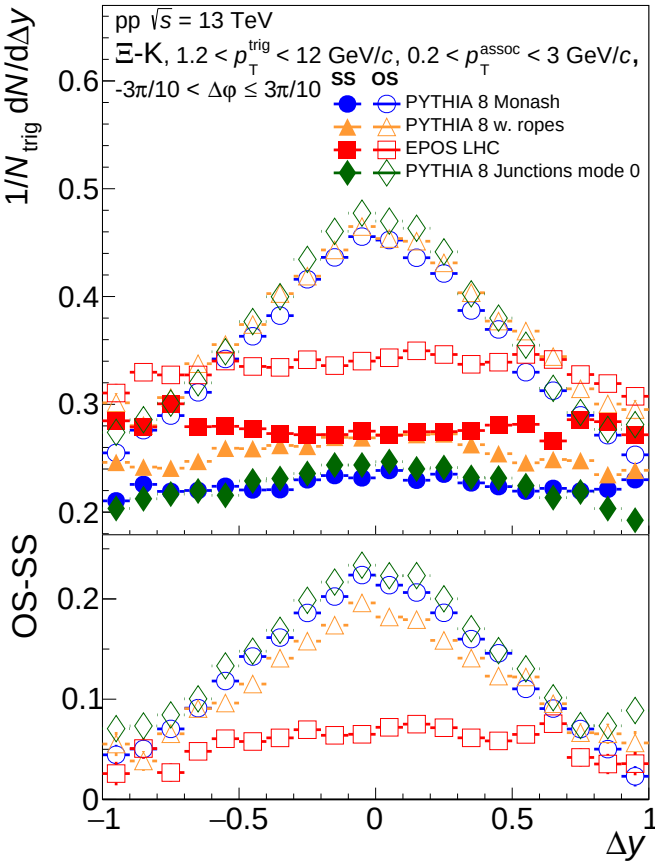
Recap: $\Xi - K$ correlations, projections

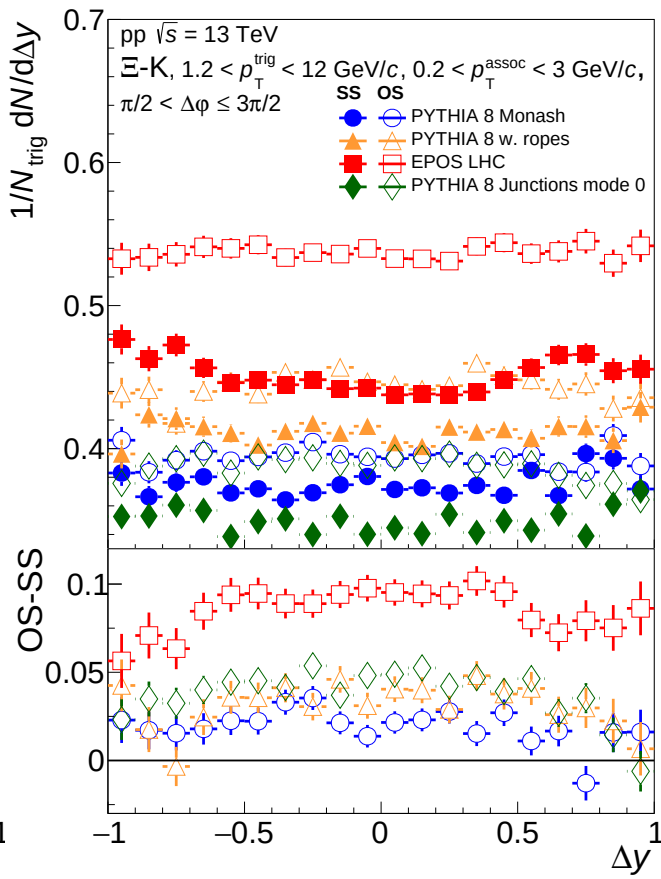


- ALICE results significantly less correlated than in PYTHIA, indicating collective behaviour
- EPOS results have practically no structure, likely due to lack of local strangeness conservation $\Longrightarrow$ clearly different than in data

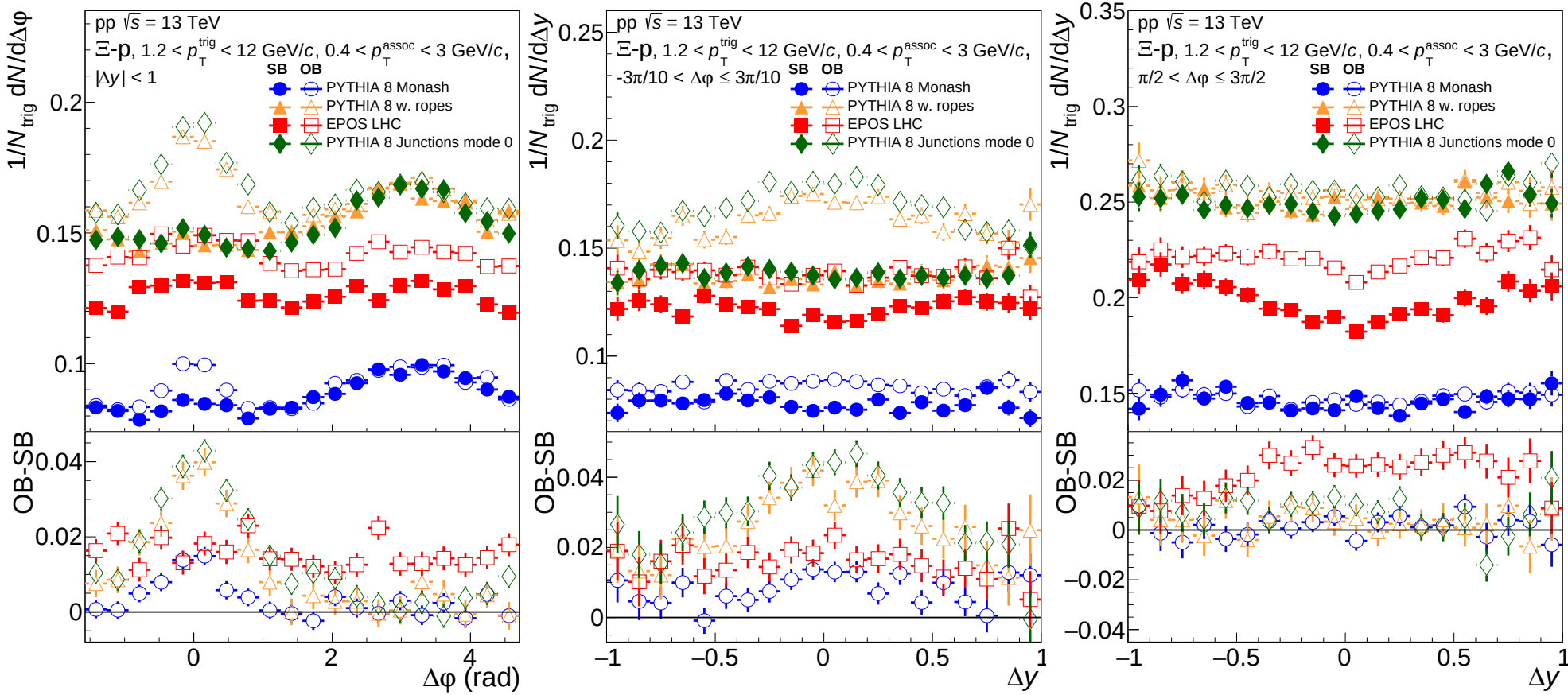
Recap, simulation results: Ξ – K correlations



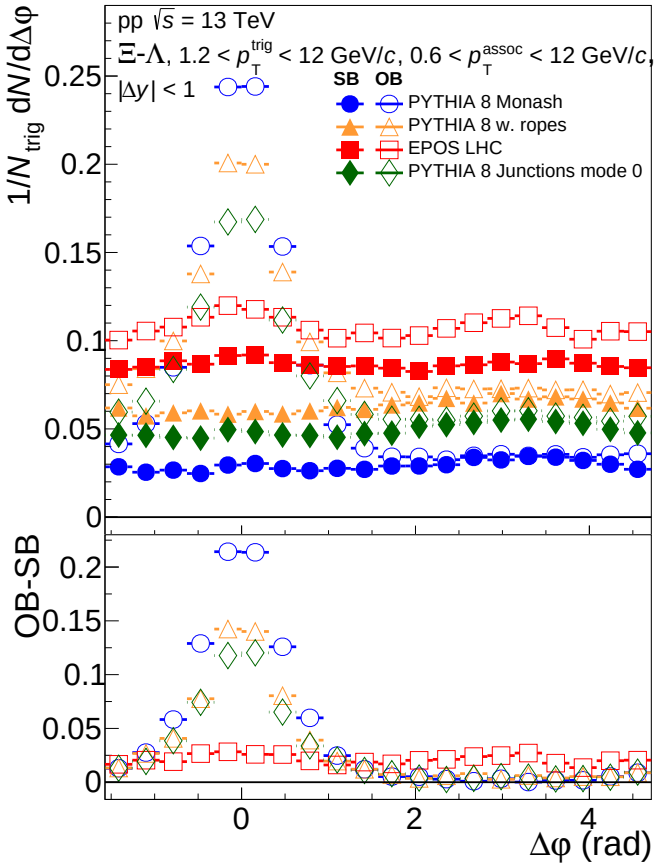


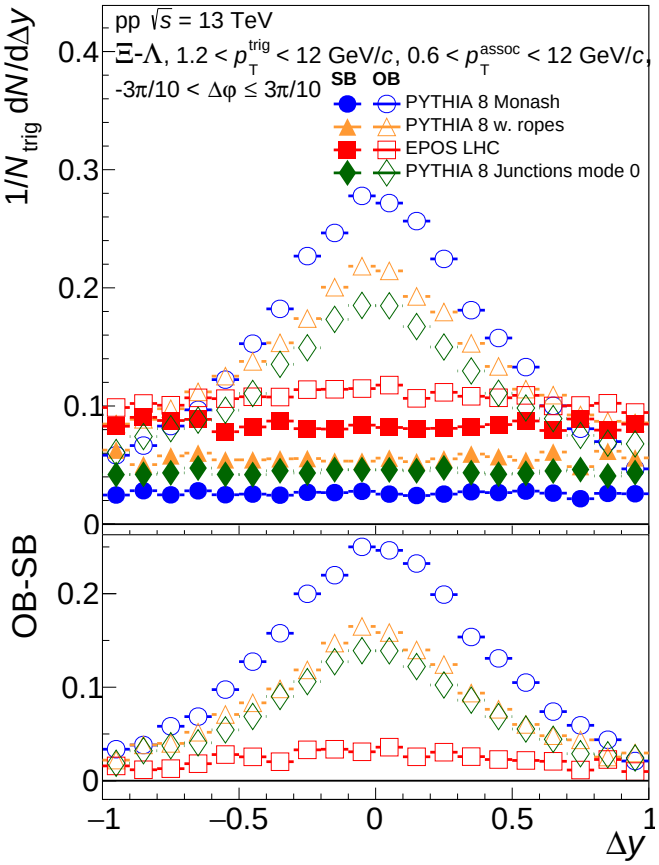


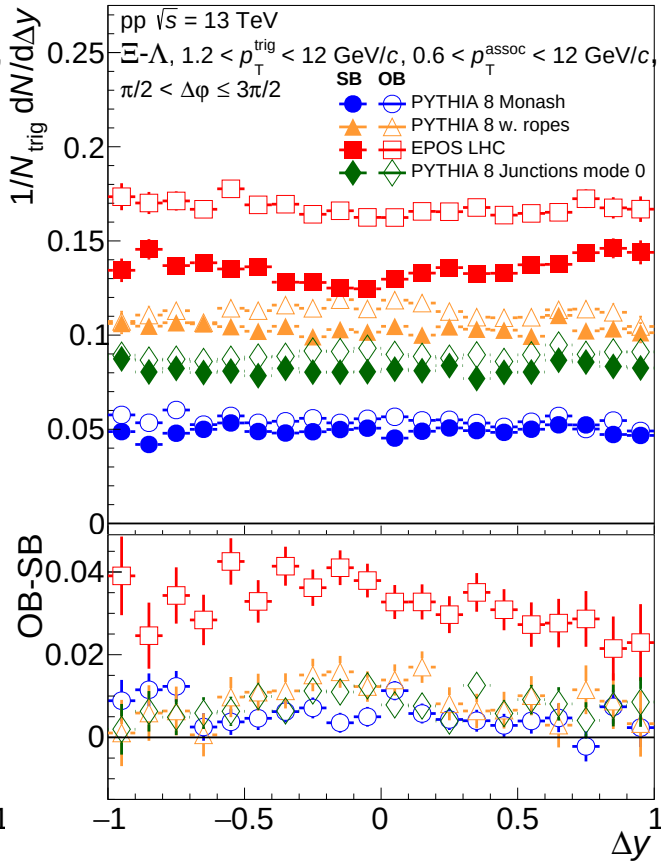
Recap: $\Xi - \mathrm{p}$ correlations (simulations)



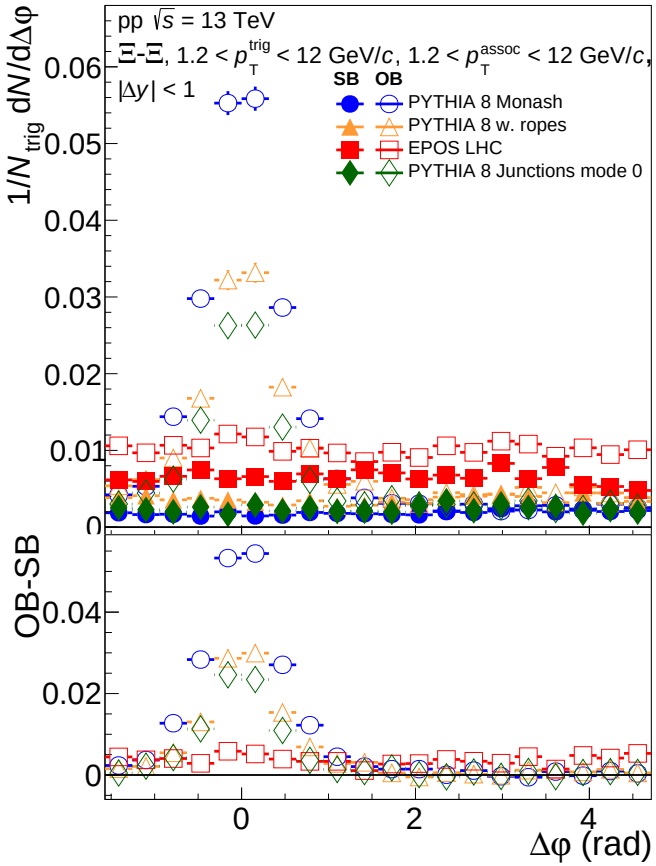
Ξ – Λ correlations (simulations)

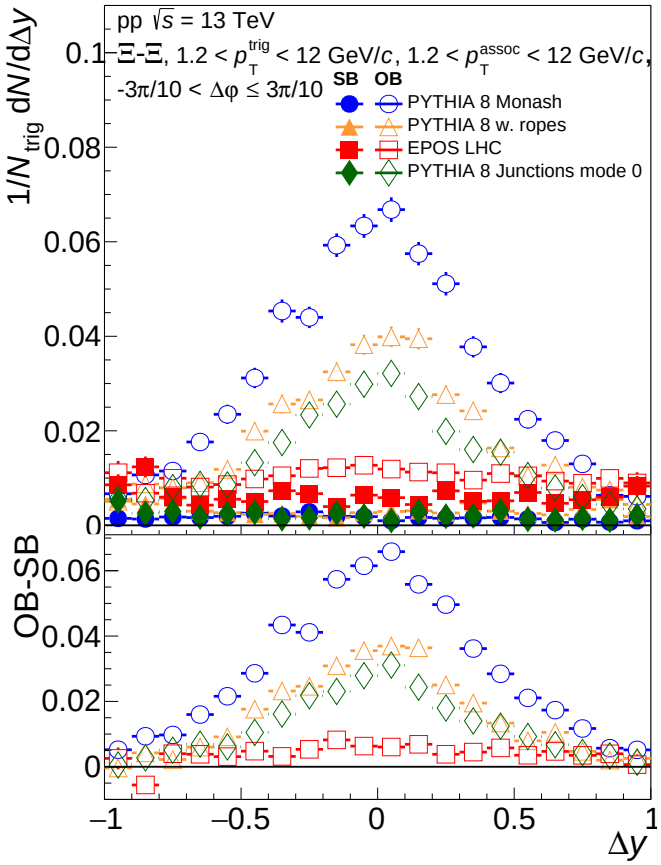


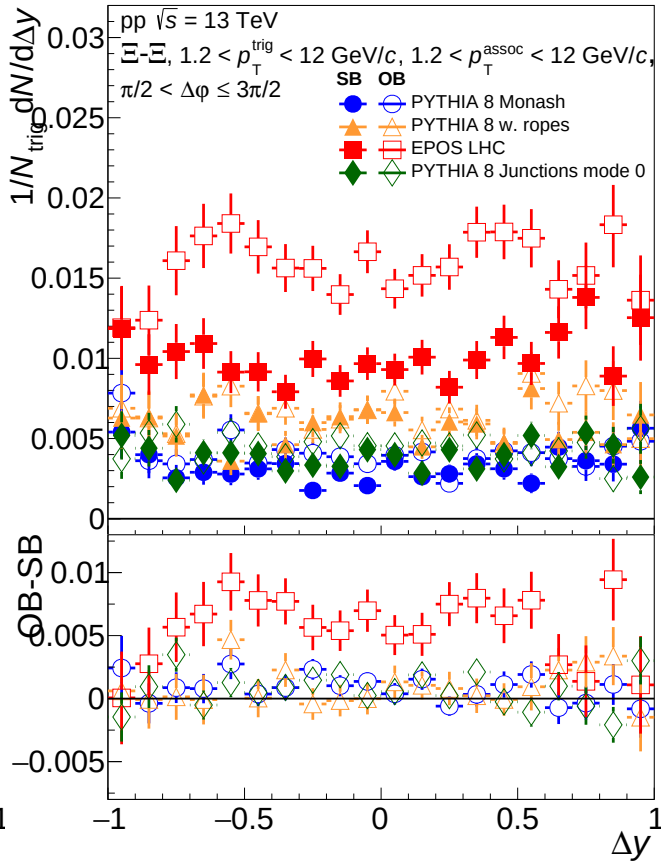




Ξ – Ξ correlations (simulations)







Conclusions

- $\Xi - \pi$ correlations are dominated by underlying event and minijet fragmentation, described quite well by both PYTHIA and EPOS, including PYTHIA extensions
- $\Xi - \mathrm{K}$ correlations are more smeared out than in PYTHIA (including extensions) but correlations are not nearly as weak as in EPOS
- Indicates both collective effects and local strangeness conservation, and that EPOS currently does not get correlations right
- Rope and junction models give very similar results, the addition of ropes seems to not affect the correlations much