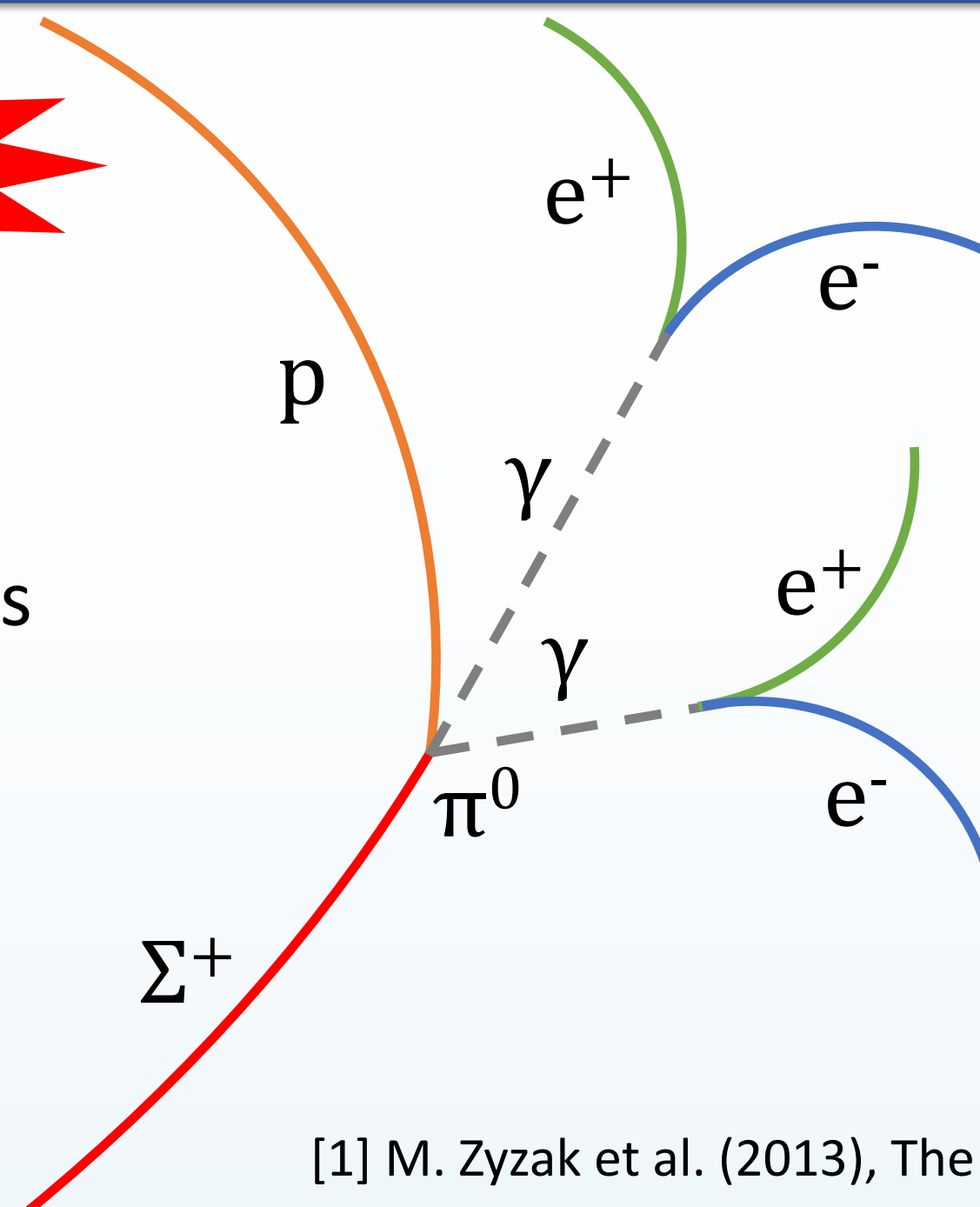


Introduction

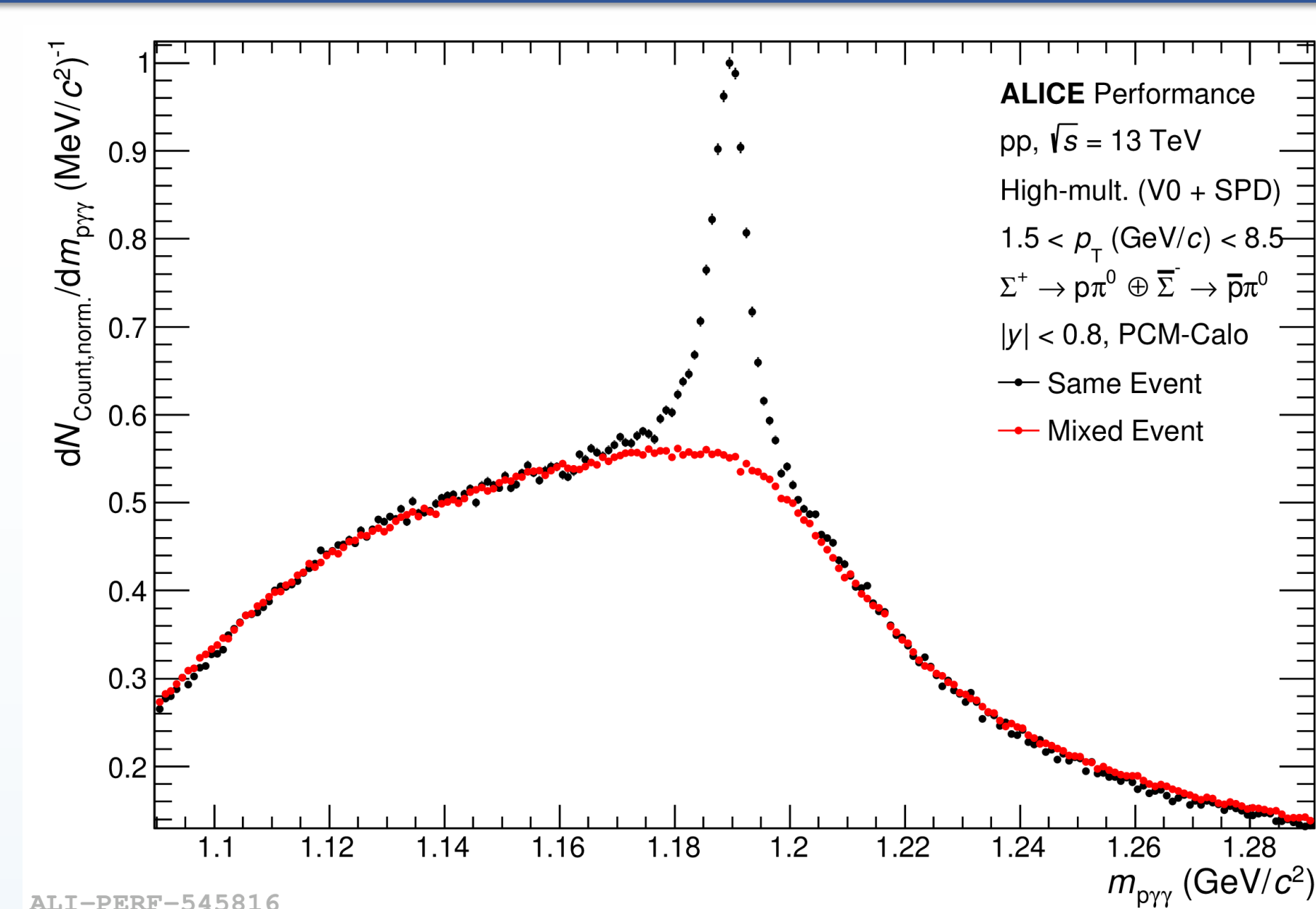
- Strangeness production not well described by common Monte Carlo generators
- The measurement of Σ hyperons is an important constrain to the models
- Experimental data on Σ production is scarce, in particular at LHC energies

Reconstruction

- Decay channel:
 $\Sigma^+ \rightarrow \pi^0 + p$ (BR = 51.57%)
 $\pi^0 \rightarrow \gamma + \gamma$ (BR = 98.82%)
- Photons reconstructed from conversions (PCM) or in the calorimeters
- Secondary vertex reconstruction with KFParticle[1]
- Novel energy correction is applied to improve calorimeter resolution

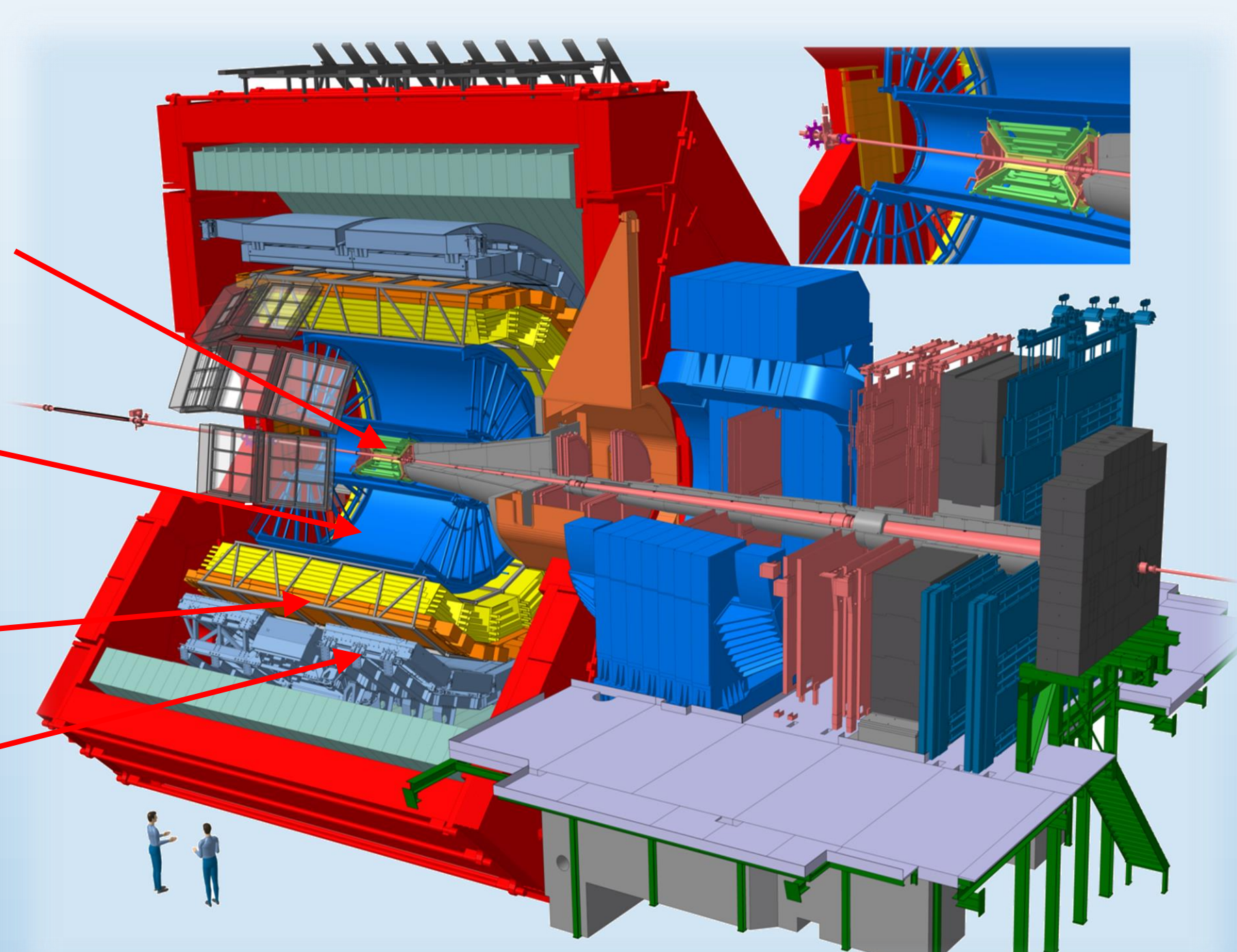


[1] M. Zyzak et al. (2013), The KFParticle package for the fast particle reconstruction in ALICE and CBM



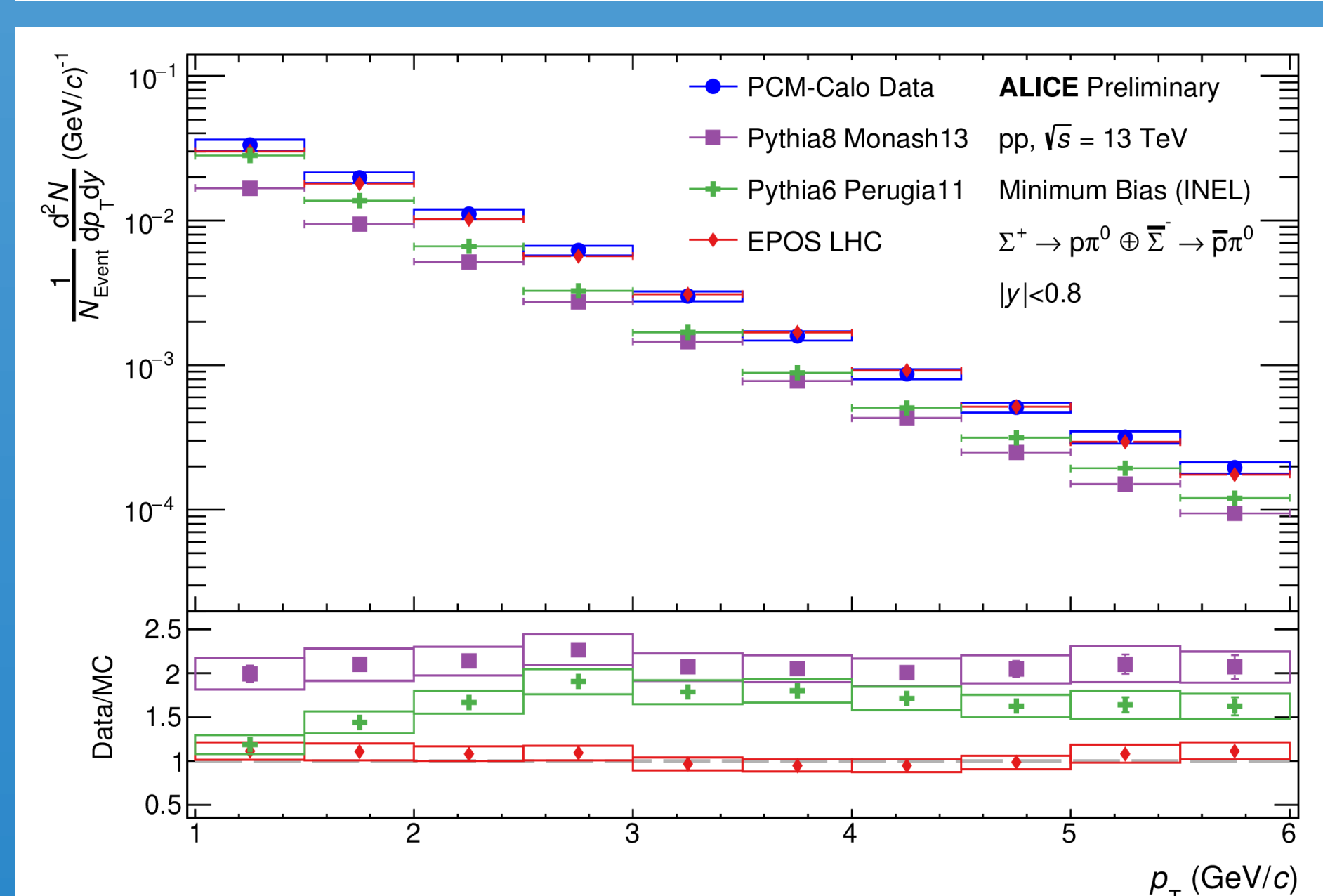
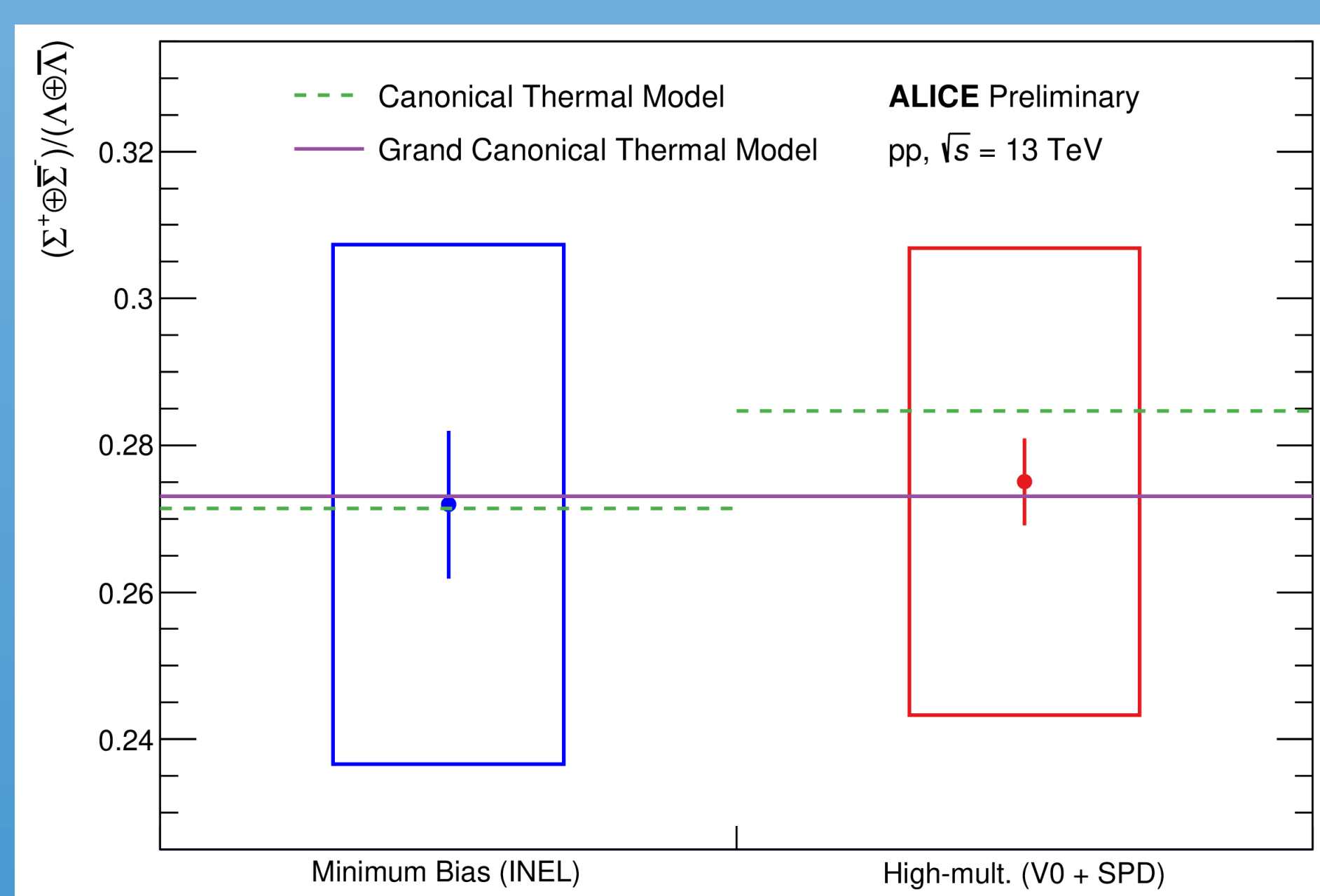
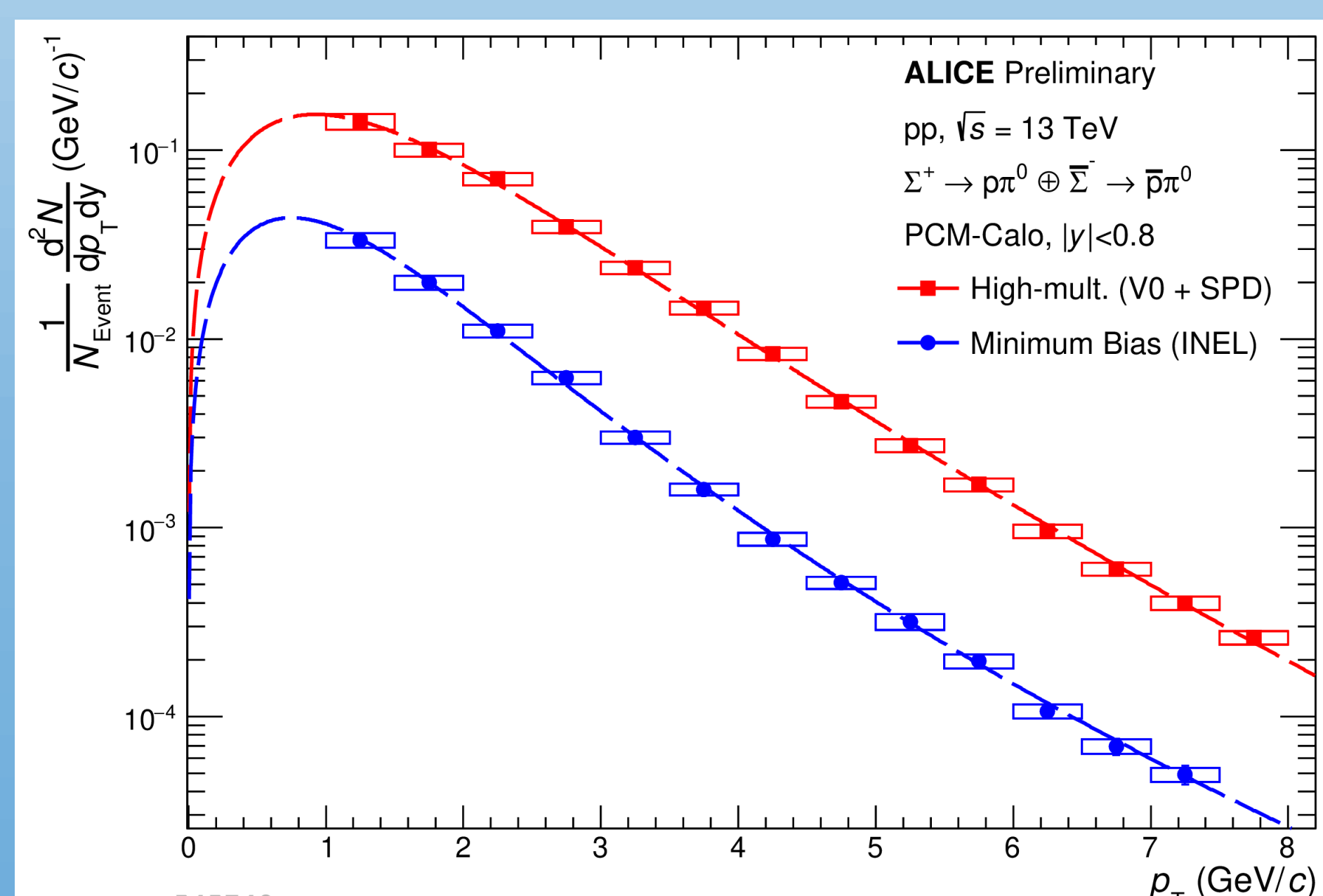
ALICE detector

- Inner Tracking System (ITS) → vertex reconstruction
- Time Projection Chamber (TPC) → tracking + PID
- Time Of Flight (TOF) → PID
- Calorimeters → photon measurement



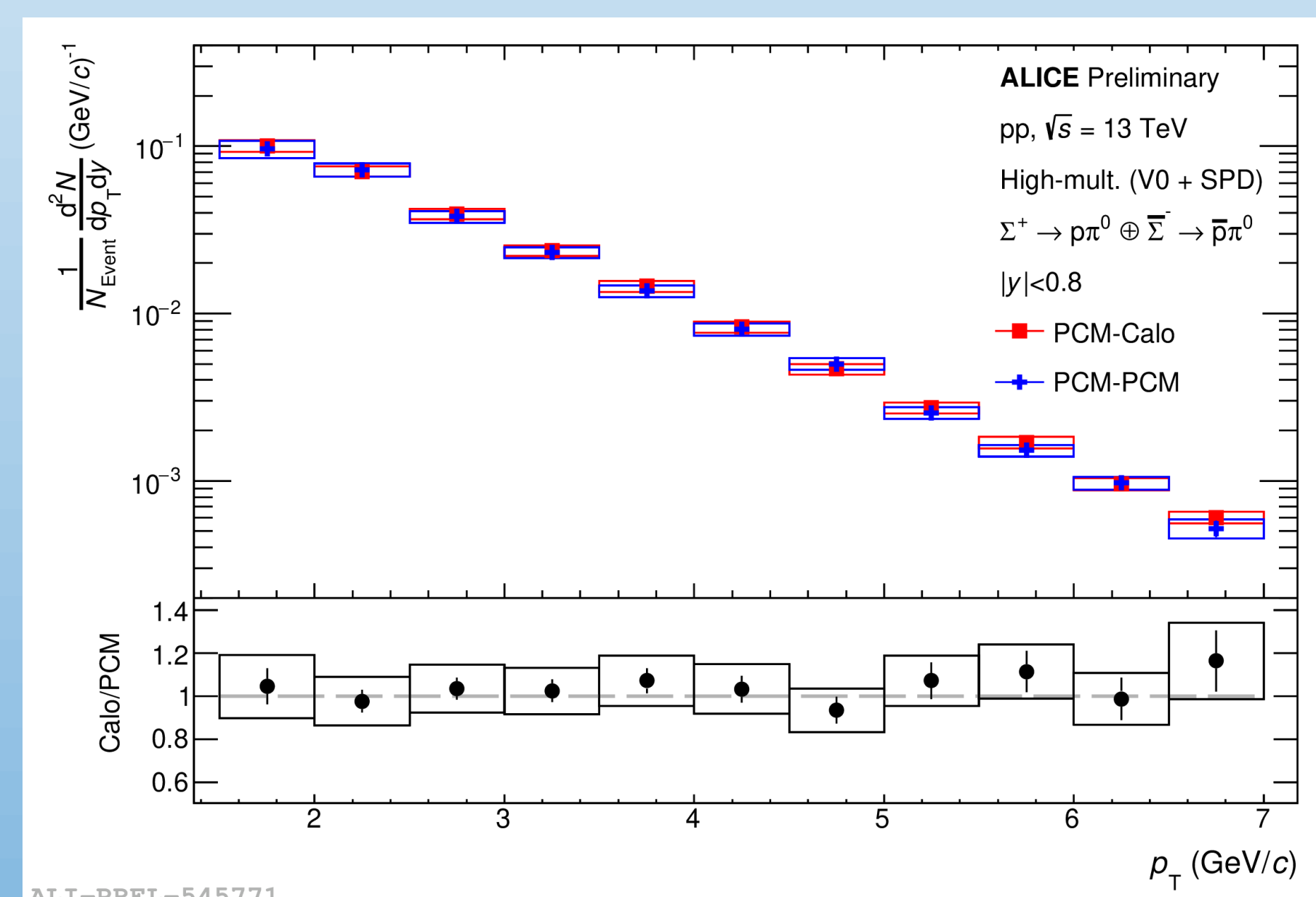
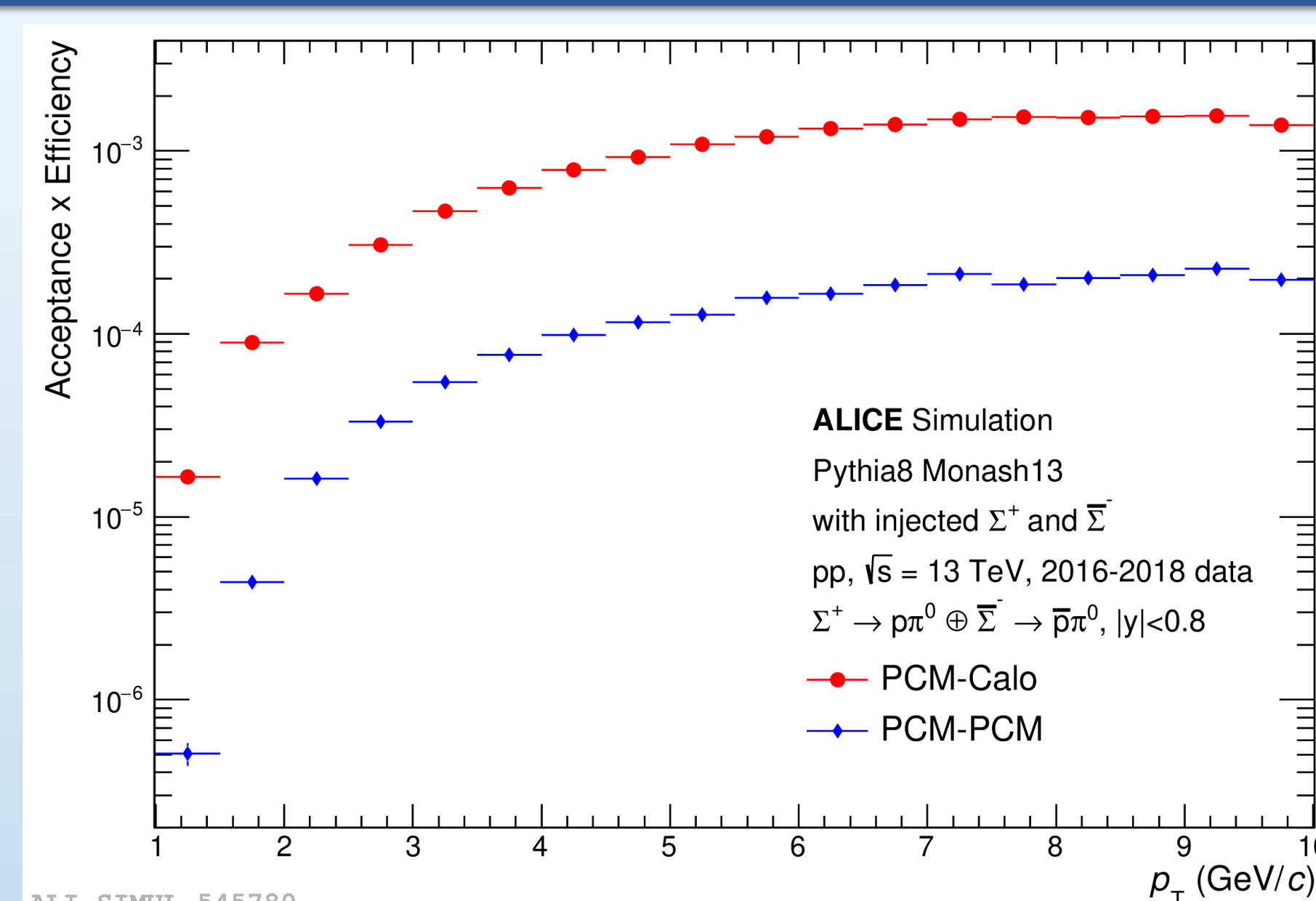
Integrated yields and model comparisons

- The p_T -spectra are measured using two trigger classes with a low and high charged particle multiplicity
- The p_T -spectra are fitted with a Levy-Tsallis function to extract the integrated yield down to $p_T = 0$
- The ratios of Σ^+ and Λ yields do not change significantly with multiplicity and are in good agreement with predictions from canonical and grand canonical thermal model calculations
- The spectral shape is well reproduced by EPOS and Pythia8
- The yields are well described by EPOS, but underestimated by both versions of Pythia

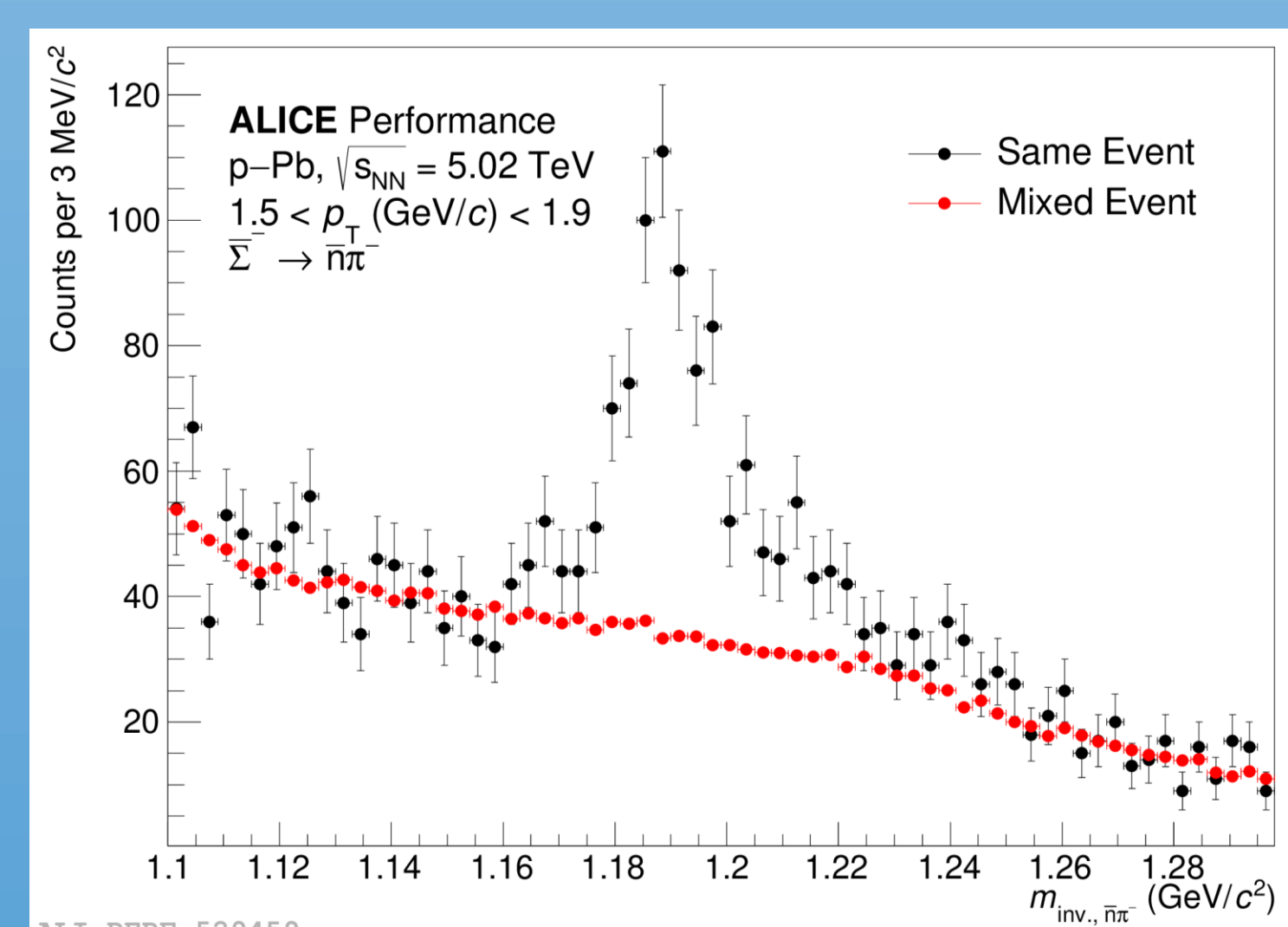


Efficiency

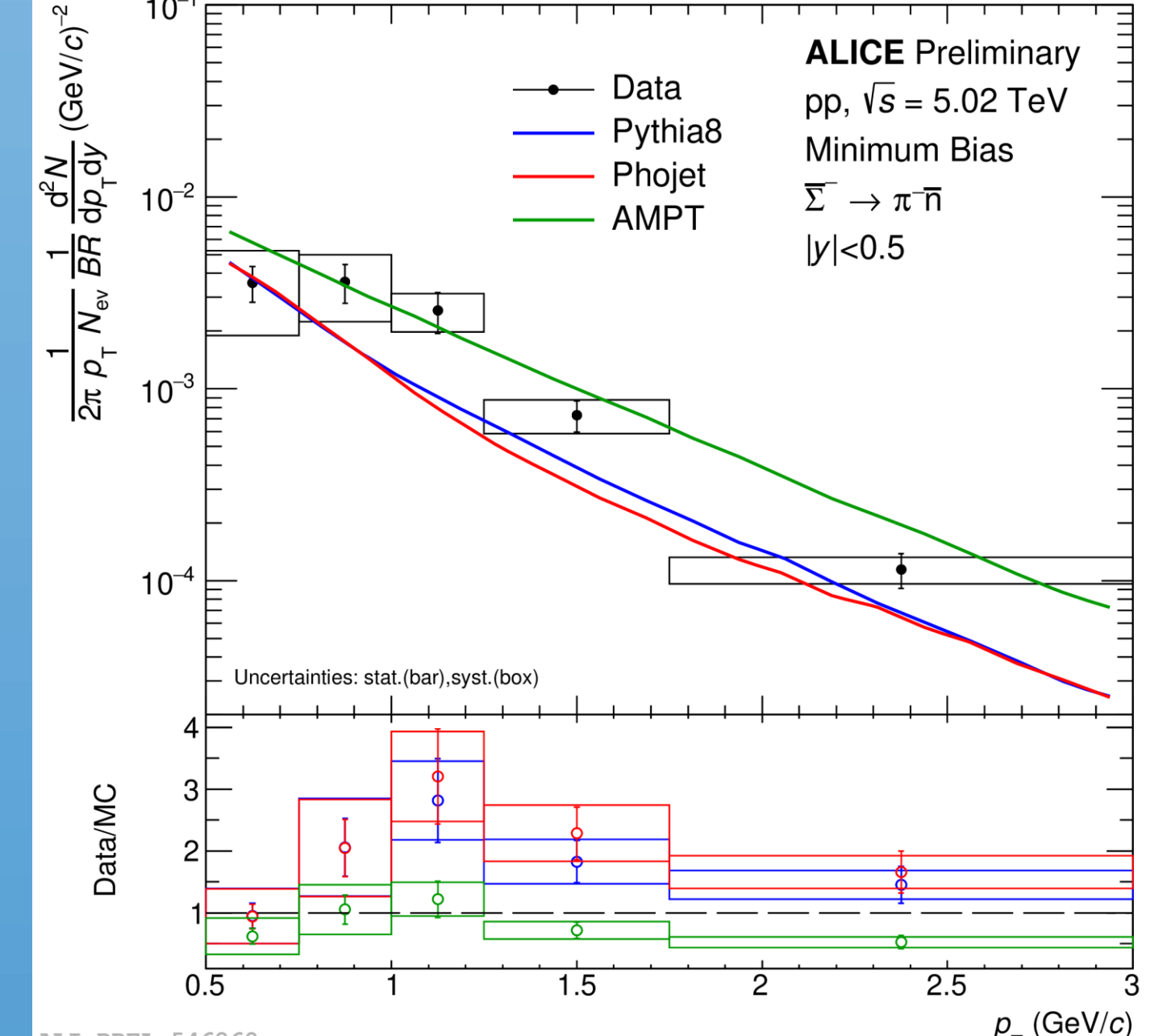
- Efficiency includes branching ratio, conversion probability (~6%), reconstruction efficiency & acceptance
- Combined method using calorimeters and PCM has about one order of magnitude higher efficiency than PCM-only
- Absorption in the detector material is found to be negligible for $p_T > 1$ GeV/c
- The PCM-PCM and PCM-Calo methods are compared as a cross-check and show good agreement within the uncertainties



Further measurements



- A complementary measurement exploits the decay into a charged pion and an anti-neutron which is measured in the PHOS calorimeter



Outlook

- Run 3 will not only provide more statistics but additionally enables the reconstruction of charged Σ via a kink topology using the upgraded ITS2 detector allowing an extension of the Σ measurement
- The reconstruction of Σ^+ gives access to the poorly known p- Σ interaction via femtoscopy and provides valuable input for nuclear theory and astro-physics, particularly on the EOS of neutron stars

